Evaluation of the implementation of the use of work equipment directive and the amending directive to the use of work equipment directive in the UK

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This report summarises the evaluation of the implementation of the Amending Directive (95/63/EC) to the Use of Work Equipment Directive (89/655/EEC) (AUWED) in the UK, as enacted in the Provision and Use of Work Equipment Regulations 1998 (PUWER 98) and the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER). The evaluation describes how organisations responded to the regulations, the costs and benefits, compliance problems and difficulties, and areas of improvement in the regulations and Approved Codes of Practice (ACoPs). It concludes that there is a reasonable level of awareness and compliance with the regulations. The regulations are regarded to be an improvement over previous regulations and offer benefits such as improved equipment safety and flexibility. Many of the new requirements for seatbelts, etc. only came fully into force in December 2002 and the full benefit has not been seen in a reduction in injury rates. Similarly, there are no apparent changes in defect rates or productivity; however, few firms appear to have taken advantage of the flexibility offered by the regulations to change practices. Improvements could be made such as clarification of "competent" person and the meaning of thorough examination / inspection.

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EXECUTIVE SUMMARY

Background and purpose of this report

This report summarises an evaluation of the implementation of the European Union’s Use of Work Equipment Directive (UWED) and its amending Directive (AUWED). UWED was originally implemented in the UK as the Provision and Use of Work Equipment Regulations 1992 (PUWER 92). In the UK these directives are now implemented primarily via the Provision and Use of Work Equipment Regulations 1998 (PUWER 98) along with the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), and the supporting ACoPs. The focus of this report is on the newer (1998) requirements of AUWED, in particular requirements with respect to:

- Inspection of equipment;
- Thorough examination of lifting equipment;
- Mobile work equipment, and;
- Organising lifting operations.

It is reasonable to suggest that the main intended benefits of health and safety regulations such as PUWER and LOLER are to reduce the number and severity of injuries, as well as to introduce more efficient and effective regulation. In theory this benefit may be detected via accident trends. However, PUWER and LOLER did not represent a step-change in the extent of regulatory requirements, rather a gradual evolution, and many of the key provisions did not come into effect until December 2002. Indeed the Health and Safety Executive’s cost-benefit assessment of PUWER 98 indicated that the main benefits in terms of lives saved would only accrue from December 2002 onwards, primarily because the main provisions for mobile equipment did not come fully into effect until this date.

The findings of this report are intended to form a part of the UK’s five yearly report to the EC, and allow an assessment of any need to amend the supporting ACoPs.

In particular, the evaluation aimed to:

- Provide a robust assessment of costs and benefits, taking account of counterfactual factors;
- Satisfy the EU’s evaluation and reporting demands for the five year report on AUWED’s (and the 10 year report on UWED’s) implementation, and;
- Identify areas for amendments / revisions of the regulations and ACoPs.

Scope

With these aims in mind, the scope of issues explored by the study included:

- To what extent are employers aware of and have taken steps to meet the provisions of PUWER / LOLER?
- What problems are employers and workers encountering with these regulations?
• What are the compliance costs for PUWER / LOLER?

• What are the benefits of PUWER / LOLER, including the employers’ perceptions and from injury rates?

• Has the change from sector specific ‘prescriptive’ regulations to a more broadly applicable and more goal oriented set of regulations (supported by an ACoP) been successful?

• What has been the impact of the supporting ACoP and guidance (L22, L113, L112, L114 and L117) and what are the areas for amendment / revision?

• What would have happened if the Regulations had not been introduced?

**Background to PUWER / LOLER and AUWED**

PUWER 98 applies to the provision and use of all work equipment including mobile and lifting equipment, in all workplaces. Specific requirements for lifting equipment and lifting operations are enacted by LOLER. Since 1992 PUWER has covered all aspects of the safety of “work equipment”, the scope of which is very broad (examples include hammers, knives, circular saws, laboratory equipment, and lifting equipment).

There are hardware requirements of providing safe work equipment in PUWER 98, such as protecting against the risk from mobile equipment rolling over or overturning by (for instance) the provision of rollover protective structures). The regulations also cover many aspects of managing the safe use of work equipment. For instance, they require the selection of suitable equipment for the job, maintenance, inspection, adequate information and training for operators. This aspect is unchanged from the 1992 regulations. Likewise LOLER covers a range of requirements for equipment, but specifically those aspects which ensure lifting operation safety.

As with many other health and safety requirements, PUWER 98 and LOLER cannot be considered in isolation. The Management of Health and Safety at Work Regulations 1999 require a risk assessment to be carried out in order to identify the measures that should be taken to comply with the range of requirements of the work equipment regulations. This should identify the factors to be taken into account in deciding what should be done to comply with PUWER 98 and LOLER.

**Methodology Overview**

*Exploratory discussions*

The research began with a review of the regulations and literature to identify key changes, those affected and current issues.

Exploratory interviews were then conducted with those likely to be affected or to have a view on those affected. Twenty four interviews were conducted with a variety of HSE staff, a range of equipment users, suppliers and their representatives, as well as those providing related services such as inspection / thorough examination or training.

These exploratory discussions identified some of the emerging issues and enabled the design of more structured and targeted interviews to elicit more detailed information, including information about what data on costs might be available.
**Case studies**

The latter exploratory work allowed more targeted and in-depth interviewing to take place. The interview style in the next stage was, therefore, more structured and more detailed, but still relatively open questioning. All case studies and further discussions were guided by case study proformas.

The case studies had a number of aims:

- To acquire examples of compliance costs (and cost savings);
- To document examples of how firms responded to the regulations, including case studies of benefits and costs;
- To elicit opinion on the perceived benefits of the regulations;
- To acquire some “rich” feedback on the ACoPs and guidance, and;
- To acquire some “rich” feedback on the impact and effectiveness of the regulations.

In addition, there was an ongoing dialogue with a range of trade associations and key inspection firms who were able to supply information to support the cost-benefit analysis, including for instance estimates of the number of items of pertinent equipment in the UK, such as the number of forklift trucks and dumper trucks in the UK, cost of various modifications or PUWER training courses, etc.

These case studies, therefore, gave an in-depth understanding of the issues, and allowed hypotheses to be developed which could then be tested by the postal survey. They also allowed the collection of detailed information about what actions were taken in response to the legislation and the development of cost benchmarks for those actions.

**Postal survey**

A postal questionnaire was then designed and piloted with a sample of the target respondents. Earlier phases of work established the main target respondents were equipment users, equipment hirers / suppliers, and organisations providing equipment inspection services.

The postal survey provided a statistically robust sample of responses that could be used to:

- Quantitatively test “hypotheses” developed during the earlier consultation phases of work (e.g. testing what proportion of duty holders do not understand CE marking, gathering evidence about the numbers taking certain types of action, etc.);
- Allow comparisons between sizes\(^1\) of companies, and also between those more and less affected by the regulations. (Please note that throughout this report “size” refers to numbers of employees), and;
- Provide estimates of the proportions of firms that enacted various changes, for use in the costing exercise.

\(^1\) Small firms are considered to have 1-49 employees, Medium 50 to 250, and Large over 250 employees.
Each of the three groups were asked about how they responded to the regulations, perceived costs and benefits, and their understanding and awareness of the regulations. The users were asked about the equipment they used. Suppliers and inspectors were asked an additional question about their customers’ understanding.

The questionnaire was designed to acquire information on:

- The effectiveness and benefits of PUWER 98 / LOLER;
- The impact of differences between PUWER 98 and PUWER 92;
- What employers would have done without PUWER 92 and 98 / LOLER;
- Information on other factors that may have influenced safety performance in the use of equipment (such as increasing automation);
- Measures of what employers (including equipment hire companies) have done in response to PUWER 92 and 98 / LOLER;
- Feedback on how PUWER 98 / LOLER ACoPs can be improved;
- Information on amount and types of equipment.

**The Sample**

The response rates were:

- 499 equipment users responded (from 3500 questionnaires sent out) within the five week deadline. This constitutes a 14% response rate.
- 72 suppliers / hirers responded (from 500 questionnaires sent out), again a 14% response rate.
- 7 of the 12 inspection companies replied by the deadline – representing 50% of these types of firms in the UK.

A sample of 499 users provides a statistically robust sample, with acceptable margins of error. In the case of inspection firms, whilst the sample is small in absolute numbers, because it represents 50% of the total number of these firms in the UK, it is robust.

**Costs**

Analysis of the postal questionnaire sample, combined with information gained from earlier work – cost benchmarks, UK equipment stock, costs of modifications, etc. – therefore allowed conclusions to be drawn regarding issues arising from compliance, unit costs for actions and the scaling up of these costs to national cost of compliance estimates.

**Benefits**

The assessment of benefits was achieved as follows:

- Judging from a review of the regulations how they may have impacted accident rates and productivity;
- Reviewing the HSE’s pre-implementation assessment of costs and benefits;
- Soliciting opinion from consultees during the early discussions and case studies about how the regulations may have impacted safety and productivity;
- Asking respondents to the Stage 3 postal survey their perception of the benefits;
- Analysing injury rates using the HSE’s database of injuries reported to them under Reporting of Injuries Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) to determine if they changed after the implementation of the regulations;
- Reviewing the influence of economic activity on injury rates.

**Accident analysis**

In order to determine any changes in the causes of reportable accidents, an analysis of enforing authority fatal and major injury accidents, and dangerous occurrences (DOs) investigations reports was undertaken.

A framework for categorising contributory causes of accidents / DOs was developed so that factors could be compared before and after PUWER 98 / LOLER. Each investigation report was examined in detail for contributory causes. Our analysis considered whether compliance with provisions of PUWER 98 (for instance, rollover protective structures) would have reduced the chances of an injury, regardless of what the legal requirements were at the time.

Those accident “kinds” (HSE’s categorisation) which were in any way related to the issues addressed by these regulations, which were in any way related to the issues addressed by these regulations, were identified for as many years as were available (1996-2001). For fatalities, all relevant accidents were examined. For major injuries, accident samples of 150 before and 150 after December 1998 were taken to assess differences. Relevance to PUWER was first assessed, and for those where PUWER was at least partially relevant, contributory causes were then analysed.

The analysis comprised the calculation of the proportion and rates of deaths classed as “PUWER preventable” and examining data for trends in percent and rates by year for each sector and for all sectors. Statistical tests were carried out to examine any differences in trends before and after PUWER 98.

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2 Fatal, major injury accidents and dangerous occurrences are reportable incidents, as defined in The Reporting of Injuries Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). It is a requirement to report them to the appropriate enforcing authority, usually the Health and Safety Executive or the Local Authority.

3 1996 was the year that HSE’s current database came into use in the field, and 2001 is the most up to date data available. (The local authority unit reported that there were no relevant fatalities in the period.)
Counterfactual & valuing benefits

A counterfactual case is an assessment of what would have happened had the regulations not been implemented. The intention was to correlate numbers and rates of deaths with economic activity indices as injury rates tend to increase with economic activity. The level of employment has been used as an indicator of economic activity. Estimates of the degree of variation in injury rates associated with economic activity have been produced and, for some categories of data, used to predict the number of injuries that would be expected before and after the change in regulations. The predicted number of injuries and the trend in rates is compared with the reported number to inform the judgement of how the regulations impacted injury rates.

Any reduction in deaths and injuries is translated into a nominal financial value by applying a value per averted death and major injury.

Comparison of costs and benefits

This involved drawing all elements of the research together, including:

- A comparison of the “net costs”, with benefit associated with discernable changes in the accident rate due to PUWER / LOLER.
- Summarising respondents’ self-assessment of compliance, effectiveness and cost-benefit.
- Drawing together the results of the accident rate analysis and employers’ subjective views of how they responded to PUWER 92 / 98 and LOLER and the influence of incidental factors.

Conclusions

It is apparent that the number of injuries fell due to UWER 92. However, it is too early to confirm the impact of PUWER 98 and LOLER. It is clear that a very large number of deaths, major injuries and over three day injuries still occur each year due to failure to comply with the provisions first introduced in 1992, as well as those introduced in 1998. These involve non-compliant equipment, such as lack of guarding, faulty or poorly maintained equipment and unsafe methods of work, as well as operator error and unsafe behaviour. However, whilst PUWER 92 and PUWER 98 / LOLER may not have entailed the introduction of a large number of new requirements, it is clear that, on the one hand, they prompted many duty holders to enact improvements but, on the other hand, there remains significant scope for achieving a higher level of compliance with the regulations. The impact of PUWER 98 and LOLER on injury rates is unlikely to be detectable for a number of years, in the same way that the impact of PUWER 92 can only now be analysed using a fifteen year period (six years before and nine years afterwards).

Specific conclusions supporting this follow:

Awareness and compliance

- A wide spectrum of duty holders have carried out a range of actions to comply with the 1998 regulations (such as equipment modifications), and there is evidence that this was at least in part motivated by the regulations. There is evidence that small and medium sized enterprises (SMEs) have done less, in part because they have less equipment significantly impacted by the requirements (see sections 4.4 and 4.5);
• A majority are aware of the regulations, and there is some evidence that awareness has increased since the 1992 regulations. Most users of the main groups of equipment do, at least broadly, understand the link between LOLER and PUWER 98 (see sections 4.2 and 4.3);

• Few organisations have taken the opportunity to change their thorough examination requirements using schemes of examination (see section 4.4);

• There is evidence of improved and on-going compliance with the requirements originally brought in by PUWER 92, although the occurrence of fatal and non-fatal accidents involving failure to adopt basic safety measures, such as guarding, demonstrates that compliance is not universal (see section 4.10).

**Attitude to the regulations**

• Duty holders believe that the regulations have led to safety improvements, such as safer equipment and a more competent workforce (see section 5.7);

• Duty holders believe that the regulations are an improvement on previous industry specific regulations and offer many advantages such as flexibility and practicality (see section 5.7).

**Concerns and difficulties**

• Duty holders have encountered a number of significant difficulties in the implementation of the regulations, in particular in the interpretation of what is a competent person, the role of CE marking, the meaning of inspection / Thorough Examination (see sections 4.3 and 4.7);

• Whilst duty holders demonstrate a high level of awareness of the regulations, there are a few areas where their understanding is relatively low, including:

  o What inspection is, in particular the “non-routine” requirements of the regulations (see section 4.3);

  o The “softer” requirements of the regulations such as planning lifting operations, and a perception that this requirement is unnecessarily bureaucratic (see section 4.3);

  o The construction sector’s awareness of the newer requirements, with an apparent reliance on the standards of previous legal regimes to schedule inspections, for instance (see sections 4.7 and 4.9);

  o A perception, particularly in construction, that by contracting out lifting operations a client has no responsibility for the lift (see section 4.9);

• Difficulties obtaining sufficient trained personnel, particularly where staff turnover is high, and / or where operators do not have English as a first language (see section 4.7).
Areas of improvement

- There is scope for improvement in the regulations and associated guidance. This is primarily to do with the presentation of the regulations, rather than the regulations themselves. However, it may be difficult to achieve greater clarity without changing the legislation where words are commonly used with different meanings. Issues where clarity could be improved include:
  - The purpose and status of CE marking and declarations of conformity (see section 4.6);
  - The meaning of “competent person” (see sections 4.3 and 4.8);
  - The use of the terms thorough examination and inspection, specifically the extent to which they do not match terms readily understood by duty holders (see section 4.3);
  - The open learning guidance has not reached a wide audience and may be a useful resource if more widely publicised (see section 4.8).

Cost and benefits

- Duty holders, on the whole, do not believe that the costs of compliance with PUWER 98 and LOLER have caused concern and do believe that they have led to improved working practices and safer equipment despite uncertainty over whether the injury rate has fallen (see section 5.7);

- The costs and benefits of compliance with PUWER 98 and LOLER are consistent with the HSE’s pre-implementation assessment, namely that the costs outweigh benefits in the initial years following implementation, but that benefits may start to outweigh costs in the future once the transition period for compliance has expired (see section 5.1.4);

- Whilst it is too early to be certain, there may be a decline in the number of major injuries, although there is no evidence of a decline in fatal injuries related to PUWER 98 or LOLER that can clearly be attributed to their implementation - however this is consistent with expectations, particularly given that this study was completed before the end of the transition period for full compliance (see sections 5.9 – 5.10);

- There is no detectable impact on equipment defect rates or productivity (see 2.1.2 and 5.7.2);

- The number of contact with machinery injuries was reduced significantly after the implementation of PUWER 92 in 1993 (see section 5.11);

- Duty holders recognise the safety benefits of machinery guarding and the need to prevent unsafe use of moving machinery, such as circular saws (see section 4.10).

Thus, in conclusion, despite some areas for improvement, they have been received well and achieved safety benefits without causing significant financial concerns.
1 INTRODUCTION

1.1 This report

This report summarises an evaluation of the implementation of the European Union’s Use of Work Equipment Directive (UWED) and its amending Directive (AUWED). AUWED amends UWED, which was implemented in the UK as the Provision and Use of Work Equipment Regulations 1992. In the UK, AUWED was implemented primarily via the Provision and Use of Work Equipment Regulations 1998 (PUWER 98) along with the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), and the supporting Approved Codes of Practice (ACoPs). The focus of the project is on the newer (1998) requirements of AUWED, in particular requirements with respect to inspection of equipment, thorough examination of lifting equipment, mobile work equipment, and organising lifting operations.

The findings are intended to form a part of the UK’s five yearly report to the EC and allow an assessment of any need to amend the supporting ACoPs.

In particular, the evaluation aimed to:

- Provide a robust assessment of costs and benefits, taking account of counterfactual factors;
- Satisfy the EU’s evaluation and reporting demands for the five year report on AUWED’s (and the ten year report on UWED’s) implementation, and;
- Identify areas for amendments / revisions of the regulations and ACoPS.

The evaluation method also needed to meet the demands arising from Cabinet Office Green Book and the Institute of Employment Studies report on the impact of the HSC / E, particularly regarding how to quantify the benefit associated with fewer injuries and how to take account of incidental factors that may influence injury rates.

With these aims in mind, the scope of issues explored by the study included:

- To what extent are employers aware of and have taken steps to meet the provisions of PUWER / LOLER?
- What problems are employers and workers encountering with these regulations?
- What are the compliance costs for PUWER / LOLER?
- What are the benefits of PUWER / LOLER, including the employers’ perspective and from injury rate data?
- Has the change from sector specific ‘prescriptive’ regulations to a more broadly applicable and more goal oriented set of regulations (supported by an ACoP) been successful?
- What has been the impact of the supporting ACoP and guidance (L22, L113, L112, L114 and L117) and what are the areas for amendment / revision?
- What would have happened if the Regulations had not been introduced?
Also, given that PUWER links into other regulations, this raises the issue of whether such linkages are understood and easy to follow. For instance, do duty holders understand the requirement to carry out risk assessment to determine how to comply with PUWER? Or, how well do duty holders understand the relationship to the Supply of Machinery (Safety) Regulations (and CE marking)?

It is reasonable to suggest that the main intended benefit of health and safety regulations such as PUWER and LOLER are to reduce the number and severity of injuries, as well as to introduce more efficient and effective regulation. In theory, this benefit may be detected via accident trends. However, as discussed below, PUWER and LOLER did not represent a step change in the extent of regulatory requirements, and many of the provisions did not come into effect until December 2002. Accordingly, you might not expect a significant fall in injuries to date. Indeed, many of the benefits may be in the form of simpler and more flexible regulation.

1.2 Background to PUWER and LOLER

1.2.1 Scope and requirements

The Provision and Use of Work Equipment Regulations 1998 (PUWER 98) and the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) are the main UK provisions implementing the Amending Directive (95/63/EC) to the Use of Work Equipment Directive (89/655/EEC). This sub-section introduces these UK regulations.

PUWER 98 applies to the provision and use of all work equipment, including mobile and lifting equipment. It applies to all workplaces and work situations where the Health and Safety at Work etc. Act 1974 applies. Further requirements for lifting equipment and lifting operations are enacted by LOLER, which applies in the same places as PUWER.

PUWER covers all aspects of the safety of “work equipment”, the scope of which is very broad. It is defined in the regulations as “...any machinery, appliance, apparatus, tool or installation for use at work...”, and examples include hammers, knives, circular saws, laboratory equipment, and lifting equipment such as hoists, lift trucks, elevating work platforms and ladders etc. Motor vehicles (not privately owned) and aircraft are also covered, but more specific legislation will often take precedence.

As their titles imply, these regulations cover more than just the hardware requirements of providing safe work equipment. They cover many aspects of managing the safe use of work equipment. For instance, they require the selection of suitable equipment for the job, maintenance, inspection and adequate information and training for operators. They also cover a range of hardware requirements from the more general requirements (of Regulation 11) to protect people from dangerous parts of machinery to more specific requirements for emergency stop controls, warnings and markings and requirements to protect against the risk from mobile equipment rolling over or overturning.

Likewise, LOLER covers a range of requirements for equipment, but specifically those aspects which ensure lifting operation safety. There are both hardware and “software” requirements. For example, there are requirements for the strength and stability of the lifting equipment, marking of equipment with safe working loads, and also a requirement to position and install lifting equipment to reduce risks to people from the equipment or the load. The core of the “softer” requirements is the organisation (planning, supervision and carrying out) of the lift to ensure that is carried out in a safe manner.
As with many other health and safety requirements, PUWER 98 and LOLER cannot be considered in isolation. The Management of Health & Safety at Work Regulations 1999 require a risk assessment to be carried out in order to identify the measures that should be taken to comply with the range of requirements of the work equipment regulations. This should identify the factors to be taken into account for, for example, the selection of suitable work equipment, the identification of the control measures necessary to prevent access to dangerous parts of machinery and measures to be considered when planning a lift.

1.2.2 The extent of change

Many of the requirements of PUWER 92 replaced previous legal requirements, whether they were implicit or explicit. In the context of health and safety legislation in the UK we must recognise that changes since 1974 are probably best characterised as evolutionary rather than radical. The advent of PUWER 98 and LOLER can be seen as similarly evolutionary in nature. The apparently drastic measure of repealing many sets of regulations and bringing in an entirely new set of regulations led to relatively little practical change for those already complying with the law.

PUWER 98 and LOLER further rationalise a raft of legislation, particularly a plethora of requirements for lifting equipment. Also, many of the new legal provisions have already been implemented by some employers, on the basis that they are needed to control risk or at least as good practice. For example, whilst the LOLER regulations introduced a new requirement of planning a lifting operation many duty holders would argue that it was implicitly already required. The Health and Safety Executive (HSE) clearly also did not view these changes as radical, and the cost-benefit analysis of the impact of the 1998 regulations predicted that the number of deaths would not fall until after 2002.

Notwithstanding the latter point, PUWER 98 and LOLER did bring in some specific new duties (see Section 2 for further details of the changes). These included new requirements for Roll Over Protection Structures (ROPS) on mobile equipment, seat restraints and “independent” thorough examination amongst others that had to be implemented at some cost. Other key changes included bringing consistency of approach across sectors and making duties as regards machinery / equipment explicit in some sectors, which previously had no specific regulations. Sectors such as education, for instance, were required only by the generalities of the Health and Safety at Work etc. Act 1974 to have safe equipment. However, the changes are not radical, and should not be overstated. In addition, many of the new requirements for seatbelts and ROPS, etc only came fully into force in December 2002.

1.2.3 Overview of HSE implementation

The HSE have taken a wide range of action in support of the implementation of these regulations, including:

- Publishing guidance, including Open Learning Training Packages;
- Training HSE inspectors in all divisions and 800 local authority inspectors;
- Agreeing practical methods of compliance with duty holders;
- Providing answers to queries from duty holders via the HSE Info line;
- Extensive consultation with stakeholders to identify and resolve issues, confusions and problems;
• Enforcement via inspections and the application of notices;
• Review and revision of equipment standards;
• Review of feedback and experience of inspection;
• A cross-HSE working group was set up to review HSE guidance on work equipment.

As a result of these actions, for example:

• Over 84,000 copies of ACoPs were purchased by February 2001, along with about 6000 copies of the Open Learning Packages;
• 6798 queries were handled regarding PUWER and LOLER by HSE Infoline in December 1998 to December 1999;
• 3000 notices were served for PUWER 98 in 1999 / 2000 (1551 improvement, 32 deferred prohibitions and 1417 immediate prohibitions) and 270 were served for LOLER (175 improvement, 3 deferred prohibitions and 92 immediate prohibitions);
• Some kinds of machinery that satisfied the requirements of European law on the safety and integrity of new products, through the European Standards route, would not meet the requirements imposed by AUWED. For example, the fork lift trucks standard did not require the fitting of seat restraining systems. This was resolved with the standard makers.
• Supplementary guidance has been produced to clarify the interface between PUWER and other relevant legislation.

1.2.4 HSE initial evaluations of PUWER and LOLER

In 2000, the HSE completed a number of internal reviews of PUWER and LOLER, drawing on consultations with duty holders, a mini survey of SMEs and queries to HSE Infoline. The main points arising from these are summarised below. It was concluded that there was a high level of awareness of the regulations, that SMEs had welcomed the regulations and recognised their safety benefits and that the compliance costs were not excessive. Plans were in hand to deal with the outstanding issues and queries.

Issues arising from consultations and queries

There were two main issues.

Firstly, because the definitions of 'work equipment' and 'lifting equipment' are broad and are, therefore, open to different interpretations there was some difficulty in determining the scope of the Regulations, particularly LOLER, which the HSE responded to by providing non-comprehensive lists of equipment;
Secondly, some employers found it difficult to adjust to the non-prescriptive form of the thorough examination requirement, which differs substantially from the prescriptive approach of previous legislation and requires employers to take more responsibility for determining what equipment needs to be thoroughly examined and for selecting a competent person. The HSE initiated a number of projects to provide guidance on what should be included in a thorough examination, what is understood by 'competence', what types of equipment will need thorough examination and how thorough examination, inspection and maintenance fit together.

**The effect of the Regulations on the hire industry**

The HSE note that the hire industry realised that they would need to meet the hardware requirements of PUWER, particularly the requirement to fit a roll-over protection structure (ROPS) and restraining systems to mobile work equipment they already had in use from 5 December 1998. This was in contrast to the four year transitional period allowed to users, the justification being that hirers owned the equipment and only they could make sure that the risks from roll-over were minimised by fitting ROPS, etc.

Joint guidance was produced that required hirers to prepare action plans that would identify all equipment at risk of roll-over, and prioritise the modifications required within acceptable timescales. The hirers were also required to discuss the conditions in which the equipment would be used with the customer in order to ensure that they were supplying a suitable machine.

1.2.5 HSE mini survey

During August / September 2000, HSE made a series of visits to a small sample of SMEs to find out:

- what they thought of the PUWER and LOLER ACoPs and how useful they had found them, and;
- how their businesses had been affected by the new Regulations.

The results of the survey, albeit small, are set out below.

**Awareness**

Over half of the respondents were aware of the guidance via either trade journals or HSE’s media, or through their membership of, or affiliation to, national committees or trade associations.

**Presentation**

Most had found the guidance clear, concise, well laid out and an improvement on previous documents, with no problems of style or content. However, some respondents found the presentation too technical, unwieldy and legalistic. A common complaint was that the documents needed clearer signposting to make it easier to find relevant text.

**Information**

Nearly all the SMEs were generally happy that the guidance delivered the information they were expecting, with some suggestions for improvements.
Comparison with other HSE guidance

All except one of the respondents had purchased other HSE ACoPs and guidance. They were evenly divided between those who considered the PUWER / LOLER guidance to be better than other HSE guidance and those who considered it worse. Those considering it better cited its ‘clarity’; those considering it worse, the lack of practical examples.

Other guidance

Half of the SMEs would like to receive further guidance tailored to their particular type of business. Most of the others considered their business activities too wide-ranging to expect HSE to produce more specific guidance.

One correspondent suggested HSE should do more to draw attention to the option of having equipment thoroughly examined according to an examination scheme, rather than at statutory intervals. He thought that more companies would choose this option if it was more widely publicised.

Impact of the regulations

Most SMEs had made changes in procedures in order to comply with the regulations, mainly relating to the inspection and thorough examination of plant.

Over half the respondents had bought new equipment as a result of the regulations, including new guards, replacement hand tools, CCTV and improved mirrors for dumper trucks, harnesses, circular saws, emergency stop controls, etc. One SME had reviewed all its equipment and found that every engineer had been working with at least one piece of defective equipment.

Costs of new equipment ranged from under £1000 for minor improvements to £6000 on new guarding, but costs for most respondents were at the lower end of the scale. None thought the costs were excessive.

Dissemination of the new requirements

A third of the respondents said the new regulations had been discussed at safety review meetings and senior management meetings. The new requirements had also been included in induction programmes for new staff and in staff circulars.

Six SMEs had provided some form of additional training as a result of the regulations, including briefings for supervisors and managers, training seminars and risk assessment training for maintenance staff.
Effect of regulations on health and safety

Nearly all the SMEs thought that the introduction of the regulations had helped to improve health and safety in their workplace, promoting a greater awareness of health and safety issues, and helping to ‘create a culture where workers’ complaints about health and safety matters will be taken seriously and acted upon’. Overall reviews of health and safety in the use of work equipment had been instigated and inspection procedures had been improved. One SME cited an accident involving a dumper truck where the driver’s life had been saved because he had been wearing a seat belt. Another company said that the new regulations had ‘100% improved health and safety’ in their workplace.

The main suggestions for improvement were:

- More industry-specific guidance;
- A detailed subject index for ease of reference;
- More practical examples;
- Examples of inspection / maintenance checklists;
- More comprehensive listing of equipment covered by LOLER.

The HSE noted that the need for specific guidance should be filled by Industry Advisory Committees.

1.2.6 Other reviews of PUWER and LOLER

A number of researchers and stakeholders (Raafat H 1999, Raafat H & Nicholas 1999) have outlined how duty holders have responded to the regulations. These reports tend to be based on either mini surveys and / or the outcome of consultation with stakeholders. The reports touch upon two main points, namely anticipated problems / concerns and what steps duty holders plan to take or have taken to comply with the regulations.

As regards potential concerns and problems, the key points are:

- Duty holders may have difficulty understanding what is meant by independence and impartiality in inspections;
- The criteria for deciding whether risk is tolerable are not obvious;
- Whilst routine or scheduled inspection and thorough examination is straightforward, the less routine demands for thorough examination may pose a greater challenge, such as examination after accidents or modifications;
- Duty holders may face problems in screening / drawing up action lists for the thorough examination of equipment;
- Many suppliers have insufficient knowledge of standards and many declarations are incomplete;
- Declarations by manufacturers should reference other applicable directives for that equipment, but very few did so correctly, and;
Many firms will consider hiring equipment on the assumption that hire companies will have addressed the regulations.

A number of reports note that the new approach requires a degree of strategic thinking and joined-up planning (e.g. purchasing, etc) that has not historically been required in prescriptive Safety, Health and Environment regimes. It is suggested that this may pose a concern for some duty holders, particularly SMEs. It was anticipated that the prospects for full compliance in anything other than large companies were low.

It was also noted that the cost of compliance would be influenced by:

- The hire and lease industry, who account for a large proportion of mobile plant, needed to implement a programme of equipment modifications, specifically Roll over protection structures (ROPS) from the outset – hence whilst there was a four year transition period for users of such equipment, it is reasonable to suppose that hire and lease firms will have been modifying equipment from the outset;
- Similarly, whilst Forklift Trucks have until 2002 to comply with tip over protection, duty holders need to put assessments and procedures in place immediately along with pre-use checks.
- The widening of term ‘duty holder’;
- The requirement for training;
- The widening of the range of equipment covered by LOLER.

Hence, there may be a significant cost of compliance. In particular, duty holders may have commenced modifying equipment well in advance of the end of 2002 transition period.

1.3 Method overview

Section 2 of this report provides a detailed description of the method. Both rich qualitative information on issues arising from implementation, and some quantitative verification of views was needed. An essential precondition for gathering quantitative data about complex issues is to develop a thorough understanding of the issues so that research questions can be posed and questionnaires designed to quantitatively test those questions. Clearly, this process can also elicit very rich information about the issues arising, both practical and in the understanding of the regulations.

Accordingly, an iterative approach is needed so that a broad understanding is first gained, allowing increasing focus on relevant issues as the work progresses. This was achieved by moving through four stages of work.

In addition, each stage of evaluation produces a set of results using different research methods. For example, stage 2 provides detailed case studies of how firms complied with the regulations. This can be compared with the level of self-reported compliance from stage 3 postal questionnaires and stage 1 interviews. If the results from each stage are similar this provides a higher level of confidence in the evaluation conclusions. Similarly, the perceived costs and benefits cited in stages 1 to 3 can be compared with numerical cost-benefit estimates of stage 4. Again, if the perceived and approximated costs and benefits are comparable this increases the confidence that can be placed in the cost-benefit results.
**Stage 1: Identifying and scoping potential impacts and key issues**

This stage of work aimed to ensure that the main stages of work covered all of the key issues and changes associated with PUWER and LOLER, along with a preliminary scoping of the types of costs and changes in safety practices amongst duty holders. This was achieved by:

- A review of the regulations themselves, and the changes, along with a brief review of recent literature helped identify some emerging issues / debates and pointed to sources of information;

- A series of semi-structured consultations with a sample of twenty stakeholders to identify areas of concerns, strengths and weaknesses and the types of costs and benefits.

Stakeholders providing the most direct information on the issues are duty holders, those providing relevant services to duty holders (e.g. inspection services), and representatives of both of these groups (e.g. trade associations, professional bodies, etc.). The HSE and local authorities also have a wealth of information since they are often the first port of call for those encountering difficulties with interpretation and compliance.

**Stage 2: Case studies and costing data**

This stage of work aimed to:

- Acquire case study material from a sample of duty holders to determine how they had responded to the regulations;

- Collate information on the typical costs of compliance within a sample of individual firms that could subsequently be used in a national cost of compliance estimate;

- Explore in greater depth the problems, benefits and areas of improvement associated with PUWER and LOLER.

This was achieved by holding in depth discussions with a sample of duty holders. Of the inspection companies carrying out inspection / thorough examination related to PUWER / LOLER only twelve companies account for approximately 90% of the UK market. A small sample of this group therefore accounts for a relatively large proportion of the UK market.

**Stage 3: Postal survey**

A large postal survey was completed to acquire a larger sample of opinion about the regulations, levels of awareness of the regulations and information on levels of compliance. It also provided information both about perceived costs and actual costs of compliance.

**Stage 4: Costs and benefits**

The costs of compliance estimated using stage 2 and 3 information were combined with an analysis of injury rate trends (using HSE injury data) to provide a comparison of costs against averted injuries.
This involved an analysis of accident causations, both before and after the regulations came into force. The main source of information on injuries is the HSE’s database of injuries reported to them by duty holders in accordance with the Reporting of Injuries, Disease and Dangerous Occurrences Regulations (RIDDOR) data, but also accident investigation reports by enforcing authority inspectors. The main analysis comprised a review of fatalities investigations since there are not the same under-reporting problems as with other types of accidents. The impact of economic activity on injury rates was considered in order to check whether injury rate trends could be attributed to the regulations.

Due to the focus of this study on the amendments introduced in 1998, the assessment of the provisions introduced under PUWER 92 is limited. Duty holders responding to the main postal survey were asked to self-report key actions taken in response to PUWER 92 and their perceptions of guarding. In addition, the injury rate trend for machinery accidents has been assessed for the period before and after 1992 to determine whether the PUWER 92 provisions led to a reduction in injuries.

1.4 Report structure
The report structure is summarised below:

- Section 2 reports the method in some detail, first giving the rationale and aims of the research, and then detailing how this was achieved in practice.

- Section 3 comprises the first part of our Stage 1 work, namely a detailed review of the differences brought in by AUWED and the legal arrangements in the UK for transposition (i.e. writing the requirements into statute).

- Section 4 provides an integrated summary of the issues identified in the Stage 1 semi-structured interviews, Stage 2 Case Studies and the results of the Stage 3 postal survey detailing awareness, understanding response to the regulations and opinion.

- Section 5 reports on the Stage 4 findings regarding costs of compliance and benefits. This includes the costs identified through Stage 2 case studies and those reported by respondents to the Stage 3 survey. It also includes the results of accident analysis and a discussion of the counterfactual case.

- Section 6 provides a summary of results for SMEs.

- Section 7 of the report integrates the findings from each stage of evaluation into a set of conclusions.

The assumptions and data used for the cost of compliance assessment are provided in an appendix.

It was also important to recognise the EU’s requirement to include small and medium sized enterprises in the study. The results for Small Medium Enterprises (SMEs) are summarised throughout the report and brought together in Section 6.

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4 Defined as enterprises with fewer than 250 employees.
2 METHOD

2.1 Stage 1 Review of the regulations, literature and exploratory discussions

2.1.1 Literature and regulation review

This comprised a detailed exploration of the changes in the regulations, the issues, types of costs likely to have been incurred and possible benefits. This was achieved by:

- Literature review, and;
- Review of the regulations.

The literature review covered previous critiques of the regulations, the results of the evaluation of PUWER 1992 and the feedback received by the HSE from duty holders. Key references used were:


The review of regulations identified changes introduced by PUWER 98.

This allowed the identification of the issues, along with information about what duty holders and others had done to comply or assist compliance. This, therefore, allowed more targeted interviewing in the following stages.

2.1.2 Semi-structured exploratory interviews

It was determined at an early stage that stakeholders could be categorised as equipment users, suppliers / hire firms, inspection firms and others such as the HSE or trade associations.
Twenty-four exploratory discussions were completed with work equipment users, suppliers, inspectors, and Health and Safety Executive staff. A range of sectors, such as manufacturing and agriculture, were represented amongst the interviewees. The consultees included:

- Trade associations;
- HSE;
- Equipment users;
- Inspection firms;
- Suppliers (hire firms and manufacturers);
- Trade Union (not extensive).

The discussions covered:

- Who was impacted by the regulations?
- What did organisations do in response to the regulations?
- What prompted firms to make reported changes?
- What are the concerns / problems associated with the regulations?
- Suggestions for improvements;
- What were the main costs and benefits, including what types of equipment were effected and how?

These discussions also explored what data is available from each type of stakeholder on the costs and benefits of compliance. In addition to open ended questions about what data is available, consultees were prompted about what data is available on:

- Defect rates;
- Productivity;
- Injury rates;
- Costs of compliance.

The feedback on data was used to design the subsequent review of costs and benefits and collation of pertinent data. It was noted by respondents that data is not collected on defect / breakdown rates or productivity levels. Also, firms do not collate information on the costs of compliance. Indeed, many of the costs were simply subsumed within general maintenance and training budgets. Also, firms did not track changes in the cost of inspection or thorough examination.

However, it was advised that estimates can be given to the:

- Amount of time spent on training, familiarisation and management, and;
• Proportion of equipment modified and the typical cost of modifications.

In addition, consultees advised that they were not aware of any significant changes in defect rates or productivity. This conclusion, combined with the point that firms do not collate data to support an analysis of defect rates / productivity, led to the view that a detailed quantitative examination of defect rates / productivity impacts was not justified.

It is apparent that firms would need to be asked to identify and record costs and benefits from the outset of responding to a new set of regulations for a full set of data to be readily available upon commencing a subsequent evaluation. This study was obliged to rely on retrospective identification and approximation of costs and benefits without the benefit of such recording.

2.2 Stage 2 Case studies

The Stage 1 work identified some of the emerging issues and described the types of costs incurred, and so allowed more targeted and in-depth interviewing to take place. The interview style in Stage 2 was therefore more structured and more detailed, but still contained relatively open questioning. All case studies and further discussions were guided by case study proformas.

The case studies had a number of aims:

• To acquire examples of compliance costs (and cost savings);

• To document examples of how firms responded to the regulations, including case studies of benefits and costs;

• To elicit opinion on the perceived benefits of the regulations;

• To acquire some “rich” feedback on the ACoPs and guidance;

• To acquire some “rich” feedback on the impact and effectiveness of the regulations.

In this stage of work we completed the following interviews:

• Twenty four with equipment users;

• Twelve with Trade Associations and training organisations;

• Six with equipment hirers / suppliers, and;

• Three with equipment inspection companies.

In addition, there was an ongoing dialogue with a range of trade associations and key inspection firms who were able to supply information to support the cost-benefit analysis, including:

• Estimates of the number of items of pertinent equipment in the UK, such as the number of forklift trucks and dumper trucks in the UK;

• The unit cost of making various modifications;

• The cost of, for example, PUWER training courses;

• The total value of the UK inspection and thorough examination trade;
• An overview of how inspection firms and supply / hire firms had responded to the regulations.

This gave an in-depth understanding of the issues and allowed us to develop cost benchmarks for the actions that employers had taken. Cost benchmarks comprised indicative figures for, for example, costs per employee of training, where an employer carries out training. The postal survey (see next section) could then be used to quantify what proportion of employers reported that they carried out actions such as training.

The case studies also provide detailed examples of how firms complied with the regulations, thereby supporting the self-reported levels of awareness and compliance found in the Stage 3 postal survey. Thus, the results of Stage 3 can be interpreted in combination with the Stage 2 case studies.

2.3 Stage 3 Postal survey

2.3.1 Aims of the survey

The postal survey provided a statistically robust sample of responses that could be used to:

• Quantitatively test “hypotheses” developed during the earlier consultation phases of work, such as testing what proportion of duty holders do not understand CE marking, and gather evidence about the numbers taking certain types of action and level of awareness;

• Allow comparisons between sizes\(^5\) of companies, and also between those more and less affected by the regulations;

• Provide estimates of the proportions of firms that enacted various changes, for use in the costing exercise.

Earlier phases of work had established that there were three main affected groups:

• Equipment users;

• Equipment hirers / suppliers, and;

• Organisations providing equipment inspection services.

These three groups were therefore surveyed by post. The questionnaire was tailored to the needs of each of these groups. Questions were similar with each of the three groups asked about how they responded to the regulations, perceived costs and benefits, and their understanding and awareness of the regulations. The users were asked about the equipment they used. Suppliers and inspectors were asked an additional question about their customers’ understanding.

\(^5\) Throughout this report “size” refers to numbers of employees. Small firms are considered to have 1-49 employees, Medium 50 to 250 employees, and Large over 250 employees.
Care was taken to increase the rate of returns by people not believing that they were affected by the regulations. Section 1 was designed to be brief and to obtain at least a minimal level of information from respondents who did not have the main groups of equipment affected by the regulations and who didn’t believe the regulations affected them at all. The instructions made it very clear that this was all that was required of these respondents, and explained how useful such a response would be.

The questionnaire was designed to acquire information on:

- The effectiveness and benefits of PUWER 98 / LOLER;
- The impact of differences between PUWER 98 and PUWER 92;
- What employers would have done without PUWER 92 and 98 / LOLER;
- Information on other factors that may have influenced safety performance in the use of equipment (such as increasing automation);
- Measures that employers (including equipment hire companies) have taken in response to PUWER 92 and 98 / LOLER;
- Feedback on how PUWER 98 / LOLER ACoPs can be improved;
- Information on amount and types of equipment.

2.3.2 Piloting

Draft questionnaires were prepared in consultation with the Health and Safety Executive, and then piloted with fourteen volunteer users and suppliers to ensure that the questions made sense to respondents and elicited the intended information. A copy of the final user questionnaire is included in Appendix 2.

It was found that the vast majority of the current UK market in PUWER / LOLER thorough examination work is taken by twelve inspection companies, three of who had assisted in the earlier phases of the work. Piloting was therefore not appropriate in the case of inspection firms. However, the Safety Assessment Federation (SAFed) kindly assisted by commenting, prompting some significant amendments which greatly improved the questionnaire.

2.3.3 Sample frame

**Equipment users sample frame**

A sample frame of equipment users was developed based on experience of the return rates of different sized companies and different sectors, the aim being to gain a sample of respondents representative of the UK working population in terms of size of company, and representative of organisations with a range of amounts of affected equipment. The sample frame is shown in Table 1. The expected return rates cited in Table 2 correspond to those that have occurred in previous national surveys completed by Greenstreet Berman Ltd.

Sectors were grouped into High, Medium, and Low indicating the extent to which PUWER / LOLER was likely to affect them, defined as follows:

- High – agriculture, construction, manufacturing, warehousing;
• Medium – health / social work, hotels & catering, utilities, telecommunications, transport; and,

• Low – banking & finance, education, local authority, retail / repairs.

The frame was designed so that roughly equal numbers of responses from these grouping would be received.

3500 questionnaires were sent out to equipment users. The details of the respondents are summarised in the next Section.

Table 1 Equipment user sample frame

<table>
<thead>
<tr>
<th>SIC 92 numbers</th>
<th>SECTOR</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
<th>Total</th>
<th>H/M/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 to 09</td>
<td>Agriculture &amp; forestry</td>
<td>79</td>
<td>14</td>
<td>15</td>
<td>108</td>
<td>H</td>
</tr>
<tr>
<td>60 to 67</td>
<td>Banking, finance, accounts or insurance</td>
<td>23</td>
<td>4</td>
<td>43</td>
<td>70</td>
<td>L</td>
</tr>
<tr>
<td>15, 16, 17</td>
<td>Construction (inc decorators, builders, plumbers, etc)</td>
<td>274</td>
<td>57</td>
<td>44</td>
<td>375</td>
<td>H</td>
</tr>
<tr>
<td>82</td>
<td>Education</td>
<td>161</td>
<td>28</td>
<td>14</td>
<td>203</td>
<td>L</td>
</tr>
<tr>
<td>80, 83</td>
<td>Health or social work</td>
<td>313</td>
<td>54</td>
<td>221</td>
<td>588</td>
<td>M</td>
</tr>
<tr>
<td>70, 58</td>
<td>Hotels &amp; catering</td>
<td>188</td>
<td>32</td>
<td>76</td>
<td>296</td>
<td>M</td>
</tr>
<tr>
<td>91, 92, 97</td>
<td>Local authority / regional government</td>
<td>57</td>
<td>10</td>
<td>40</td>
<td>107</td>
<td>L</td>
</tr>
<tr>
<td>20-39</td>
<td>Manufacturing</td>
<td>57</td>
<td>10</td>
<td>520</td>
<td>587</td>
<td>H</td>
</tr>
<tr>
<td>71, 72, 73, 78, 79, 81, 89</td>
<td>Other services (laundry, hairdressing, estate agents etc)</td>
<td>313</td>
<td>54</td>
<td>52</td>
<td>419</td>
<td>L</td>
</tr>
<tr>
<td>49, 10 to 14</td>
<td>Utilities (gas, water, electricity)</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td>32</td>
<td>M</td>
</tr>
<tr>
<td>75, 76, 50 to 57, 59</td>
<td>Retail &amp; repairs</td>
<td>216</td>
<td>37</td>
<td>103</td>
<td>356</td>
<td>L</td>
</tr>
<tr>
<td>43, 48</td>
<td>Telecommunications (post, phone)</td>
<td>57</td>
<td>18</td>
<td>39</td>
<td>114</td>
<td>M</td>
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<tr>
<td>40-41, 44-47</td>
<td>Transport</td>
<td>71</td>
<td>12</td>
<td>59</td>
<td>142</td>
<td>M</td>
</tr>
<tr>
<td>42 (not 4212, 4213)</td>
<td>Warehousing</td>
<td>37</td>
<td>5</td>
<td>22</td>
<td>64</td>
<td>H</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>1846</td>
<td>335</td>
<td>1280</td>
<td>3462</td>
<td></td>
</tr>
</tbody>
</table>
Table 2 Equipment user – expected returns

<table>
<thead>
<tr>
<th></th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected returns</td>
<td>185</td>
<td>50</td>
<td>256</td>
<td>491</td>
</tr>
<tr>
<td><em>(proportion of total expected)</em></td>
<td><em>(0.1)</em></td>
<td><em>(0.15)</em></td>
<td><em>(0.2)</em></td>
<td></td>
</tr>
<tr>
<td>So Expected sample</td>
<td>38%</td>
<td>10%</td>
<td>52%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Suppliers sample

A sample of equipment manufacturers and hire / lease companies were surveyed. The sample frame for them was based simply on company size. Most such organisations supply to a range of industries, not immediately obvious from public data, so it is not practicable to design a sample frame to predict industry sector responses.

500 questionnaires were issued.

Inspection firms sample

For companies providing inspection services, the Safety Assessment Federation (SAFed) claims that its members currently account for over ¾ of the UK commercial inspection / thorough examination sector. Others are developing their own services and are confident about increasing business, but several sources confirmed the current domination of SAFed members. SAFed identified twelve members who are involved in inspection / thorough examination relevant to PUWER / LOLER. All twelve, therefore, were surveyed (though it should be noted that three had assisted in the earlier phases of the work).

2.3.4 Survey Responses

Data entry and analysis

All User and Supplier questionnaires received within five weeks of posting were entered onto spreadsheets, and analysed using spreadsheet functions.

Given the small numbers of inspection questionnaires these were manually processed.

The sample

The response rates were:

- 499 equipment users responded (from 3500 questionnaires sent out) within the five week deadline. This constitutes a 14% response rate.
- 72 suppliers / hirers responded (from 500 questionnaires sent out), again a 14% response rate.
- 7 of the 12 inspection companies replied by the deadline – representing 50% of these firms.

A sample of 499 users provides a statistically robust sample, with acceptable margins of error. For example, with a sample of 499 if 70% give particular response the margin of error is 4%.
In the case of inspection firms, whilst the sample is small in absolute numbers, it represents 50% of these firms and hence is robust.

In the case of supply firms a sample of seventy two has a wider margin of error than the users’ sample. If 70% of suppliers give a particular response the margin of error is 10.5%. Thus, care must be taken in the case of suppliers where there is an even split of responses.

Figure 1 shows the range of sectors that equipment user respondents represented. This shows a good representation from manufacturing and construction, sectors more affected by these regulations and still accounting for significant employment in the UK. The proportions are roughly in line with the number of people employed in each of these sectors (as our sample frame had been designed to achieve). Hence there was little need to weight responses to match the levels of response to the size of each sector.

![Figure 1](image_url)

**Figure 1** Proportion of equipment users respondents by sector (n=499)
Figure 2 shows that amongst both users and suppliers the representation of different company sizes was in line with the aims of the sample frame. The proportion of responses from small, medium and large firms is approximately in line with the proportion of the UK workforce employed by each size of firm. There was also a reasonable level of response from each size of firm within each sector for both users (Figure 3) and suppliers (Figure 4).

Figure 2 Proportion of user and supplier respondents by size of organisation (size is by employee numbers, n = 499 users and 72 suppliers)
Figure 3 Proportion of user respondents by sector and company size (number of employees) (n = 499)
Figure 4 Supplier respondents, by sector supplied to

Figure 5 User respondents by estimated impact of PUWER / LOLER on sector (High / Medium / Low)
Figure 5 shows that the sample of equipment users also contains a fairly even split across the sectors that we judged would be affected by PUWER / LOLER to a “high”, “medium” or “low” extent. Note also that of the 499 respondents, 323 had equipment in the main categories and / or believed that the regulations applied to them.

In order to identify those significantly affected by PUWER and LOLER, respondents were asked to indicate whether they used or supplied the main groupings of equipment affected: machinery requiring guarding, lifting equipment, powered work platforms, mobile work equipment and contract lifting services. Legally, powered work platforms are a subset of lifting equipment, but in common parlance these are often regarded to be separate types of equipment. This means that there will be some double counting between these two categories. Figure 6 shows the percentage of the sample (499 users, 72 suppliers) that indicated they used / supplied that equipment (or service).

Respondents were also asked if they used certain types of moving machinery that would require guarding, particularly under the provisions introduced under PUWER 92. This question aimed to identify users who operated saws, presses, etc. This question was asked separately to the question on whether they used lifting or mobile equipment. Hence, the use of lifting and mobile plant was reported separately from other types of equipment that require guarding.
2.4 Stage 4 Costs and benefits

2.4.1 Costs of compliance

Numerical estimate

The aim was to develop an estimate of the cost of compliance with LOLER / PUWER 98 for the period 1998 to 2007. It was decided not to attempt to quantify the cost of compliance for PUWER 92 for the period 1993 to 1997 due to the impracticality of retrospectively soliciting cost data from firms for that period.

The estimate was intended to build upon the original cost-benefit analyses of the HSE, validating data and assumptions as appropriate. This was achieved in a number of steps:

- Stage 1 consultations identified types of costs and who bore them, along with a some examples of actual costs;
- Detailed discussions and Stage 2 case studies provided estimated costs on a unit basis, such as cost per seat belt;
- Stage 1 and 2 consultation with trade associations, along with Stage 3 postal survey responses, provided fleet estimates, and;
- Stage 3 postal surveys provided estimates of the proportion of duty holders incurring various costs.

The first stage of the study established who is likely to have borne costs of compliance, and what types of actions people took that would have entailed costs. This was achieved iteratively through review of the regulations, literature review and interviews with those identified as having costs. One issue here was distinguishing between costs of equipment modifications borne by suppliers complying with the Supply of Machinery Safety Regulations 1992, and the same costs borne by users as in response to PUWER.

Clearly, duty holders (equipment users, contract lifting service providers) and other service providers (inspection companies, equipment suppliers, etc.) were the main source of cost information.

Gathering cost information in the area of health and safety can be difficult. Experience shows that it is difficult for respondents to postal questionnaires to quantify compliance costs. Previous surveys and evaluations have found that few (if any) duty holders have entirely separate budgets for health and safety, many aspects being incorporated into a general management arrangements e.g. training budgets, or maintenance regimes, etc. The Stage 1 and 2 discussions confirmed that this also applies to PUWER 98 and LOLER compliance costs.

The Stage 2 case studies included more interviews with those affected asking specific questions about the costs of actions taken to establish unit costs for the various identified actions people took. Respondents were able to provide “ball-park” estimates of what the costs have been, such as:

- Number of staff trained;
- Typical duration of training per staff members;
Proportion of equipment modified, such as two out of ten fork lift trucks;

Number of days spent on managing the regulations;

Typical cost of modification, such as £150 for a seat belt;

Approximate change (as a %) in the level of thorough examination (TE) and the total cost of TE in the UK;

Cost of one-off items, such as software;

Etc.

In order to gain national estimates, some quantification was needed of what proportion of those (apparently) affected did actually take action. A number of methods were used to “scale up” the results to give an overall UK cost. A key method was to identify, through the postal survey (Stage 3), the proportion of UK industry taking certain actions, such as training and equipment modification.

It was also necessary to gain estimates of the total UK fleet. This was achieved by:

- Review of previous studies that offered fleet estimates;
- Information from trade associations;
- Scaling up fleet sizes of individual firms responding to the postal survey to the rest of the UK.

The case study proforma also incorporated some free text space to ensure all relevant actions were identified. An opportunity then existed to revisit the “ball park” compliance costs to complete the analysis.

As far as possible the information from each stage of work was cross-validated. Thus, the examples of compliance costs cited in Stages 1 and 2 were compared. Similarly the judgements about the proportion of equipment modified given by Stage 2 case study firms was compared with the result of the Stage 3 postal survey.

**Overall cost of compliance**

The estimates were then used to produce an approximation of the ten-year cost of compliance over the period 1998-2007. The Net Present Value was calculated using a 5% discount value. This involved discounting the recurring annual costs and adding them to the one off costs of compliance.

The cost of compliance estimated here can be compared with the HSE’s original approximate cost of compliance, developed prior to the implementation of the regulations, as a form of cross-validation. The total compliance cost was also translated into a cost per year and a cost per employee as a means of judging their “face” validity, i.e. does the cost per employee appear credible?
**Perceived cost**

Respondents were also asked to judge the level of compliance cost. In particular:

- Initial discussions and case studies elicited general opinion about the significance of compliance costs;
- The postal survey included a question that asked respondents to judge the impact of compliance costs on their business.

The perceived level of cost can be compared with the numerical estimate as a form of checking their validity.

**2.4.2 Assessment of benefits**

**Aims and overview**

The assessment of benefits was achieved as follows:

- Judging from a review of the regulations how they may have impacted accident rates and productivity;
- Reviewing the HSE’s pre-implementation assessment of costs and benefits;
- Soliciting opinion from consultees during the Stage 1 discussions and Stage 2 case studies about how the regulations may have impacted safety and productivity;
- Asking respondents to the Stage 3 postal survey their perception of the benefits;
- Analysing injury rates using the HSE’s database of injuries reported to them under RIDDOR to determine if they changed after the implementation of the regulations;
- Reviewing the influence of economic activity on injury rates.

Respondents were asked why they introduced the reported changes as another means of gauging whether any reduction in injury rates could validly be ascribed to the regulations rather than incidental factors, such as market pressures.

The study focused on the impact of the provisions introduced by LOLER and PUWER 98 in 1998. An analysis of contact with machinery injuries has also been completed for the sake of identifying any change in injury rates that may be ascribed to the provisions introduced in 1993 under PUWER 92. The latter analysis sought to take account of the impact of economic cycles on machinery related injury rates.

It was intended to translate an estimate of the number of averted deaths / injuries into a total financial benefit by using values of lives saved and values of averted injuries. This value could then be compared with the estimated cost of compliance for the same ten-year period.

The numerical estimate of averted injuries can also be compared with respondents’ perception of the impact of the regulations on safety as a form of cross referencing to judge the validity of the numerical assessment.
This stage of work also entailed identifying the causes of those deaths and major injuries still occurring that may have been prevented by better compliance with the provisions of LOLER / PUWER 98. The information on the causes of injuries can be used to identify whether they are attributed to particular aspects of LOLER / PUWER 98 that require further attention, and / or whether they arise from non-compliance with the regulations as a whole. Finally, the analysis can be used to assess whether deaths and injuries due to the factors covered by LOLER / PUWER 98 still comprise a significant proportion of injuries. This can be used as a measure of the effectiveness of the implementation of these regulations.

As previously noted, the initial stages of consultation reported that the regulations did not have any noticeable impact on defect rates or productivity, and no organisations could offer data on these points. Accordingly, the quantitative assessment of benefits focused on the change in injury rates. The assessment of PUWER 98 and LOLER commenced with an analysis of fatal accident investigation reports, as they provide some information to help determine if the number of fatalities related to the provisions covered by PUWER 98 and LOLER have declined. The analysis then proceeds to consider major injuries and, in the case of machinery related injuries, over three day injuries.

As the work progressed it became apparent that there was little, if any, change in the rate of injuries, which could be identified before and after 1998 that could be ascribed to the provisions introduced in 1998. Aside from the apparent plateau in injury rates, the relatively small number of deaths and the short period of study (1996 to 2001) reduce the likelihood of being able to confirm the statistical significance of small changes in injury rates. Accordingly, the need to identify a counterfactual case, wherein incidental factors are identified that might account for reductions in injury rates, was of less importance. In addition, it transpired that the HSE did not foresee, at the time of implementing the regulations, any reduction in injury rates until after 2002. Hence, the assessment of counterfactual issues focused on whether economic factors may have masked improvements in safety performance.

The analysis of machinery related injuries for the period 1988 to 2001 was able to identify a falling trend, after allowing for the economic cycle. The estimated number of averted machinery injuries was therefore expressed as a financial value.

2.4.3 Overview of accident / incident investigation analysis

In order to determine any changes in the causes of reportable accidents, an analysis of enforcing authority fatal and major injury accidents, and dangerous occurrences (DOs)\(^6\) investigations reports was undertaken.

A framework for categorising contributory causes of accidents / DOs was developed so that factors could be compared before and after PUWER 98 / LOLER. Each investigation report was examined in detail for contributory causes. Consideration was given to the change in information provided by inspectors in their investigation reports following the introduction of the regulations. For instance, lack of rollover protective structures (ROPS) may not have been explicitly mentioned in relation to accidents before PUWER 98 came into force, but our analysis was considering whether accidents where rollover protective structures, for instance, would have reduced the chances of an injury, regardless of what the legal requirements were at the time.

\[^6\] Fatal, major injury accidents and dangerous occurrences are reportable incidents, as defined in The Reporting of Injuries Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). It is a requirement to report them to the appropriate enforcing authority, usually the Health and Safety Executive or the Local Authority.
Those accident “kinds” (HSE’s categorisation), which were in any way related to the issues addressed by these regulations, were identified for as many years as were available – 1996-2001. For fatalities, all relevant accidents were examined. For major injuries, accident samples of 150 before and 150 after December 1998 were taken to assess differences. Relevance to PUWER was first assessed, and for those where PUWER was at least partially relevant, contributory causes were then analysed.

Fatal injuries

The analysis of fatal injuries is summarised below.

1. Step 1: Collate reports

Accident investigation summaries were collected entailing:

- People killed by overturning vehicles (Fork lift trucks, mobile plant, tractors, etc);
- People struck by moving vehicles (Fork lift trucks, mobile plant, tractors, etc);
- People killed by contact with moving machinery;
- People killed by electrocution (by contact with equipment improperly earthed / isolated);
- People killed during lifting operations – falls from lifting equipment, being struck during lifting operations, collapse of equipment during lifting operations.

The HSE provided copies of accident investigation summaries from the “Focus” database back to 1996. The analysis was restricted to those deaths involving equipment that is (or would now be) covered by PUWER 98 / LOLER.

2. Step 2: Categorise causes

A classification scheme was developed and applied in order to:

- Identify which deaths could have been prevented by the proper implementation of PUWER 98 / LOLER, per year for each sector, and for all sectors together;
- Identify which deaths could not have reasonably been prevented by the proper implementation of PUWER 98 / LOLER, per year for each sector, and for all sectors together.

(Note that the introduction of CCTV and special mirrors to correct poor driver visibility is dealt with in PUWER, but there has been a problem with the supply legislation that has resulted in only limited fitting of these devices, mainly to Quarrying Machinery, so the benefit of this requirement is not yet realised.)

7 1996 was the year that HSE’s current database came into use in the field, and 2001 is the most up to date data available. (The local authority unit reported that there were no relevant fatalities in the period.)

8 “FOCUS” is the database that HSE operates to collect and maintain records about their contact with duty holders and workplaces, enforcement action taken and reported incidents/complaints etc.
3. **Step 3: Analysis**

The analysis comprised:

- Calculating the proportion of deaths classed as “PUWER preventable” as a percentage of all deaths per type of incident (i.e. overturning, struck by, etc), and then for all fatals that fall into these types;

- Calculating the rate of fatal deaths per 100,000 workers for each year for each type of preventable and non-preventable type of incident;

- Examining data for trends in percent and rates by year for each sector and for all sectors.

4. **Step 4: Statistical tests**

A number of statistical tests were applied, specifically:

- Of the difference in the percent of deaths that are “PUWER preventable” before and after 1998-89 — for all industries data and for each sector;

- Of the difference in the rates of deaths per million employees that are “PUWER preventable” before and after 1998-99 – for all industries data and for each sector.

The trends in “PUWER preventable” deaths were compared with overall rate of deaths attributed to each type of incident (e.g. overturning) and to overall rate of fatal injury.

5. **Step 5: Counterfactual**

The intention was to correlate numbers and rates of deaths with economic activity indices as injury rates tend to increase with economic activity. The level of employment has been used as an indicator of economic activity. Estimates of the degree of variation in injury rates associated with economic activity have been produced and, for some categories of data, used to predict the number of injuries that would be expected before and after the change in regulations. The predicted number of injuries and the trend in rates is compared with the reported number to inform the judgement of how the regulations impacted injury rates.

It should be noted that respondents were certain that the equipment modifications, training and changes in Thorough Examination (TE) were a direct response to the specific requirements of PUWER 98 and LOLER, and did not occur for any other reason. This was supported by the detailed case studies, wherein respondents directly linked changes to the regulations.

6. **Step 6: Value of life saved**

Any reduction in deaths and injuries is translated into a nominal financial value by applying a value per averted death and major injury of:

- £1.8m per death

- £150,000 per major injury.
These values were estimated in the evaluation of the Paper And Board Industry Advisory Committee (PABIAC) safety initiative\(^9\), and take account of the higher damage / business disruption costs incurred in workplace incidents than the road traffic environment from which such values were originally derived. In principle the total number of averted injuries are estimated for the same period as the cost of compliance and discounted by 5% to produce a comparable net present value.

**Major injuries**

Data was also collected on investigated major injuries entailing:

- Overturning vehicles (Fork lift trucks, mobile plant, tractors, etc);
- Struck by moving vehicles (Fork lift trucks, mobile plant, tractors, etc);
- Contact with moving machinery;
- Electrocution (by contact with equipment improperly earthed / isolated);
- During lifting operations – falls from lifting equipment, being struck during lifting operations, collapse of equipment during lifting operations.

A sample of 150 injuries was analysed. An estimate was produced of the proportion of investigated major injuries that were PUWER / LOLER “preventable” before and after 1998 to identify any changes.

**Dangerous occurrences (DOs)**

A sample of investigated DOs involving agents covered by LOLER was obtained. Incidents, which were LOLER preventable as above, were identified. The number and rate per 100,000 employees by year was plotted.

**Review of HSE analyses of transport injuries**

The HSE’s 2001 review of workplace transport injuries\(^10\) has been reinterpreted for the needs of this study. The HSE work covered both fatal and major injuries. The re-assessment includes:

- Assessing trends in the rate of those categories of transport related injuries that may have been impacted by the regulations;
- Factoring in the influence of reporting practices and economic activity levels;
- Concluding whether there are any detectable changes in injury rates.

**Contact with machinery injuries**

The annual HSE statistics on Contact with moving machinery have been assessed for the period 1986 to 2001 to identify any change before and after 1993. This includes:

- Assessing trends in the rate of injuries before and after 1993;

\(^9\)Horbury C & D. Collier *The effectiveness and impact of the PABIAC initiative in reducing accidents in the paper industry* CRR 453/2002

• Factoring in the influence of reporting practices and economic activity levels;
• Concluding whether there are any detectable changes in injury rates after 1993.

2.4.4 Comparison of costs and benefits

This involved drawing all elements of the research together, including:

1. A comparison of the “net costs” with benefit associated with discernable changes in the accident rate due to PUWER / LOLER was made.


3. Drawing together the results of the accident rate analysis and employers’ subjective views of how they responded to PUWER 92 / 98 and LOLER and the influence of incidental factors.

This thus enabled conclusions to be drawn regarding the balance of costs and benefits.
3 THE AMENDING DIRECTIVE TO THE USE OF WORK EQUIPMENT DIRECTIVE (AUWED)

3.1 Introduction

The purpose of this section is to detail the key new provisions of the Amending Directive (95/63/EC) to the Use of Work Equipment Directive (89/655/EEC).

Since the key UK provisions implementing this Directive are the Provision and Use of Work Equipment Regulations 1998 (PUWER 98) and the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), this section incorporates an analysis of the differences between PUWER 98 and PUWER 92, and the key changes in legislative requirements brought in by LOLER.

Table 3 Overview of scope and requirements of PUWER 98 / LOLER

<table>
<thead>
<tr>
<th>Whilst PUWER 98 and LOLER (and their associated guidance) cover all work equipment, it is of particular relevance to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Woodworking machinery;</td>
</tr>
<tr>
<td>• Mobile equipment / vehicles;</td>
</tr>
<tr>
<td>• Rider operated trucks and lifting equipment;</td>
</tr>
<tr>
<td>• Power presses;</td>
</tr>
<tr>
<td>• Other machinery with moving parts.</td>
</tr>
</tbody>
</table>

Accordingly, sectors such as construction, manufacturing and warehousing may have a larger amount of and higher hazard equipment covered by the regulations than (say) the finance industry.

Key requirements cover management and physical aspects of equipment, such as training, equipment selection, maintenance, inspection and examination, lighting, emergency stops / controls.

There is some overlap between PUWER and other health and safety regulations.

3.2 Overview of the new requirements and UK transposition arrangements

3.2.1 Introduction

AUWED’s main new requirements are around mobile work equipment, lifting equipment and the inspection of work equipment.
There is a mix of “hardware” (physical features of equipment) and “software” (management provisions) requirements. The specific provisions for mobile equipment have been transposed into UK legislation primarily through PUWER 98, and for lifting through LOLER. Most of the requirements of PUWER 98 apply also to lifting equipment. In other words, LOLER attempts to control risks arising from lifting operations specifically, and leaves the more general hazards to PUWER 98.

Inspection requirements are implemented via both sets of regulations, though it should be noted that the requirement to inspect equipment covered by the Construction Health, Safety and Welfare Regulations is implemented by Regulation 29 of those regulations.

PUWER 98 and LOLER should not be considered in isolation. The Management of Health and Safety at Work Regulations 1999 (the Management Regulations) require a risk assessment to be carried out in order to identify the measures that should be taken to comply with relevant legislation. This should ensure, for example, the selection of suitable work equipment under PUWER 98 (Regulation 4) and the identification of the control measures necessary to prevent access to dangerous parts (Regulation 11) for machinery not supplied under the Supply of Machinery Regulations 1992, and measures to be considered when planning a lift (Regulation 8 LOLER).

3.2.2 Health and Safety at Work etc. Act 1974 and other legislation

It should be noted that aspects of AUWED are implemented through section 2 of the Health and Safety at Work etc. Act 1974. Supporting ACoPs and guidance are contained within HSC’s “The Safe Use of Equipment; Provision and Use of Work Equipment Regulations 1998, Approved Code of Practice”. This includes guidance on erection and dismantling of work equipment, safe systems of work, groups at risk, competence of workers, risks to pedestrians from the movement of mobile work equipment and risks from lightning strikes.

There is also some overlap between PUWER 98 and other legislation such as the Workplace (Health, Safety and Welfare) Regulations 1992 (risks to pedestrians from vehicles), and the Construction (Health, Safety and Welfare) Regulations 1996 (standards for work equipment such as scaffolding).

3.2.3 Other differences between PUWER 92 and 98

PUWER 98 replaces PUWER 92, and revokes the Power Presses Regulations 1965 and amendments (1972), as well as the remaining provisions of the Woodworking Machinery Regulations 1974. New regulations (part of PUWER 98) replace legislation applying to power presses, and an ACoP and guidance (supporting PUWER 98) has been produced for woodworking equipment. As well as implementing AUWED’s requirements, the opportunity has been taken to consolidate much legislation into one set of regulations. Other differences are:

- The definition of “work equipment” has been extended to include installations “such as a series of machines connected together for example a paper-making line or enclosure for providing sound insulation or scaffolding or similar access equipment (except where the Construction (Health, Safety and Welfare) Regulations 1996 impose more detailed requirements).” However, since the word “installation” replaces the phrase “any

11 Health & Safety Executive / Local Authorities Enforcement Liaison Committee (HELA) The Provision and Use of Work Equipment Regulations 1998 LAC No 90/3
assembly of components which in order to achieve a common end are arranged and controlled so that they function as a whole” in PUWER 92, this change is unlikely to make a big difference;

- In contrast to PUWER 92, there is now a duty on people who have control of work equipment such as plant hire. It should be noted that, in effect, the formal transitional period provides for some of the provisions for mobile work equipment (regulations 25-30) for these duty holders do not apply, since work equipment that they supplied for use in other workplaces would be considered “new equipment” for that workplace if supplied for use after 4 December 1998 (the transitional provisions only allow that Regulations 25-30 do not apply to “work equipment provided for use in the undertaking or establishment before 5th December 2002”12 Regulation 37);

- There were also changes in the guidance and ACoP supporting regulation 7 (specific risks) to attempt to clarify meaning. The changes reflect HSC’s view of the meaning of the directive that in situations where all the requirements of PUWER are met, but that there are still significant residual risks then greater emphasis should be given to the selection of persons to use the equipment and their instruction and training.

- There were changes to regulation 10 (conformity with Community requirements), also intended to clarify requirements, and minor changes to regulation 18 (control systems) which are required by AUWED. It should be noted that during the final stages of completing this research in late 2002, regulation 10 was further amended.

3.2.4 Other changes in the UK relevant to lifting equipment

LOLER replaces most of a variety of sector-based legislation on lifting equipment e.g. legislation on factories, offices, shops, railway premises and construction sites. Seventeen sets of regulations have been repealed (in whole or in part) along with ss22, 23, and 25-27 of the Factories Act 1961. Almost all earlier lifting legislation has been repealed or revoked. For instance, amendments to the Shipbuilding and Ship-repairing Regulations 1960 remove the lifting requirements from those Regulations. Regulations in the Docks Regulations 1988, which were inconsistent with LOLER have been revoked, although some 'lifting' parts of these regulations have been retained because they go beyond LOLER, e.g. reg.16 concerns marking the weight of lifting accessories if they are significantly heavy.

Therefore, LOLER creates a single set of regulations that apply to all sectors. This single regime was new in 1998, though HSE considers most of LOLER’s requirements to be direct replacements for those in the earlier sector-based legislation, or enforced using Health and Safety at Work etc. Act 1974 provisions13.

Although it has a much broader definition, LOLER is aimed primarily at the type of equipment covered by previous legislation – cranes, lifts and hoists, as well as components such as chains, ropes, slings, hooks, shackles and eyebolts. However, LOLER will now apply in whichever industry this range of equipment is used, including those (such as agriculture and education) not previously covered by specific regulations.

12 Regulation 37, Provision and Use of Work Equipment Regulations 1998
13 HSE Operational Circular OC 234/11 Lifting operations and Lifting Equipment Regulations 1998
LOLER does not define lifting equipment as narrowly as older legislation. Earlier legislation was concerned with cranes and other lifting machines, but had narrow definitions about which equipment it applied to. For example, the definition excluded fork lift trucks (FLT) as lifting machines. LOLER overcomes some of these problems since it applies to any lifting equipment that presents similar risks to the equipment mentioned in older legislation. Some examples of equipment that would not have previously been covered by lifting legislation include: ropes used for climbing or work positioning during arboriculture; a paper roll hoist on a printing machine; automated storage and retrieval system; bath hoist lifting a nursing home resident; or refuse vehicle loading arm used for loading skips onto a lorry, etc\textsuperscript{14}.

3.3 UK AUWED transposition arrangements

3.3.1 The Provision and Use of Work Equipment regulations 1998

*Regulation 6 Inspection*

This requires the systematic checking of work equipment to identify whether the equipment can be operated, adjusted and maintained safely, and that any deterioration can be detected and remedied before it results in unacceptable risks. Inspections are to be carried out following installation and before use, following relocation of work equipment, following deterioration of work equipment, or in other exceptional circumstances affecting the safe operation of the equipment.

This regulation also requires records of such inspections to be kept. Checks can include visual or functional checks and testing. (As noted above work equipment covered by Regulation 29 of the Construction (Health, Safety and Welfare) Regulations 1996 is not included within the scope of Regulation 6.)

HELA LAC 90/3 states that: “The new requirement to inspect work equipment builds on and acts as an “audit” of both the operator / user checks, which should be carried out as part of good practice and maintenance (servicing) procedures… The general principle should be that inspection is necessary when equipment or parts of equipment will deteriorate and lead to danger and this will not be picked up through operator checks and normal servicing regimes.”\textsuperscript{15}

*Regulations 25-30 Mobile equipment*

As discussed above some of the requirements of AUWED, with respect to mobile equipment, are implemented via the Health and Safety at Work etc. Act 1974 (and published in the PUWER ACoP and guidance). In particular, with regard to the protection of pedestrians this builds on provisions in the Workplace (Health, Safety and Welfare) Regulations 1992 and the Construction (Health, Safety and Welfare) Regulations 1996.

Regulations 25-30 of PUWER 98 also apply to mobile equipment; from 5 December 1998 for mobile work equipment taken into use in an undertaking on or after that date. For other equipment employers had four years to comply (i.e. until 5 December 2002).


\textsuperscript{15} Health & Safety Executive / Local Authorities Enforcement Liaison Committee (HELA) The Provision and Use of Work Equipment Regulations 1998 LAC No 90/3
**Regulation 25 Employees carried on mobile work equipment**

Mobile work equipment used to carry people should:

- Be suitable for carrying persons – drivers and workers (including passengers), and;
- Incorporate features to protect against:
  - Falling out of the work equipment;
  - Unexpected movement of the work equipment, and;
  - Contact with wheels or tracks.

Making mobile work equipment safe will include measures such as fitting locks to doors, providing extra safety belts or extra guarding and providing safety warning notices.

**Regulation 26 Rolling over of mobile work equipment**

This regulation applies where there is a risk of roll-over. It addresses both measures necessary to reduce the risk of roll-over and increase the protection of those being carried in the event that roll-over does occur. Thus the regulation sets two key requirements for work equipment:

- Its design should make it structurally safe (e.g. “Roll-over protective structures” (ROPS), inherent stability, etc.). Examples where ROPS will be the most practical solution include tractors (where no cab is / can be fitted); certain compact dumpers; all-terrain vehicles (sit-in type); and rough terrain variable reach trucks (telehandlers).
- It should incorporate measures that will hold those being carried securely and so protecting them from crushing should roll-over occur (e.g. “Restraining systems”).

**Regulation 27 Overturning of fork-lift trucks**

Regulation 26 does not apply to a forklift truck, which have a structure(s) ensuring that it does not fall more than 90 degrees and gives sufficient clearance to people should it fall further. Regulation 27 specifically deals with the risk to fork-lift truck occupants from crushing during roll-over.

**Regulation 28 Self-propelled work equipment**

This regulation requires a number of safety features covering:

- Regulation 28(a): unauthorised start up;
- Regulation 28(b): collision of rail-mounted equipment;
- Regulation 28(c): braking and stopping;
- Regulation 28(d): emergency braking and stopping facilities;
- Regulation 28(e): field of vision;
- Regulation 28(f): lighting for use in the dark;
- Regulation 28(g): fire-fighting equipment.
**Regulation 29 Remote-controlled self-propelled work equipment**

This regulation covers work-equipment controlled by devices not physically linked to the equipment, e.g. radio control. It requires that the equipment stops automatically once it leaves its control range, and incorporates features to reduce the risk of crushing or impact.

**Regulation 30 Drive Shafts**

This covers the risk from a drive shaft stalling (which can lead to the ejection of parts, for instance) and requires the protection of the shaft while it is uncoupled.

### 3.3.2 Lifting Operations and Lifting Equipment regulations 1998

LOLER deals with the particular risks associated with both the provision and use of lifting equipment and the management of lifting operations. As said previously, it has a wider definition of “lifting equipment” than previous legislation, and applies across all sectors. However, HSE considers that most provisions were previously required either under sector-specific legislation or under the general provisions of the Health and Safety at Work etc. Act 1974.\(^{16}\)

Like PUWER 98, measures required by LOLER will be identified via a risk assessment required by the Management of Health and Safety at Work Regulations 1999.

The key new requirements of AUWED are found in regulation 8 (organisation of lifting operations) and Regulation 9 (thorough examination and inspection).

**Regulation 8 Managing lifting operations**

The main requirements of Regulation 8 are that lifting operations (from where the load starts to where it finishes) are planned, supervised, and safe. The plan may need to be written for some major operations. The amount and quality of supervision will be proportional to the risk and take into account the people involved.

One provision previously provided for in some regulations (now revoked) was lifting loads greater than the Safe Working Load of lifting equipment. HSE considers this is unnecessary for normal (i.e. non-test) lifting operations, since it is nowadays relatively easy to obtain suitable lifting equipment. There is, therefore, no provision within LOLER for this.

The Approved Code of Practice covers the following aspects of organising a lift:

- Planning;
- Working under suspended loads;
- Visibility of the path of the load by the operator;
- Attaching / detaching and securing loads;
- Environment e.g. wind, fog, unstable ground;
- Location;

\(^{16}\) HSE Operational Circular OC 234/11 *Lifting operations and Lifting Equipment Regulations 1998*, Para 142
Regulation 9 Thorough Examination

The ACoP and guidance paragraphs 297-299 describe the four situations in which thorough examination under Regulation 9 may be required. These are:

1. When lifting equipment is first 'supplied', i.e. used for the first time by that employer;
2. When certain equipment, e.g. a tower crane, is 'installed';
3. Periodically during the lifetime of equipment; and
4. Following exceptional circumstances.

The thorough examination requirements carry forward long-standing procedures in the UK, e.g. FA 1961 s.27, for 'traditional' lifting equipment (e.g. cranes, lifts, hoists, teagles, pulley blocks) and are essentially unchanged from those earlier provisions. HSE advises that where a thorough examination was required for such lifting equipment under previous legislation, then such examinations should now be required under LOLER reg.9. Due to the extended scope of the regulations, thorough examinations will also be needed where such lifting equipment is used in premises (such as farms, universities, etc.), which were not previously subject to specific lifting law.

Where other types of lifting equipment, not previously covered by such provisions (such as MEWPs (mobile elevated work platforms) present risks which are similar to those arising from the use of 'traditional' lifting equipment, HSE’s advice is that they will also need a thorough examination.

The regulation gives a choice between fixed frequencies of examination defined in the regulations (Regulation 9(3)(a)(i),(ii)) (unless a competent person deems shorter intervals necessary) or examination according to an “examination scheme” specifying the intervals between examinations and drawn up by a competent person (9(3)(a)(iii)). The regulation also requires inspection where the risk assessment identifies risks to operators and other workers, which would be addressed by inspection.

Key issues covered in the ACoP are:

- Competent person (knowledge and impartiality);
- Thorough examination (which equipment and how thorough);
- Testing (competent person should decide);
- Examination after installation or reconfiguration;
- In-service thorough examination;
- Examination schemes;
- Inspection.
4 EXPERIENCES OF IMPLEMENTATION

4.1 Introduction
This section draws together results from the interview stages and the main postal surveys of equipment users, suppliers and inspection companies. It reports back on the following themes:

- Awareness and familiarity of the regulations;
- Understanding of the regulations and their associated concepts;
- What actions people have taken to comply with the regulations;
- Motivations for that action;
- Understanding of equipment supply legislations;
- General issues and problems with implementation;
- HSE ACoPs and Guidance;
- Other sector specific issues;
- PUWER 92 and ongoing compliance;
- Respondent suggested improvements.

4.2 Awareness and familiarity

4.2.1 Key points

- The 1998 regulations seem to have been successful in raising awareness of all equipment regulations;
- The majority are aware of the regulations, and most users of the main groups of equipment do, at least broadly, understand the link between LOLER and PUWER 98;
- The vast majority of suppliers of work equipment believe the regulations apply to the equipment they supply (probably influenced by their awareness of the Supply of Machinery (Safety) Regulations 1992);
- Over one third of small companies with equipment claim not to have heard of the regulations;
- Sectors with an above average rate of not having heard of the regulations are: agriculture, education, hotel and catering, health and retail (though note that when broken down into sectors the numbers are relatively small so that this cannot be a firm conclusion);
• Construction show an above average familiarity with the regulations, but still 9 out of 56 declare themselves not very familiar with the regulations;

• Around 10% of those who supply the main groups of equipment assess themselves as not being very familiar with the regulations. This doesn’t vary according to type of equipment supplied. Combined with evidence that there is reliance on suppliers by users for training, this may be a concern.

4.2.2 Results in detail

The view amongst suppliers (backed by the RSU report\textsuperscript{17}) was that small companies were not aware of the regulations. Initial interviews confirmed this, particularly amongst retail and construction companies. This was supported by the survey, but to some extent is explained by smaller companies not having much equipment significantly impacted by the regulations.

LOLER and PUWER 98 raised awareness of PUWER 92 (and possibly also the other elements of the 6-pack). There was a fairly consistent view that PUWER 98 actually increased compliance with provisions brought in by PUWER 92. There was an impression amongst interviewees that LOLER had a greater impact on awareness. The interviews showed that there is now a wider awareness of the existence of legislation on work equipment, and there seemed to be a view that there was an improved understanding of what “work equipment” meant, as a result of PUWER 98. One interviewee suggested that this was because PUWER 92 was subsumed by the 6-pack.

The main survey shows that almost 60% of respondents think that PUWER and LOLER apply to them at least “somewhat”, almost 50% believing that PUWER applies “a lot” (Figure 7). Although the survey will have influenced some respondents’ awareness of the regulations, this clearly shows that a majority do understand that there are regulations on work equipment, which apply to them. There is however a marked difference between responses according to company size. Figure 8 shows that less than 40% of small companies believe that PUWER applies to them at all, and this drops to less than 20% for companies with less than 10 employees. In contrast, over 90% of organisations with over 250 employees believe that PUWER applies at least “somewhat”. This may be a cause for concern, but may merely indicate that smaller firms are less likely to have equipment, which requires significant action by the user in order to comply with the regulations.

\textsuperscript{17} Review of the Provision and Use of Work Equipment Regulations (PUWER) 1992 RSU Ref 3525/R64.030
Figure 7 Percentage of users believing that PUWER and LOLER apply to them

Figure 8 Extent of belief of application of PUWER, by size of firm (defined by number of employees)
Figure 9 shows that the vast majority of suppliers surveyed thought that PUWER and LOLER applied to the equipment they supplied. It is likely that this is influenced by their awareness of the Supply of Machinery (Safety) Regulations 1992, regulations which are closely related to PUWER and LOLER, but which place duties on suppliers.

The survey also tested self-declared familiarity with the regulations. Note that, as with most of the survey questions, this question was answered by those respondents identifying themselves as using or supplying equipment definitely covered by LOLER and / or PUWER.

Figure 10 shows the familiarity with the PUWER regulations, prior to the survey, of all those who thought that either PUWER or LOLER applied to them. (Note that respondents were asked to estimate their familiarity with the regulations prior to the survey). It shows that almost 5% of suppliers had never heard of the regulations and another 5% were not very familiar with them. Just over 20% of users have either not heard of the regulations, or have heard of them but are not very familiar with them. Breakdown of the supplier data shows no significant differences between suppliers of different types of equipment.

Figure 11 shows this data for users by size of company, and it shows a very marked difference between company sizes. Of SMEs, over 30% of companies with 10-49 employees claim never to have heard of the regulations, as do over 40% of smaller firms (< 10 employees).
**Figure 10** Familiarity with PUWER of users and suppliers

<table>
<thead>
<tr>
<th></th>
<th>Users</th>
<th>Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Never Heard</td>
<td>7.6%</td>
<td>4.8%</td>
</tr>
<tr>
<td>2 Heard not familiar</td>
<td>14.6%</td>
<td>4.8%</td>
</tr>
<tr>
<td>3 Familiar</td>
<td>44.0%</td>
<td>46.8%</td>
</tr>
<tr>
<td>4 Very Familiar</td>
<td>33.8%</td>
<td>43.5%</td>
</tr>
</tbody>
</table>

**Figure 11** Familiarity with regulations by company size (by employee numbers)
Table 4 shows this data by sector. The sectors which have above-average proportion of respondents who have never heard of the regulations are agriculture, education, hotel and catering, health, and retail. Those sectors showing above average combined “familiar” and “very familiar” are construction, local government, manufacturing, and utilities (though utility numbers are very small). It is notable, though perhaps not surprising, that despite the regulations’ relevance to the sector, five out of fourteen agriculture respondents indicated that they had not heard of or were not very familiar with the regulations. Construction can be contrasted with this, with an above average familiarity with the regulations. However still 15% had either not heard of the regulations or were not very familiar with them.

**Table 4 User familiarity with PUWER by sector**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Never heard of them</th>
<th>Heard of them but not very familiar</th>
<th>Familiar with the regulations</th>
<th>Very familiar with the regulations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Agriculture</td>
<td>2</td>
<td>14%</td>
<td>3</td>
<td>21%</td>
<td>5</td>
</tr>
<tr>
<td>Construction</td>
<td>3</td>
<td>5%</td>
<td>6</td>
<td>11%</td>
<td>25</td>
</tr>
<tr>
<td>Financial Services</td>
<td>0%</td>
<td></td>
<td>1</td>
<td>33%</td>
<td>2</td>
</tr>
<tr>
<td>Education</td>
<td>4</td>
<td>18%</td>
<td>4</td>
<td>18%</td>
<td>9</td>
</tr>
<tr>
<td>Hotel and / or catering</td>
<td>2</td>
<td>17%</td>
<td>2</td>
<td>17%</td>
<td>7</td>
</tr>
<tr>
<td>Local Government</td>
<td>0%</td>
<td></td>
<td>0%</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>4</td>
<td>4%</td>
<td>8</td>
<td>7%</td>
<td>49</td>
</tr>
<tr>
<td>Health</td>
<td>5</td>
<td>13%</td>
<td>9</td>
<td>23%</td>
<td>18</td>
</tr>
<tr>
<td>Business / Professional services</td>
<td>1</td>
<td>10%</td>
<td>3</td>
<td>30%</td>
<td>5</td>
</tr>
<tr>
<td>Retail or repairs</td>
<td>2</td>
<td>13%</td>
<td>3</td>
<td>20%</td>
<td>8</td>
</tr>
<tr>
<td>Transport</td>
<td>1</td>
<td>5%</td>
<td>5</td>
<td>23%</td>
<td>8</td>
</tr>
<tr>
<td>Telecoms</td>
<td>0%</td>
<td></td>
<td>1</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>Utilities</td>
<td>0%</td>
<td></td>
<td>0%</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Warehousing</td>
<td>1</td>
<td>5%</td>
<td>6</td>
<td>32%</td>
<td>6</td>
</tr>
<tr>
<td>Grand Total</td>
<td>25</td>
<td>7%</td>
<td>51</td>
<td>15%</td>
<td>150</td>
</tr>
</tbody>
</table>
Figure 12 shows familiarity with the LOLER regulations of all those who thought that either PUWER or LOLER applied to them. (Note again that respondents were asked to estimate their familiarity with the regulations before the survey). These show very similar results to the PUWER familiarity. However there is a notable difference in confidence on the part of suppliers – more suppliers think themselves “very familiar” and fewer just “familiar” compared to users. A breakdown of respondents supplying different types of equipment shows little variation in proportions of total “familiar” with “very familiar”, though there are greater proportions assessing themselves as “very familiar” amongst those supplying lifting equipment or contract lifting services.

![Figure 12 Familiarity with LOLER of users and suppliers](image)

Figure 13 shows the PUWER familiarity data, but by the differently impacted sectors. Again all answering this question have previously answered that either LOLER or PUWER apply to them. Over 15% of industries likely to have high numbers of equipment are not familiar with, or have not heard of, the regulations, but this is significantly fewer than medium and low equipment sectors. Encouragingly, a much higher proportion of "High" sectors are “Very Familiar” with the PUWER regulations.
Figure 13 Familiarity with PUWER by High / Medium / Low equipment users

4.3 Understanding

4.3.1 Key points

- The application of PUWER 98 and LOLER is clear to those with the key groups of equipment;

- Construction respondents are most likely to agree that by contracting out lifting operations the client has no responsibility for the lift;

- Around a third of respondents with work equipment agree that it is not clear what is meant by a “competent person”;

- There is widespread opinion that there is confusion about the nature of risk assessment;

- There is great confusion about the meanings of and distinction between “thorough examination” and “inspection” as defined in the regulations, many believing that:
  - Inspection is always in-depth and always involves someone external to the company;
  - Inspection is anything at all that involves checking health and safety features;
  - Thorough examination is a type of planned preventive maintenance.
Almost a fifth of users either agreed that or were unsure whether doing thorough examination means you don’t have to do inspection;

The survey showed that there was a good understanding that carrying out planned preventive maintenance did not mean that inspection was then not necessary;

A significant minority believe the LOLER requirement to plan lifts is unnecessarily bureaucratic.

4.3.2 Results in detail

General

There were a range of issues of understanding arising from the early stage interviews, including confusion over the relationship between PUWER and LOLER; between PUWER and the Management Regulations; the LOLER planning requirements; and the definition of competent person and understanding of risk assessment. The main survey was used to further test these issues.

The interviews showed that the general view is that there are difficulties grasping the relationship between LOLER and PUWER, and between PUWER and the Management Regulations. There was some evidence that many smaller companies in particular have little understanding of their responsibilities. This was particularly noticeable amongst small retail companies, several of whom had not heard of the regulations, including a full-time health and safety officer. One comment was that the distinction between lifting and other work equipment was not clear.

In our early interviews there was widespread opinion amongst equipment hire and manufacturers, and some Health and Safety Inspectors that people still do not understand “risk assessment” as a concept or consider it at an early enough stage. For instance:

- A belief in the woodworking industry that brakes are always required, even if there is no access to the blade during run-down.
- Paper mills not assessing the very frequent use of rope hoists so that there has been a high failure rate, and no increased inspection frequency.
- Users asking for safety features as a bolt-on, not on the original specification.

Encouragingly, the main survey showed a reasonably high level of understanding amongst those who are aware they have key pieces of equipment. For instance Table 37 and Table 38 (see Appendix 1) show that:

- Of the 183 who said they had machinery requiring guarding - only one thought PUWER did not apply to them;
- Of the 158 with MEWPS no one thought PUWER did not apply;
- Of the 120 with mobile equipment no one thought PUWER did not apply;
- Of the 124 respondents who contract in lifting services only two thought that LOLER did not apply to them;
Of the 158 respondents with MEWPS only two thought that LOLER did not apply (with one not answering); and,

Of the 256 saying they have lifting equipment only two felt that LOLER did not apply.

Also encouragingly, Table 39 (see appendix 1) shows that of 275 respondents who think LOLER applies to them only three believed that PUWER does not apply to them. Generally people believed the two sets of regulations either applied to them or they did not, in contrast to early indications that many who understood that LOLER applied to them did not always understand that PUWER did as well.

The main survey also asked people to rate the strength of their agreement with various statements about the regulations (see question 7 in the user questionnaire in Appendix 2). Figure 14 shows the responses of users to these questions and Figure 15 shows the same for suppliers. Both figures show similar patterns of responses, though there are some differences. Suppliers are less unsure of their views about whether there are conflicts or duplication, though both groups on average think there is duplication (over 50% agreeing), but no conflicts (though with a higher degree of uncertainty – over 35% of users indicating “unsure”).

![Figure 14: Understanding of and attitude towards regulations (Users)](image-url)
Several interviewees commented that following the LOLER requirement to plan lifts to the letter would not be practicable. There seems to be a widespread perception that LOLER requires extensive written planning for all lifting operations, even those posing very low risk and/or carried out routinely. This may actually reflect confusion about when written plans are required and the extent of detail required.

The main survey showed a significant proportion agreeing that there was unnecessary bureaucracy, with around 20% of both groups agreeing that this was true.

The other main issue arising about LOLER was that some users believe that when they contract out lifting, this leaves them with no responsibility for the safety of the lifting operation. Suppliers reported this in the early interviews and this was supported by the results of the main survey. There was a marked difference between users and suppliers in the percentage of respondents agreeing that, for contracted out lifting operations “the contractor is entirely responsible for the safety of the lift”. 10% of suppliers either “probably” or “definitely” agreed, whilst almost a quarter of users agreed. There is also a difference in response by size of company (Figure 16). SMEs were both more unsure about their response and more likely to agree, but still almost 20% of large companies (33 out of 181) agree with the statement. Perhaps most importantly, around 20% of those who indicated that they currently used such lifting services agreed with the statement as well (Figure 17). When analysed by sector there is little discernable difference in attitudes (perhaps due to the small numbers), but it is notable that over a third of construction respondents (twenty one out of fifty eight) agree that the safety of a lifting operation is the contractor’s entire responsibility (Table 40 in Appendix 1).
Figure 16 “When contracting out lifting operations the contractor is entirely responsible for the safety of the lift” by size of company (by employee numbers)

Figure 17 Of those who use contract lifting services, do they agree that the contractor is entirely responsible for the safety of the lift?
**Competence & training**

“Competent person” is not a well understood phrase. Many suppliers / hirers do not think their customers understand what “competence” means.

There was a suggestion that the confusion arises from it being a term used in different parts of legislation, one pointing out that there have been sixty definitions of the term in health and safety legislation. There is a perception that there is “inconsistency” in the meaning of the term in different regulations, and this is considered confusing. For instance, the competence required of drivers is different compared with other workers. There is also some concern about how to assess training providers.

In summary, there is widespread confusion about the meaning of the term “competence”, and there may be scope for further clarification.

The main survey showed that suppliers were less uncertain than users about “competence”, but still a third of supplier respondents (and almost a third of users) thought that it was not clear what a “competent person” is (Figure 14, Figure 15).

**Box 1 Difficulty encountered by user with understanding of “competence”**

“The definition of competence to operate MEWPs remains a challenge to us all. IPAF, CITB or other recognised certification takes us so far, but may not apply to the type of MEWP being operated; may have lapsed; or may be newly gained, Experienced operatives may be extremely competent on their machines, but hold no formal qualification.”

**Inspection and thorough examination**

The early interviews pointed to widespread confusion about the meaning of the terms “inspection” and “thorough examination”. One equipment supplier said “we found it hard grasping the difference between “inspection” and maintenance”. This respondent went on to say about their clients: “We are still doing presentations four years on – there is confusion and ignorance”. The inspectors’ survey confirmed their view that their clients do not understand the terms.

The main survey tested to what extent respondents agreed or disagreed with a range of statements about inspection and thorough examination. Figure 18 and Figure 19 show the responses to all these statements. This confirms that there is confusion, but also shows that whilst there is this confusion there were relatively few “unsure” responses. This can be seen most markedly with the three statements:

- “Equipment inspection always involves an in depth check carried out by someone external to the company who provides a formal report to your organisation”;
- “Inspection of machinery and equipment is anything that involves checking the health and safety features”, and;
- “Thorough examination is a type of planned maintenance”.
And, additionally for suppliers:

- “Thorough examination is a special type of inspection”.

**Box 2 Use of the term “inspection”**

“We engaged a specialist engineer to annually inspect all lifting equipment” (Medium sized user)

This pattern would suggest that people are confident about their view, whether right or not. Most striking in these results is the proportion believing that inspection is always externally provided and formally reported. Almost one half of users believed this, and just over a third of suppliers. If this is considered alongside the numbers who see inspection as anything that involves checking health and safety features (over 60%), one can see that this might well be perceived as a fairly onerous requirement, and may explain some resistance to carrying out inspection. It may also be contributing to people’s views about unnecessary bureaucracy of health and safety regulations.

The early stage interviews suggested that not only are the terms not understood on their own, the difference between inspection and thorough examination is not well understood. Duty holders did not always seem to be clear that they are different and separate requirements. The main survey showed that whilst most people understand that inspection and thorough examination are the not the same thing, around 8% of both groups think that they are the same, and a further 8% of users are unsure. Around 47% of suppliers agree that their customers do not understand the difference between thorough examination and inspection (Figure 19).

The early interviews suggested that there is some confusion about the difference in requirements for thorough examination / inspection for work equipment and for lifting equipment. This affects, in particular, mobile equipment, which is also lifting equipment. There is a debate about what “inspection” and “thorough examination” entail and which is more detailed. Some even refer to a hybrid “thorough inspection”.

It appears that the word “inspection” is widely used as an umbrella term for many types of activities. In particular, independent companies carrying out “thorough examination” themselves refer to their activities as “inspection”. Indeed all seven respondents to the inspectors’ survey agreed that thorough examination was a special type of inspection. As will be seen later (see figure 21), the word “inspection” would seem to have had a common and established usage prior to the PUWER 98 / LOLER regulations. This is all likely to make successful communication about “inspection” extremely difficult. This became very apparent during our early discussions. For instance, when asked about inspection many explained the role of their insurance company / independent engineers, who were in fact almost always carrying out thorough examinations.

The early stage interviews also suggested that it was likely that users were not fully aware of the requirement to carry out “non-routine” (e.g. installation, post modification or accident) inspection requirements, and so they are not carried out. Suppliers claim that users are better organised for routine regular inspections.

One can also hypothesise that, given the survey results, there is a widespread belief amongst users that “inspection” means a visit by an external provider, and so such users may well be more resistant to carrying this out for such “non-routine” inspections (though this says nothing about whether they nevertheless carry out an internal inspection as implied by the early stage interviews).
There was some concern that users find understanding the difference between maintenance and inspection regimes difficult – many think they are the same thing according to the suppliers’ view of customers. More encouragingly though, fewer than 4% of user respondents thought that doing planned preventive maintenance meant not having to inspect, and no supplier respondents thought this.

Moving to the Thorough Examination (TE) requirement specifically, early stage interviews showed that some view a LOLER TE certificate as meaning there is no further need for inspection, or testing and certification (supplier view of customers). The main survey supported this to some extent with almost 10% of equipment users agreeing with the statement: “Doing thorough examination means that you don’t have to do inspection”. A further 8% of users were unsure about this statement (see Figure 18). A similar proportion of suppliers shared this view (Figure 19). Encouragingly, however, over 80% of both groups were confident this statement was not true.

The extent of the belief that thorough examination is a type of planned maintenance is also notable with over 60% of both groups believing this.

Figure 18 and figure 19 show the extent of users’ and suppliers’ (respectively) agreement with the following statements (Note: commentary added in italics):

- Equipment inspection always involves an in depth check carried out by someone external to the company who provides a formal report to your organisation. (*External not required*)
- Inspection of machinery and equipment is anything that involves checking the health and safety features. (*Definition not this broad*)
- Thorough examination is a special type of inspection. (*Exploring understanding of word “inspection” – no correct answer*)
- The phrases “inspection” and “thorough examination” mean the same (*Not true*)
- Doing thorough examination means you don’t have to do inspection (*Not true*)
- Thorough examination is a type of planned preventive maintenance (*Not true*)
- Doing planned preventive maintenance means you do not have to inspect equipment. (*Not true.*)

Suppliers (figure 19) were also asked whether they agreed with the following:

- Our customers know the difference between thorough examination and inspection.
Figure 18 Equipment users’ understanding of inspection and thorough examination (see above for key)

Figure 19 Equipment suppliers’ understanding of inspection and thorough examination (see above for key)
4.4 What people did and did not do

4.4.1 Key points

- It is clear there have been significant actions taken by duty holders and suppliers in response to the regulations. Suppliers have done more than users. This is likely in part to be in response to the Supply of Machinery Safety Regulations 1992.

- Companies with a well developed approach to health and safety management needed to do very little to comply.

- The main actions were:
  - hardware modifications, mainly roll over protection structures (ROPS) and seat restraints (despite the fact that the legislation did not require this to be completed until December 2002, prior to the research done for this report);
  - one-off and recurring training; and
  - improvements in administration systems.

- On the whole less was done by smaller firms but this is likely to reflect the fact that they have less equipment. Organisations with 10-49 employees did significantly more than those with fewer than 10 employees.

- Suppliers are spending significantly more time on training and information, in particular spending more time on handover of equipment to smaller users, and seeking more concrete assurances of competence from larger users.

- There is some evidence that the ‘soft’ requirements such as planning inspections are less well complied with.

Box 3 Examples of what a supplier did in response to PUWER 98

“We, along with [our inspection company], (who act as our competent persons for inspection under LOLER and PUWER)…. reviewed our entire product range for hire and use by [my company] as Work equipment.

Some new training programmes were introduced particularly for Lifting equipment delivery and handover to customers and further product courses devised in some cases Used IPAF training standard for [lifting operations services] division delivery drivers. This was to allow sufficient conversation between the hirer (driver) and user to ensure the correct selection of equipment as [my company] had identified the need to explore fully their customer's requirements.

We don't deliver chain saws, customers must visit shops in order to ensure [we] can talk them through the controls, need for PPE etc.

We determined no further written schemes were required but an increase of 30% more items to be examined under LOLER. This covers changes in frequency from 12 to 6 months (for items lifting people) and items not previously Thoroughly Examined. We sold MEWPs that weren't considered stable enough to be used.
4.4.2 Results in detail

The early discussions suggested a range of actions taken on hardware, training and administration. The main hardware changes were rollover protection and seat restraints. Early interviews suggested that, on the whole, companies with a well developed approach to health and safety management needed to do very little to comply, saying that much of what is “new” was implicit in previous requirements. Several of these companies commented that “the 6-pack” had a much bigger impact on them. Several suppliers commented that they had reviewed, and sometimes improved, their handover procedures, for instance requiring formal assurance of competence from larger more competent organisations and insisting on a full handover for less competent, often smaller, users.

Box 4 Examples of what two suppliers did in response to PUWER 98

"we looked at the whole fleet [of lift trucks] – 600 new and 400 second hand and had to put seat restraints in all the second hand lift trucks. …. it seems the manufacturers see it as a sales opportunity"

"In handing over machines to customers we tend to target the small / private user as “must-haves”. In fairness, these people are usually the quickest to request a full handover session. With the larger operators, we can secure an undertaking from them that all operatives are trained, and that no handover is required unless requested. This leaves a section of the market where an assumption of competence is made"

The main survey explored what people did through a variety of questions asking what people did more of after the 1998 regulations.

Respondents were asked: “To what extent did you do any of the following due to PUWER and / or LOLER after November 1998”?

- Assesses the risk of mobile equipment rolling over.
- Reviewed the safety of lifting operations.
- Took new measures to separate pedestrians from mobile equipment.
- Spent more time planning lifting operations.
- Carried out additional training.
- Set up new administration systems, e.g. for recording equipment checks / examinations.
- Hired in mobile equipment, e.g. those involving heavy loads.

Figure 20 and Figure 21 show the responses to these questions, with similar questions being put to both equipment users and suppliers. There was another question asking for specific details about modifications.
From our interviews, there was evidence that many smaller companies have done very little to comply with the regulations (especially small retail companies, several of whom had not heard of the regulations, including a full-time health and safety officer). Again this may be due to a majority of smaller companies having less equipment significantly affected. There was a general impression amongst service providers that little is done, and cynicism about whether risk assessment is done, and if it is done whether it is little more than just lip service.

Figure 20 and Figure 21 show a significant proportion already taking action that might be associated with compliance with PUWER 98 and LOLER. For instance almost 40% were already assessing the risk of rollover, 50% already reviewing the safety of lifting operations, around one third already spending time planning lifting operations, and 40% considering that they were already carrying out adequate training.

The survey also shows that there was a significant proportion who took action as a result of the regulations, with over a quarter of users saying they did more assessment of the risk of rollover, over 30% saying they reviewed their lifting operations and spent more time planning the lifts, and almost 50% claiming to have done more training (whether this is one-off or regular). Suppliers’ responses would suggest that there has indeed been an increase in demand for training, with almost a half saying they created / increased training or information services for their clients.

Anecdotally, information suggested that hire companies seem to have been affected most. As well as the requirement to protect against rollover applying earlier than for most duty holders, it was suggested that there has probably been an increase in contract lifting services as well as hire of lifting and mobile equipment, especially in construction. The survey supported this to some extent with an increase in both, but only amongst 10-12% of users. Some suppliers reported that the planning of lifts was seen as a business opportunity.

**Administration**

As said previously, the early stage interviews suggested that those companies with good registration / certification already in place were less affected by the requirements of PUWER 98. This is supported by the survey which shows that over 50% of users, and almost the same proportion of suppliers already had administration systems in place to cope with the changes. Around 45% of suppliers and 30% of users thought that they had made changes to, or introduced new, administration systems to help them / their clients comply with the regulations.

**Inspection**

Interestingly, over 40% of suppliers say they already provided an inspection service to clients prior to the 1998 regulations. This would seem to show that there is a clear pre-PUWER 98 understanding of what the term means. So, it would seem that this 40% did not do this as a result of the PUWER 98 / LOLER regulations, but a further (almost) 30% claim that they created or increased their inspection services as a result of the 1998 regulations.
Figure 20 Proportion who modified behaviour as a result of regulations after November 1998 (users)

Figure 21 Proportion who modified behaviour as a result of regulations after November 1998 (Suppliers)
Comparing the results from the two groups (Figure 20 and Figure 21), we can see that there does not seem to be significant differences in the extent to which suppliers were affected by the need to do rollover assessment, except that users in fact claim to a greater extent that they were already doing this prior to the 1998 regulations. Suppliers do seem to have been more impacted in terms of the extent to which they carried out training and set up new / improved administration systems.

The interviews suggested that larger hire firms have increased the amount of time they spend on handovers to smaller users, and seek more assurances from larger companies that users are competent. There was also evidence that users are relying heavily on equipment manufacturers and hirers for advice, inspection and repair services. Similarly, there was some evidence that companies with a relatively sophisticated approach to health and safety management insisted on better standards from contractors. These findings are supported by the main survey finding that 50% of suppliers have set up some form of new information / training service.

Several people, mainly suppliers of machinery or services, commented during the early interviews that even where hardware requirements are recognised, and attempts made to comply, often “softer” requirements such as inspection, planning lifts, etc. are not complied with, sometimes being completely ignored. However, the main survey did show that over 30% of users felt they were already planning lifting operations and a further 30% did more of this as a result of the 1998 regulations. That said, if we examine what lifting equipment users said (see Table 5), 11% of these respondents (27 out of 251) indicated that time spent planning lifts was not relevant to them. It seems, however, that between a third and a half were already doing the things indicated, with the regulations prompting a further third or more to take more action.

Similarly, Table 6 shows some relevant questions answered by mobile equipment users, 40-50% of whom were prompted to increase their assessment of the risk of rollover, to do more to manage the separation of pedestrians from mobile equipment and to carry out additional training. Similar proportions felt they were already doing these things.

The interviews also suggested that there was some improvement in managing the separation of pedestrians and mobile equipment. The motivation was not clear from the interviews, but the survey suggested that over a quarter of users did more as a result of the regulations, and almost a further 40% considered that they were already adequately managing this. Nine out of 119 (8%) of mobile equipment users, however, thought that managing the separation of pedestrians from mobile equipment was not applicable to them (Table 6).
Table 5: What lifting equipment users said they did following the 1998 regulations

<table>
<thead>
<tr>
<th>reviewed safety of lifting ops</th>
<th>Did more</th>
<th>Already doing</th>
<th>Don’t Know</th>
<th>Not Applicable</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>89</td>
<td>130</td>
<td>20</td>
<td>11</td>
<td>250.</td>
</tr>
<tr>
<td>%</td>
<td>36%</td>
<td>52%</td>
<td>8%</td>
<td>4%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>more time planning lifting ops</th>
<th>Did more</th>
<th>Already doing</th>
<th>d / k</th>
<th>n / a</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>91</td>
<td>92</td>
<td>41</td>
<td>27</td>
<td>251.</td>
</tr>
<tr>
<td>%</td>
<td>36%</td>
<td>37%</td>
<td>16%</td>
<td>11%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>additional training</th>
<th>Did more</th>
<th>Already doing</th>
<th>d / k</th>
<th>n / a</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>108</td>
<td>106</td>
<td>24</td>
<td>13</td>
<td>251.</td>
</tr>
<tr>
<td>%</td>
<td>43%</td>
<td>42%</td>
<td>10%</td>
<td>5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>new admin systems</th>
<th>Did more</th>
<th>Already doing</th>
<th>d / k</th>
<th>n / a</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>80</td>
<td>140</td>
<td>21</td>
<td>10</td>
<td>251.</td>
</tr>
<tr>
<td>%</td>
<td>32%</td>
<td>56%</td>
<td>8%</td>
<td>4%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>contracted out lifting operations</th>
<th>Did more</th>
<th>Already doing</th>
<th>d / k</th>
<th>n / a</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>35</td>
<td>106</td>
<td>21</td>
<td>89</td>
<td>251</td>
</tr>
<tr>
<td>%</td>
<td>14%</td>
<td>42%</td>
<td>8%</td>
<td>35%</td>
<td>100%</td>
</tr>
</tbody>
</table>
**Table 6** What mobile equipment users said they did following the 1998 regulations

<table>
<thead>
<tr>
<th>Assessed rollover</th>
<th>Did more</th>
<th>Already doing</th>
<th>Don’t Know</th>
<th>Not applicable</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>46</td>
<td>59</td>
<td>7</td>
<td>6</td>
<td>118.</td>
</tr>
<tr>
<td>%</td>
<td>39%</td>
<td>50%</td>
<td>6%</td>
<td>5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New measures to separate pedestrians</th>
<th>Did more</th>
<th>Already doing</th>
<th>d / k</th>
<th>n / a</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>46</td>
<td>58</td>
<td>6</td>
<td>9</td>
<td>119.</td>
</tr>
<tr>
<td>%</td>
<td>39%</td>
<td>49%</td>
<td>5%</td>
<td>8%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional training</th>
<th>Did more</th>
<th>Already doing</th>
<th>d / k</th>
<th>n / a</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>57</td>
<td>50</td>
<td>7</td>
<td>5</td>
<td>119.</td>
</tr>
<tr>
<td>%</td>
<td>48%</td>
<td>42%</td>
<td>6%</td>
<td>4%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hired in mobile equipment to comply</th>
<th>Did more</th>
<th>Already doing</th>
<th>d / k</th>
<th>n / a</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>26</td>
<td>50</td>
<td>12</td>
<td>31</td>
<td>119</td>
</tr>
<tr>
<td>%</td>
<td>22%</td>
<td>42%</td>
<td>10%</td>
<td>26%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 7 shows responses by company size (defined by numbers of employees). It shows the results of those who thought the question was relevant to them. As can be seen, generally speaking the larger the company the more likely it is that they will have been prompted to take action following the 1998 regulations. It is notable, however, that other than for the smallest firms, the difference in proportions taking actions is not great. Also, organisations with 10 – 49 employees do almost as much as medium sized companies (50 – 249 employees), and indeed increased the amount of time spent planning lifts to a greater extent than did medium-sized organisations.

(Note: The proportions believing each question was not relevant to them were significantly higher amongst small companies than medium and large (see above). Again, this either supports the theory that they have much less equipment, or that they do not understand the relevance of the regulations so well.)
Table 7 What respondents said they did following the 1998 regulations by size (defined by numbers of employees)

<table>
<thead>
<tr>
<th>No of employees</th>
<th>Definitely did more of this due to PUWER 98 / LOLER</th>
<th>Already doing this before PUWER 98 / LOLER</th>
<th>Do not know</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessed the risk of mobile equipment rolling over</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>0.00%</td>
<td>60.00%</td>
<td>40.00%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>31.25%</td>
<td>62.50%</td>
<td>6.25%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>41.30%</td>
<td>45.65%</td>
<td>13.04%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>36.49%</td>
<td>51.35%</td>
<td>12.16%</td>
<td>100%</td>
</tr>
<tr>
<td>Reviewed the safety of lifting operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>18.75%</td>
<td>50.00%</td>
<td>31.25%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>28.57%</td>
<td>66.67%</td>
<td>4.76%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>31.48%</td>
<td>51.85%</td>
<td>16.67%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>39.08%</td>
<td>53.45%</td>
<td>7.47%</td>
<td>100%</td>
</tr>
<tr>
<td>Took new measures to separate pedestrians from mobile equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>0.00%</td>
<td>61.54%</td>
<td>38.46%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>20.00%</td>
<td>66.67%</td>
<td>13.33%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>28.57%</td>
<td>61.22%</td>
<td>10.20%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>41.40%</td>
<td>48.41%</td>
<td>10.19%</td>
<td>100%</td>
</tr>
<tr>
<td>Spent more time planning lifting operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>14.29%</td>
<td>50.00%</td>
<td>35.71%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>44.44%</td>
<td>50.00%</td>
<td>5.56%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>32.00%</td>
<td>42.00%</td>
<td>26.00%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>42.33%</td>
<td>40.49%</td>
<td>17.18%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 7 (Cont) What respondents said they did following the 1998 regulations by size (defined by numbers of employees)

<table>
<thead>
<tr>
<th>No of employees</th>
<th>Definitely did more of this due to PUWER 98 / LOLER</th>
<th>Already doing this before PUWER 98 / LOLER</th>
<th>Do not know</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carried out additional training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>7.69%</td>
<td>53.85%</td>
<td>38.46%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>33.33%</td>
<td>61.90%</td>
<td>4.76%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>42.86%</td>
<td>41.07%</td>
<td>16.07%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>46.29%</td>
<td>44.00%</td>
<td>9.71%</td>
<td>100%</td>
</tr>
<tr>
<td>Set up new administration systems e.g. recording checks / examinations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>7.14%</td>
<td>57.14%</td>
<td>35.71%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>27.27%</td>
<td>59.09%</td>
<td>13.64%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>31.58%</td>
<td>54.39%</td>
<td>14.04%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>34.46%</td>
<td>58.19%</td>
<td>7.34%</td>
<td>100%</td>
</tr>
<tr>
<td>Hired in mobile equipment to comply with the regulations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>14.29%</td>
<td>28.57%</td>
<td>57.14%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>27.27%</td>
<td>63.64%</td>
<td>9.09%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>28.95%</td>
<td>52.63%</td>
<td>18.42%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>31.36%</td>
<td>50.85%</td>
<td>17.80%</td>
<td>100%</td>
</tr>
<tr>
<td>Contracted out lifting operations, e.g. those involving heavy loads</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 10</td>
<td>10.00%</td>
<td>50.00%</td>
<td>40.00%</td>
<td>100%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>25.00%</td>
<td>66.67%</td>
<td>8.33%</td>
<td>100%</td>
</tr>
<tr>
<td>50 to 250</td>
<td>13.89%</td>
<td>69.44%</td>
<td>16.67%</td>
<td>100%</td>
</tr>
<tr>
<td>Over 250</td>
<td>22.31%</td>
<td>65.29%</td>
<td>12.40%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Training

There was significant initial one-off training associated with PUWER 98 or LOLER, but respondents rarely cited additional ongoing training costs as significant. Interviewees in general found it difficult to disentangle this from a general improvement in health and safety management. Training companies did, however, report increased work following the introduction of LOLER and PUWER 98. This was confirmed by the survey (Figure 20) in that 40% of users say they have had to do additional training as a result of the regulations. Responses to another separate question, specifically asking about training every year, are shown in Table 8 by company size (as a percentage of all survey respondents). Over 40% of larger firms train staff every year whilst only 3% of smaller firms do so, again reflecting the likelihood that they do not have as much equipment.

Table 8 “Do you need to train new staff each year due to LOLER / PUWER 98?”

<table>
<thead>
<tr>
<th>Size of company (based on no. of employees)</th>
<th>No. companies who train yearly</th>
<th>% of sample training yearly</th>
<th>Total number of companies in the sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>86</td>
<td>44%</td>
<td>195</td>
</tr>
<tr>
<td>Medium</td>
<td>22</td>
<td>29%</td>
<td>77</td>
</tr>
<tr>
<td>Small</td>
<td>11</td>
<td>17%</td>
<td>64</td>
</tr>
<tr>
<td>Micro</td>
<td>4</td>
<td>3%</td>
<td>156</td>
</tr>
</tbody>
</table>

Modifications

From the interviews there was consistent evidence that significant numbers of site dumpers had ROPS fitted (construction) in response to the regulations. There was some indication that reversing cameras were fitted (dumpers over 20 Tonnes) (though it should be noted that in large part this was not likely to be due to PUWER, but due to a long running campaign in Quarries dating back to the late 1980s). Many lift trucks have had lap belts fitted, and it was reported that this is now a standard fitting on forklift trucks. A few reported that they have decided against ROPS and seat belts on the grounds of risk assessment. It appears to be a minority who understand this flexibility.

This is discussed in more detail in the costs section of Section 5.

Thorough examination and inspection

On the whole thorough examination (TE) has changed very little – people say they have mostly maintained former regimes. There was some evidence that where TE was previously required on a fourteen monthly basis, some had to increase it to twelve monthly. Some companies have chosen to increase to six monthly TE programme to be sure that all equipment is covered in time; others do say that they have done this for some lifting equipment for lifting people. One company also said that slings and shackles now need to be TEd and that was a cost for them.
According to the interviews there is little use of schemes of examination (which seem to be seen as involving a management cost). There are a few examples of particular circumstances however, where the option of a scheme of examination has been very welcome (e.g. equipment used very infrequently, ski lifts where weather restricts ability to carry out TE, TE for components which cannot be TEd without destroying the equipment).

Although LOLER extended the range of equipment covered by lifting regulations (e.g. telehandlers and work platforms), it seems that in most sectors these items were already managed under previous regimes for other lifting equipment. Awareness seems to have increased of the requirement to TE / inspect MEWPs, etc. but there was little evidence from the interviews that this has led to change, presumably as it was already being done in most cases.

The main survey lent support to the conclusion that very few have taken the opportunity of using schemes of examination. The responses are shown in Figure 22 for users and suppliers. Almost no-one indicated that they had reduced the frequency of thorough examination. However, over 30% of both users and suppliers indicated that they had increased frequency of thorough examination (TE), at least for some types of equipment. The responses given, when asked what types of equipment had changed their frequency, are shown in Table 41 in Appendix 1. Most frequently mentioned are Fork lift trucks, hoists, and patient hoists (notable for thirteen mentions out of thirty health care respondents with lifting equipment). The increase in patient hoist TE supports the SAFed claim that a significant part of the small increase in the TE industry was due to the health care sector.

The survey also shows that over 40% of users and over a quarter of suppliers increased (at least to some extent) their use of external providers of TE services.

There were many comments that not much extra inspection is done. Where there is inspection it was generally required by previous legislation, e.g. the F91 form is reported to still be in use for crane inspection. When probed about inspection, people mention that planned preventive maintenance staff flag up problems. It is doubtful that this is a systematic system based on risk assessment, and some may be confusing PPM and inspection. On the whole, previously required standards have been adopted as a compliance strategy.

One lifting equipment / services supplier commented that there was no reduction in defects in returned equipment – their view was that many, in particular in construction, still relied on experience rather than proper training. However, for professionals he thought the LOLER regulations had had a positive effect.
Box 6 Other examples of what a people did to comply with the regulations

**Large manufacturer:** “we purchased a computer package which takes you step by step through each machine risk assessment and will not let you continue until you have actioned each step”

**Medium user:** “we hired consultants to provide intensive one day training for site supervisors and managers on the implications of the regulations, and training to managers in inspection of harnesses etc. Upgraded maintenance systems to ensure that all bits of kit were covered”.

The construction industry reported that the main costs were fitting ROPS. Fitting to equipment 10-12 years old is costly. Many manufacturers have gone out of business so other engineers have to be employed to design and fit them.

One construction contractor began a programme of checking their sub contractors were making arrangements to comply with PUWER 98 and LOLER. They wrote to all their regular subcontractors on the tender list informing them of new regulations, key requirements and set dates for compliance. This was made a requirement before any further work could be won from them. Company reports that this had a “chain-reaction” in the rest of the industry. “We reviewed our lifting operations and maintenance procedures but very little had to be changed from the requirements of the old regulations. The main change was the implementing of 6 monthly examinations to meet requirements of raising and lowering people. This was 100% because of the regulations”

The end of this section is a repeat of the previous box
4.5 Motivation for action

4.5.1 Key points

- With some exceptions most cite the regulations as the reason for their action. Some reported that they reviewed their systems as a result, but found they had little that needed to be done in order to comply.

- Some were motivated by a general desire to improve their management systems.

- Improvements to pedestrian separation from vehicles were more likely to be motivated by earlier legislation than PUWER 98.

4.5.2 Results in detail

Broadly speaking, it seems that action taken is probably mostly motivated by the regulations (though this is probably less the case for companies already with a well developed health and safety management system). Sometimes this motivation is not directly as a result of the regulations, e.g. hire companies see it as a business advantage and necessity because many clients demand that they are up to date with the legislation. With fitting of rollover protection this is usually motivated by the regulations. Interviews showed that this is markedly the case for hirers. It is likely that action by suppliers will also have been influenced by the Supply of Machinery Safety Regulations 1992.

Improved administration and asset management seems, in part, to be motivated by improving management systems as well, although the regulations were often a prompt. Seat restraints in forklift trucks are becoming a standard expected by users when they buy new trucks, but is not necessarily something they seek as a direct result of health and safety legislation.

Initial one-off training was clearly motivated by the regulations, although many took the opportunity to improve health and safety management.

Interviewees reported that increasing the frequency of thorough examination was in response to the regulations. It seems most people took measures to separate pedestrians and vehicles either in response to the Workplace Regulations or general improvements in health and safety management.

The survey supports this position. Figure 20 and Figure 21 (already discussed) show clearly that people believe they took action as a result of the regulations. A comparison was made between what was done by those that had declared themselves familiar and those unfamiliar with the PUWER regulations. The results are shown in Table 42 in Appendix 1. This shows that those that declare themselves either familiar or very familiar with the regulations were consistently prompted to do more after November 1998 than were those who claim either not to have heard of the regulations at all or say they are not very familiar with them. Although there are other factors, not least the motivation to find out about the regulations, this would suggest that the regulations have contributed to motivation to take action.

Production pressures are cited as a reason for not being able to comply fully with the work equipment requirements as duty holders saw them, in particular with respect to preventive maintenance.
4.6 Supply issues and standards

4.6.1 Key points

- There is widespread confusion about CE marking;
- Many are sure of their understanding even when it is wrong;
- The vast majority do understand a CE marking does not exempt them from carrying out risk assessments;
- ¾ believe that a CE marking is a quality mark;
- Significant minorities believe that CE marking always means that:
  - An independent institute has declared that the equipment is safe;
  - No further information is available about safety;
  - The equipment is guaranteed safe for use.

4.6.2 Results in detail

Our work at all stages (literature, interviews and survey) showed that there is much confusion and misunderstanding about CE marking and the health and safety information available to users from suppliers. Worryingly, many are sure of their understanding, even when it is wrong, and it seems that the CE mark is generally viewed as a comfort.

Box 7 View of the use of CE marking

“CE marking is almost a complete waste of time. It’s not proof that a machine is safe and the user must do their own risk assessment” Senior Health and Safety professional at a large user organisation

The view articulated in Box 7 was expressed by both users and suppliers (despite the requirements of the Supply of Machinery (Safety) Regulations 1992 which deals with CE markings). However, when comparing the main survey results it should be noted that the sample for suppliers is around ¼ of that of users. Inspector respondents showed a better understanding, but there are still some misconceptions.

Suppliers reported that customers have, for instance, asked if a CE marking could be stamped on their own existing equipment, and have little if any understanding of the requirements. Suppliers also reported that there were “cowboys” supplying equipment who do not understand the regulations (LOLER and Supply of Machinery (Safety) Regulations) and / or who do not comply with them. One commented that imports generally lack information documentation. According to a study carried out by Rafaat and Nicholas there is varying compliance with CE marking. This makes it difficult for users to effectively make use of CE marking.

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Understanding of the requirements was tested in the main survey with a series of statements, asking respondents to say whether they were true or false. The results are shown as a percentage of those responding in Table 9 and Table 10 for equipment users and suppliers respectively.

**Table 9** Do you think that the following statements about CE marking on equipment are true or false? (Users)

<table>
<thead>
<tr>
<th>Users</th>
<th>FALSE</th>
<th>UNSURE</th>
<th>TRUE</th>
<th>Total No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whatever a CE marking appears on, this means that an independent institute has declared that the equipment is safe</td>
<td>55%</td>
<td>17%</td>
<td>28%</td>
<td>285</td>
</tr>
<tr>
<td>The equipment is manufactured to a recognised quality standard</td>
<td>15%</td>
<td>9%</td>
<td>76%</td>
<td>285</td>
</tr>
<tr>
<td>Risk assessment for the equipment by the user is NOT required</td>
<td>94%</td>
<td>4%</td>
<td>2%</td>
<td>287</td>
</tr>
<tr>
<td>On most equipment it means the manufacturer has declared that the equipment complies with all relevant health and safety supply regulations</td>
<td>20%</td>
<td>12%</td>
<td>68%</td>
<td>285</td>
</tr>
<tr>
<td>Further information is available to users about the safety of the equipment</td>
<td>16%</td>
<td>27%</td>
<td>57%</td>
<td>284</td>
</tr>
<tr>
<td>The equipment is guaranteed safe for use</td>
<td>59%</td>
<td>16%</td>
<td>25%</td>
<td>285</td>
</tr>
<tr>
<td>The equipment complies with all relevant safety regs.</td>
<td>31%</td>
<td>19%</td>
<td>50%</td>
<td>286</td>
</tr>
</tbody>
</table>
Table 10 Do you think that the following statements about CE marking on equipment are true or false? (Suppliers)

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>FALSE</th>
<th>UNSURE</th>
<th>TRUE</th>
<th>Total No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whatever a CE marking appears on, this means that an independent institute has declared that the equipment is safe</td>
<td>47%</td>
<td>11%</td>
<td>42%</td>
<td>62</td>
</tr>
<tr>
<td>The equipment is manufactured to a recognised quality standard</td>
<td>18%</td>
<td>6%</td>
<td>76%</td>
<td>62</td>
</tr>
<tr>
<td>Risk assessment for the equipment by the user is NOT required</td>
<td>92%</td>
<td>3%</td>
<td>5%</td>
<td>61</td>
</tr>
<tr>
<td>On most equipment it means the manufacturer has declared that the equipment complies with all relevant health and safety supply regulations</td>
<td>11%</td>
<td>8%</td>
<td>81%</td>
<td>62</td>
</tr>
<tr>
<td>Further information is available to users about the safety of the equipment</td>
<td>30%</td>
<td>18%</td>
<td>52%</td>
<td>61</td>
</tr>
<tr>
<td>The equipment is guaranteed safe for use</td>
<td>61%</td>
<td>3%</td>
<td>35%</td>
<td>62</td>
</tr>
<tr>
<td>The equipment complies with all relevant safety regs.</td>
<td>28%</td>
<td>3%</td>
<td>69%</td>
<td>61</td>
</tr>
</tbody>
</table>

As can be seen from Tables 9 and 10, the only thing which the vast majority of users and suppliers are sure about is that CE marking does not mean that risk assessment does not have to be carried out by the user. Unsurprisingly, this is also the case for the inspector group. However, responses to other questions would suggest that, even if most understand this legal requirement, the CE marking gives much confidence that a piece of equipment is safe. One has to question whether users take the requirement to carry out risk assessment seriously, particularly in the light of the early findings that since CE marking is often thought to be a guarantee that equipment is safe, there is no need to do risk assessment. Indeed, a third of suppliers responding to the survey think this and a quarter of users. Also, five out of seven inspection respondents believed this.

The main survey supported much of the early findings that there is confusion, misunderstanding and misplaced confidence in CE marking. It found, for instance, that 50% of users thought that a CE marking meant that “The equipment complies with all relevant safety regulations”, as did 30% of suppliers, and five out of seven inspector respondents. Also, almost 30% of users believe that “a CE marking always means that an independent institute has declared that the equipment is safe” (Table 9). This included around a quarter of companies employing more than 250 employees (Table 11). Surprisingly, around 40% of suppliers also believe this (Table 10). This supported the early finding that it is widely thought that all CE marking indicates external independent verification.

This view is perhaps understandable. There are a range of European Directives which require independently verified CE marking. It is only the Machinery Directive (implemented in the UK as the Supply of Machinery (Safety) Regulations 1992) which allows self verification.
Many seem to believe that British Standards for machinery are legal requirements (supplier view of customers). There may well be some confusion between the CE marking and the British Standard “kite” mark. Indeed the main survey indicated an overwhelming belief amongst both users and suppliers (¾ of both groups) that a CE marking means that equipment has been manufactured to a recognised quality standard (see Table 9 and Table 10). Surprisingly, this is true for all sizes of companies, with larger companies in fact being surer of their answer (Table 12).

**Table 11** “Whatever a CE marking appears on this means that an independent institute has declared that the equipment is safe” – responses presented by company employee numbers

<table>
<thead>
<tr>
<th>Employees</th>
<th>Under 10</th>
<th>10 to 49</th>
<th>50 to 250</th>
<th>Above 250</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely False</td>
<td>19%</td>
<td>21%</td>
<td>40%</td>
<td>36%</td>
<td>34%</td>
</tr>
<tr>
<td>Probably False</td>
<td>5%</td>
<td>13%</td>
<td>17%</td>
<td>25%</td>
<td>21%</td>
</tr>
<tr>
<td>Unsure</td>
<td>33%</td>
<td>33%</td>
<td>12%</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>Probably True</td>
<td>38%</td>
<td>25%</td>
<td>28%</td>
<td>20%</td>
<td>23%</td>
</tr>
<tr>
<td>Definitely True</td>
<td>5%</td>
<td>8%</td>
<td>3%</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100</td>
<td>100%</td>
</tr>
<tr>
<td>Total Numbers (n)</td>
<td>21</td>
<td>24</td>
<td>58</td>
<td>178</td>
<td>281</td>
</tr>
</tbody>
</table>
Table 12 A CE marking means that "the equipment is manufactured to a recognised quality standard" – responses presented by company employee numbers

<table>
<thead>
<tr>
<th>Employees</th>
<th>Under 10</th>
<th>10 to 49</th>
<th>50 to 250</th>
<th>Above 250</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely False</td>
<td>5%</td>
<td>13%</td>
<td>5%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Probably False</td>
<td>0%</td>
<td>4%</td>
<td>7%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Unsure</td>
<td>29%</td>
<td>13%</td>
<td>7%</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td>Probably True</td>
<td>57%</td>
<td>50%</td>
<td>45%</td>
<td>44%</td>
<td>46%</td>
</tr>
<tr>
<td>Definitely True</td>
<td>10%</td>
<td>21%</td>
<td>36%</td>
<td>32%</td>
<td>30%</td>
</tr>
<tr>
<td>Total No.</td>
<td>21</td>
<td>24</td>
<td>58</td>
<td>179</td>
<td>282</td>
</tr>
<tr>
<td>Grand Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Early interviews suggested that Declarations of Conformity are not understood, and there is some evidence that suppliers provide inadequate information on them. Encouragingly, the main survey showed no supplier saying that they had “never heard of” Declarations of Conformity, but still around a quarter said that they only “vaguely” understood how they could help users in purchasing equipment (Figure 23). This ties in with the result that 30% of suppliers did not believe that health and safety information (further to the CE marking) is available to users (Table 10). Figure 23 shows the self-assessed understanding of Declarations of Conformity of all users, users by company size, and suppliers. Almost 15% of all equipment users had not heard of them and less than 50% claim to understand them more than “vaguely”. There is a clear difference between the groups on this, with around 30% of small companies not having heard of Declarations of Conformity, and none claiming to understand them “very well”.
Figure 23 To what extent do you think you understand how a “declaration of conformity” can help you when purchasing new machinery - by employee numbers

The supplier data was also analysed by the type of equipment supplied, but there was no significant differences between the groups (see Table 43 in Appendix 1).

4.7 Issues / problems

4.7.1 Key points

- The consolidation of legislation is widely welcomed, the only exceptions being the construction and agriculture industries.

- There have been some difficulties obtaining sufficient trained personnel, particularly where staff turnover is high, and / or where operators have poor English spoken and reading skills, usually because they do not have English as a first language.

- Inspection companies perceive that customers believe CE marking always means that equipment is safe, and consequently do not trust inspection companies’ advice.

- Few are taking advantage of the flexibility offered in respect of schemes of examination, most preferring to follow the prescribed fixed periods.
4.7.2 Results in detail

Consolidation of legislation

Most interviewed in the early stages welcomed the two single sets of regulations introduced in 1998. People value the tidy up of sector legislation. Health and safety professionals and other service providers in particular like the one set of regulations very much, and think it will have led to greater efficiency, though they can’t quantify this. A multi-site / activity company commented that they found it easier to be consistent across the company. It was thought that this also helped to increase the impact of new legislation. There were comments also that transition phases were very helpful. Only construction and agriculture would like industry specific regulations.

UK availability of trained personnel

Difficulties have included obtaining trained personnel when one-off jobs are required. One construction company commented on the difficulties associated with a high turnover of staff and the increased training requirement. This problem is exacerbated when they are working with a high number staff whose English is poor, often those who do not have English as a first language.

There seem to be difficulties with the UK’s capacity to provide appropriate training for woodworkers (especially for small business), which is affecting training. There were some comments about the appropriateness of available training. For instance, the way the NVQ is structured means that people learn how to use machinery that they don’t normally use. This is because in order to get the qualification they need to have worked on several machines, an experience many small businesses will be unable or unwilling to provide. Also, providers are no longer formally approved, though the standards for trainers haven’t changed. It is now perceived as more difficult to select an appropriate training provider (see also CRR 339/200119).

CE marking

One insurance company commented that since many believe that CE marking automatically means equipment complies with PUWER, customers often believe that inspection companies (in offering their services) are taking commercial advantage of a situation if they point out that that equipment with a CE marking does not comply. This misunderstanding can put inspection companies in a difficult position and makes them less effective as agents of change.

Inspection, thorough examination and testing

There was a concern that flexibility of frequency of examination / testing, especially for lifting accessories, may be lowering standards. It is noteworthy that at this stage no such comments were received from construction companies. This could be explained by the tendency reported in the early stages to continue inspection under their previous standards (e.g. F91 forms in construction).

There was some discomfort with the flexibility afforded by the regulations in general. One comment was that it was “too vague”. Some construction feedback also suggested that there wasn’t enough prescription. There is a mixed view of whether the legislation is more flexible, and whether this is a good thing.

There may be some confusion regarding the flexibility offered by written schemes of examinations. As already reported, the survey confirms that few are taking advantage of it.

4.8 HSE ACoP and guidance

4.8.1 Key Points

- The ACoP is widely praised by health and safety professionals and those with a good understanding of health and safety requirements

- There is some suggestion that it could be made more accessible to wider audiences by the use of plain English, more case study material and explanation of related legislation rather than simple referencing.

- Almost no one had heard of the open learning guidance.

4.8.2 Results in detail

The ACoP is generally thought of as good. Several commented that it is an improvement in clarity to previous guidance in particular on timings and types of equipment affected.

As Figure 24 shows, the main survey broadly supports this conclusion, with most respondents agreeing with the statement: “The ACoP and guidance for PUWER 98 / LOLER are clear and comprehensive”. A slightly smaller proportion of supplier respondents say they are “unsure” about their views, which might suggest they have more experience of the ACoP and guidance, since more have a view. There is a similar pattern in response to the statement: “It is not clear from the guidance what is meant by a competent person” (Figure 25). In both cases, 50% or slightly more are happy with the guidance. However this does leave around 30% unhappy with the guidance on what a competent person is, with the rest being unsure.

Box 8 View of the ACoPs

“The ACoPs for PUWER and LOLER are like the bible” Construction user
Figure 24 The ACoP and guidance for PUWER 98 / LOLER are clear and comprehensive.

Figure 25 It is not clear from the guidance what is meant by a competent person.
There were particularly positive comments in the early stages in terms of the use of the ACoP by health and safety professionals, but it was often not considered useful for operational staff. Many considered that it was not clearly enough written for this purpose. Several suggested a need for “plain English”, the CITB pointing out that the 1.6m workers in the construction industry in the UK have an average reading age of 10. They suggested that an ACoP might usefully include information for managers to pass on to their staff. One interviewee felt there should be more guidance for inspection of specific pieces of equipment.

Moving to the thorough examination requirement specifically, one relatively sophisticated user said that they shouldn’t need to carry out Thorough Examination because their people hoists were not “exposed to conditions causing deterioration which is liable to result in dangerous situations”. He felt that contractors were pushing an interpretation of this that suited them. His argument was that in relatively benign environments lifting equipment in use was not exposed to “conditions causing deterioration” and so therefore the exclusion for thorough examination should apply. The guidance (at para. 298) does state that “all lifting equipment deteriorates in use” (our emphasis), but this was not clear to this respondent. There may be scope for clarification here, though it should be noted that whilst sophisticated, this was only one respondent. Though in the form of a complaint, this does indicate that some suppliers of thorough examination services have interpreted the legislation correctly.

Another specific ACoP / guidance issue is related to woodworking. The text of HSE’s “old” guidance for training for woodworking machinists has been reproduced at the back of the ACoP. Many in the industry do not seem to be aware of this, expressing regret that it has been removed. The woodworking information sheets are more widely read. One inspector felt this was evidence about how people use ACoPs.

No one during the early interviews had a view on the open learning packs and it was rare to find someone who had come across the open learning guidance20 at all.

4.9 Other sector specific issues

4.9.1 Key points

- Local authorities and agriculture (some lifting equipment), health care and social services (patient hoists) may have had some increase in costs due to increase in (external) thorough examination
- After initial confusions there seems to have been acceptance of the regulations in the construction industry. This may be due to reports that previous standards have been widely thought to be adequate, but there has certainly been an increase in the use of mobile equipment with ROPS.
- The recent woodworking ACoP requiring risk assessment specifically for braking and limited cutter-tool projection is beginning to cause the industry problems, but the requirements do not begin to take full effect until December 2003.

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• The main issues in forestry have been agreeing where seat belts and ROPS are required. Also the forestry industry wanted a “certificate of competence” for chainsaw operation and there continue to be difficulties agreeing which training body the industry wants to run the qualification.

4.9.2 Results in detail

It would appear that local authorities and agriculture (some lifting equipment), health care and social services (patient hoists) may have had some increase in costs due to increase in (external) thorough examination.

Initial discussions with those managing warehouses would suggest that some are deciding that the use of seat restraints is not reasonably practicable.

**Engineering** generates the most inspector enforcement queries, but virtually all are to do with the difficulties of interpretation of Regulation 10. This would suggest that enforcement activity is higher in this sector, no doubt a reflection of the amount of equipment in use and size of the industry. Queries have recently been rising in number from **woodworking**, whilst **construction** has generated very few enforcement queries, anecdotally explained by an impression that previous requirements are considered good enough and these standards are generally being followed. Queries regarding mobile work equipment are slowly rising.

**Construction**

Despite some initial confusion, particularly on the definition of “lifting equipment”, feedback suggests that the construction industry seems now quite comfortable with LOLER and PUWER. There have been few enforcement issues, thought by some to be because of the previous construction specific regime, in particular for lifting equipment.

However, it is also clear that the regulations have had an impact on the construction industry, with one inspector commenting that he rarely came across construction vehicles without roll-over protection. It should be noted that this was not at first true, with a reported shortage of companies which were able to fit ROPS, and it may only currently be true for companies who rely mostly on hired equipment. Another interviewee thought that more effort was going into selecting appropriate equipment and allocating responsibilities more clearly.

There are still some arguments about seat restraints in construction (there was an accident where someone drowned, arguably because of the seat restraint), but the biggest issue is getting people to wear them on site – again a managerial / cultural issue. However, though the competence requirements of PUWER impinge, the legislation most relevant to this issue is perhaps the Management of Health and Safety at Work Regulations 1999.

The need for all-round vision on construction vehicles is causing some problems for two reasons. There is no recognised definition of what this means and the European Normative Standard EN 474-1 relevant to earth moving equipment refers to an ISO standard which only requires a view 12m around the vehicle. However, vision required is actually very close to the vehicle just when the vehicle is setting off. The ISO standard is being reviewed, but there appears to be a misunderstanding in the industry.
**Woodworking**

HSE introduced a new ACoP for the woodworking industry under PUWER 98, in particular requiring risk assessment specifically for braking and limited cutter-tool projection (i.e. the cutter not projecting beyond the block). Regulation 15 requires braking if there is a risk of contact with the blade during run down. (So this is not an absolute requirement to provide braking – guarding, for example, may be an option to prevent risk of contact with a moving blade)

This risk assessment provision is not well understood; many believing, for instance, that brakes are required on all machines. However, it was felt that people had grown too used to the old woodworking machinery standards, which were less flexible and so led to minimum standards. The regulations now are more forward thinking and provide a lever for HSE to press for change.

Suggested advantages of limited cutter projection were improved quality and reduced kick back and noise. However, the general view is that it is an expensive modification. For instance, a spindle moulder for a particular job will have to be custom built using a CNC profile grinder – for most users this is only feasible at a tooling supplier, even small one-off jobs cost £50-100 a time. Transition for this provision is to 5th December 2003. There is a suspicion that some in the industry are waiting to see whether and how HSE is going to enforce the regulations.

The requirement to fit brakes is being introduced in phases – machines are grouped into three and the requirement comes in for those groupings in 2003, 2005, and 2008, i.e. one group at a time. This may be causing some confusion, and the logic of the groupings is not fully understood.

Evidence for impact, however, is indicated by tooling companies’ reports of increased orders. A problem though is that larger companies sell off old machinery, which is bought up second hand by smaller organisations

Most woodworking machines are very durable and last for a long time (e.g. reports of a 1944 machine at auction) making modifications difficult. One interviewee estimated around £500-£800 per machine to upgrade.

**Forestry**

The main issues in forestry have been seat belts and ROPS. This has been a particular issue for trapped excavators: it is usually argued that these are not necessary for construction, but probably are required for forestry. Wood chippers’ guarding changed standards but it is not thought this is due to PUWER. It appears that HSE worked with manufacturers following fatalities, especially abroad, to improve standards.

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21 **PUWER 98: Retrofitting of braking to woodworking machines** WIS 38, HSE Books 1998 explains “For circular saw benches, dimension saws, powered and hand-fed cross-cut saws, single-end and double-end tenoning machines and combined machines incorporating a circular saw and/or a tenoning attachment, the work must be completed no later than 5 December 2003, i.e. 5 years after PUWER 98 comes into force.

For narrow bandsaws, re-saws, vertical spindle moulding machines (unless fitted with a manual or foot-operated brake), hand-fed routing machines, thicknessing machines, planing/thicknessing machines and surface planing machines, the work must be completed no later than 5 December 2005, i.e. 7 years after PUWER 98 comes into force.

For any other machine not specified above but for which the risk assessment shows braking to be necessary, the deadline is 5 December 2008, i.e. 10 years after PUWER 98 comes into force.”

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The forestry industry wanted a “certificate of competence” for chainsaw operation. There continue to be difficulties agreeing which training body the industry wants to run the qualification. Under one system the trainer does the assessment; under another the training is followed by a period of experience in the field with a separate assessment following. The latter is more difficult to deliver, especially in a rural environment, but offers advantages in quality. Provision may be lacking in terms of providers who will visit work places. Another complication has been the structure of public funding and the complexity of gaining it.

4.10 PUWER 92 – Ongoing compliance

4.10.1 Key points

- There is clear evidence from the current survey that there is ongoing compliance.
- There is evidence of improved compliance when comparing with previous reviews.
- The majority of users believe guarding is necessary.
- The vast majority of users (99%) understand they have an ongoing need to ensure machinery complies with safety law after it is purchased.
- Significant minorities think that guarding slows down production (9%), do not think that guarding is to prevent unsafe operation (12%), and take no action if staff do not work safely with machinery (6%).

4.10.2 Results in detail

The focus of all stages of the current research is the newer requirements of PUWER 98. However, at all stages some broad issues of ongoing compliance with the requirements of PUWER 92 were tested. As well as asking questions in the early stages, the survey followed up the work of two previous reviews of PUWER 92:

- Review of the Provision and Use of Work Equipment Regulations (PUWER) 1992
  Unpublished report to the Health and Safety Executive RSU Ref: 3525/R64.030, The Consultancy Company, Feb 1998


The latter review had a broadly similar representation of industries in its respondents, though only broke it down into “services”, “industrial” and “NHS”. However, the results are probably broadly comparable. It concluded that awareness of the PUWER regulations was the second lowest amongst the 6-pack with 50% aware, and 63% of so-called “industrial” respondents aware (p. 13-14). The current survey shows that less than 8% of work equipment users had never heard of the PUWER regulations, and over three quarters of the sample rated themselves as either “familiar” or “very familiar” with the regulations.
It should be noted that in the current survey this question was only asked of people who had identified themselves as having equipment likely to be significantly affected, the group for whom the PUWER regulations are most important. If we take the whole sample of 499 user respondents and take a worst case assuming that all 197 who did not have equipment in the specified groups (machinery requiring guarding, equipment used for lifting, powered work platforms, mobile work equipment, or did not use contract lifting services) had not heard of PUWER, then the proportion not aware only rises to 44%. It seems unlikely that none of the 197 had heard of the regulations, so this would at face value, appear to be an increase in awareness compared to the earlier survey.

The first-mentioned report above (Review of the Provision and Use of Work Equipment Regulations (PUWER) 1992, unpublished) reported on research which asked a range of questions on what had been done in response to PUWER 92. Results of the current survey are shown in Figure 26.

We have compared the results of these two surveys, but comment first on the sampling is warranted. The vast majority of the sample of the PUWER 92 RSU report is drawn from industries that the current research categorises as highly (H) affected by the PUWER regulations. Only Retail (34 respondents out of 280) was represented from less affected sectors. For instance, there is no banking / finance, local government, other services or education, and around 60% of the respondents are manufacturing companies. The responses to the PUWER 92 question from the current sample (shown in Figure 26) are from those who have identified themselves as being affected by the regulations. So one set of respondents represent industries most likely to be impacted by the regulations, and the other set have identified themselves as affected. The two sets of results can therefore be broadly compared.

Comparisons between the results of the report to RSU and the current work show that users do the following in order to comply with PUWER:

- Equipment safety audit – almost 50% previously, 70% of the current survey responding “always” or “usually”;
- Equipment risk assessment – almost 60% previously, over 65% of the current survey responding “always”, and over a further 20% responding “usually” carried out;
- Reactive / no procedure maintenance – around 25% previously, similar in the current survey;
- Schedule for checking and maintaining guarded machinery – around 65% previously, over 80% in the current survey;
- Training – 20% previously provided no training, less than 5% of the current survey respondents did not provide training or information on machinery safety and over 90% at least “usually” provided information and / or training on machinery safety;
- Reliance on suppliers for provision of all training – less than 5% previously relied on suppliers, similar in the current study survey, but with almost a further 30% using suppliers as part of their training provision.
Therefore, on machinery safety audits and risk assessment, there is a clear increase in those claiming to carry these out. There is also some increase in the proportions carrying out planned preventive maintenance (and similar proportions who only carry out reactive maintenance). There may be a reduction in those providing no training, but the questions are hard to compare, as the current survey enquired about information provision in the same question.

The risk assessment results on both surveys might be questioned by some interviewees who contributed to the earlier stages of the current work, particularly machinery suppliers and training providers, many of whom commented that risk assessment was not done. This may in part be a reflection of the adequacy of risk assessments, which of course was not tested by the above questions.

The lack of reduction in reactive maintenance supports the early stage results where interviewees frequently commented that there was often only reactive maintenance. In particular an HSE Principle Inspector commented that there is still a culture of reactive management, and this is the main reason why planned preventive maintenance is not done.

The current study also shows evidence of compliance in other areas:

- The provision of information or training on machinery safety is claimed by just over 90%.
- Almost 70% say they either “always” or “usually” work to a written safe system for the operation of guarded machinery.
- Over 90% say that all or most of their machines requiring guard ing are fitted with emergency stop controls.
- Around 75% have a system for preventive maintenance of guarded machinery.
- Over 60% say they always check that new machinery complies with safety regulations, with a further 30% saying they usually do.
Figure 26 Action to comply with PUWER by users of machinery requiring guarding

Respondents were asked “If you have equipment that requires guarding, such as circular saws, conveyor belts, power presses, drills etc please indicate if you:

a. Provide information and training to staff on the safe use of guarded machinery.
b. Check that new machinery complies with safety regulations.
c. Rely on equipment suppliers to provide staff training.
d. Have a schedule for checking and maintaining guarded machinery.
e. Have a system of preventive maintenance for guarded machinery.
f. Only carry our repair & maintenance on equipment after a fault develops.
g. Audit the safety of machinery.
h. Have the emergency stops on guarded machinery.
i. Have a written safe system for operating guarded machinery.
j. Have assessed which of your equipment needs guarding.”

The current study also asked attitudinal questions detailed in Figure 27.

The majority of users believe guarding is necessary with 99% either “definitely disagreeing” or “disagreeing” that “experienced staff who behave safely” are an alternative to guarding, and over 95% disagreeing that guarding is pointless because staff will defeat it. Also encouragingly, despite the confusion about the supply of machinery requirements, the vast majority of users (99%) understand that they have an ongoing need to ensure machinery complies with safety laws after it is purchased.

Significant minorities still think that guarding slows down production (9%), do not think that guarding is to prevent unsafe operation (12%), and take no action if staff do not work safely with machinery (6%).
Respondents were asked “To what extent would you agree with the following statements:

a. You don’t need to guard machinery if you have experienced staff who behave safely.

b. Machinery only needs to comply with the relevant safety standards at the time of purchase / installation.

c. Guarding machinery slows down production.

d. Guarding machinery is pointless because staff will defeat the guards anyway.

e. All our machinery that needs guarding has suitable guards and emergency stops etc.

f. Machinery guarding is needed in order to prevent unsafe operation by people.

g. Our operators sometimes try to work around guards / break safe operating procedures for guarded machinery.

h. We always take action if staff do not work safely with guarded machinery.”

4.11 Suggested Improvements

This section is derived from feedback received during the in-depth discussions, primarily in the second round of interviews. There is thus some repetition in order to gather together suggestions in one section. We have not commented on the practicability of the suggestions simply reported them.

ACoP and guidance-related suggestions

- Many considered that the ACoP was not written clearly enough for operational staff. Several suggested a need for “plain English”. The CITB pointed out that the 1.6m workers in the construction industry have an average reading age of 10 and suggested that an ACoP might usefully include information for managers to pass on to their staff. One interviewee felt there should be more guidance for inspection of specific pieces of equipment.
• Several others suggested that more cross referencing to other legislation in the ACoPs would assist understanding. Some thought in particular that the link between PUWER, LOLER and the Management Regulations could be made less confusing. One suggestion was that guidance should not just refer to “risk assessment in other regulations”. It should at least, to some extent, explain what it is without the necessity of obtaining another document. Also, several suggested that there should be practical examples of what risk assessment means in particular contexts for PUWER and LOLER. There were similar suggestions that LOLER should explain the inspection requirement under PUWER for lifting equipment, rather than simply refer to the other document.

• A very specific issue is LOLER Regulation 9/ACoP. It should be made clearer that lifting equipment in use is “exposed to conditions causing deterioration”.

• Generally, SMEs would like more industry specific ACoPS / Guidance, and some suggested more case study material in the guidance.

• There were suggestions that there should be free downloadable ACoPs.

• Some wanted more clarification of maintenance requirements, perhaps a reflection of the confusion with the inspection and thorough examination requirements.

• Several thought that more needed to be done to improve duty holders’ understanding of the terms “thorough examination” and “inspection”. Suggestions for change include not using the term “inspection” or making more specific terms such as Thorough Examination for Lifting Equipment” (TELE). One suggested it ought to be possible to make the various requirements under both regulations more transparent. There was a suggestion that there could be an “Ask Jeeves” web site for health and safety advice, and / or advice independent from HSE.

**Other suggestions**

• One user who appeared to fully understand CE marking commented that he thought it was a waste of time as they effectively ignored the CE marking and had to do everything themselves. Similarly another suggested getting rid of the CE marking in cases where there is no independent verification to reduce the confusion.

• One service provider suggested that TE should be referred to as “Lifting Equipment TE” (or “Power Press TE”) to help avoid confusion.

• One suggested more guidance on competence in the form of a “competence gauge” would assist. By this was meant a recognised guided way of assessing someone’s competence for a particular job.

• One suggested that there should be a minimum planning period for lifts, likening it to the planning period required of much asbestos removal work. He agreed this should be limited to lifting operations with relatively high hazard potential. A permit to work system should be required in such a situation.
5 COSTS AND BENEFITS

5.1 Summary

5.1.1 Introduction

The comparison of costs and benefits has entailed an assessment of qualitative and quantitative information. The quantitative assessment involves comparing a numerical estimate of the costs of compliance with a numerical estimate of the benefits. The costs referred to here relate to the expenditure incurred by duty holders to comply with the regulations. The assessment of compliance costs takes account of reduced costs, such as lower thorough examination costs. Thus, the cost of compliance is net of any averted expenditures, such as reduced examination costs. Similarly, any financial savings, such as reduced machinery breakdowns or production interruptions, would be deducted from the compliance cost to give a net compliance cost.

The “cost” of injuries is not treated as a cost. Rather any reduction in injuries is expressed as a “benefit”. This is achieved by multiplying the number of averted injuries by a value of life. The value of life includes estimates of tangible costs such as damage and intangible costs, specifically the value of pain and suffering.

The cost of compliance is then compared with the value (benefit) of averted injuries.

The qualitative assessment involves reporting duty holders’ perceptions of the balance of costs and benefits, the perceived significance of compliance costs and the perceived reduction in injuries.

The results of the numerical assessment can be compared with duty holders’ perceptions for the purpose of determining if the quantitative and qualitative assessments concur.

5.1.2 Costs of compliance

Four sets of information are presented regarding the cost of compliance, namely:

- A summary of the HSE’s original compliance cost estimates from 1996\textsuperscript{22};
- A summary of the types of costs reported by firms in discussions and case studies;
- The self-assessed significance of costs reported by respondents in the main postal survey;
- A new estimate of the compliance costs derived using a combination of the latter two sources.

The four points of information are compared with the assumption that there should be some degree of correspondence between them. It is also assumed that if the subjective perceptions of costs correspond with the numerical cost estimates, this increases the confidence that can be placed in the numerical cost estimate. It is not expected that the HSE’s original cost estimate will exactly match the current cost estimate as the two estimates use different data and methods.

\textsuperscript{22} HSE Cost benefit assessments of PUWER 98 and LOLER.
It is concluded that, for LOLER / PUWER 98 together, firms have incurred a one-off cost of compliance in the order of £100m and recurring (undiscounted) annual costs of about £13.5m to £26m per year - a ten year (1998 – 2008) cost of £200m to £290m when discounted at 5%. Survey respondents reported that this cost is significant, but does not affect businesses or cause serious concern. The total ten year compliance cost of LOLER and PUWER 98 estimated by the HSE was in the range of a saving of £69.4m to an increased cost of £182m.

It is pertinent to note that a significant proportion of the cost has been incurred in modifying equipment to meet regulatory requirements, for which the transition period ends in December 2002.

5.1.3 Benefits

Four sets of information are presented regarding the benefits of the regulations:

- A summary of the benefits foreseen by the HSE’s original assessment;
- A summary of the benefits cited by firms in discussions and case studies;
- A summary of the responses to questions about the benefits in the main postal survey;
- An assessment of the number of deaths and injuries averted by the regulations using HSE RIDDOR data.

It is important to note that the HSE’s cost-benefit analysis did not foresee any reduction in deaths until after December 2002. The assessment of RIDDOR data completed by this study is consistent with the HSE’s prediction, i.e. there is little detectable reduction in statistical injury rates.

The main benefits to date comprise a streamlined set of regulations, increased awareness of safety and improved equipment design. There is some evidence of a reduction in major injuries.

The HSE estimated that PUWER 98 should prevent ten deaths in the period 2003 to 2006, i.e. about three deaths per year.

5.1.4 Comparison of costs and benefits

The HSE made the following predictions regarding the balance of compliance costs and benefits for PUWER 98 and LOLER.

- For LOLER: The benefits were not quantified but were considered modest, whilst costs ranged from a saving of £109.4m to a cost of £112.8m
- For PUWER: Benefits of £8.2m would be outweighed by the costs of £40m to £77m in the ten year period up to 2005/06.

The HSE predicted that the costs of compliance could exceed the benefits, i.e. a cost of compliance ranging from a saving of £69.4m to an additional cost of £189.9m for the ten year period up to 2005/06, compared to a quantifiable safety benefit of £8.2m. The costs of compliance could hence be twenty three times greater than the quantifiable safety benefits in the pessimistic case.
The current assessment is consistent with this prediction wherein a one-off cost of compliance in the order of £100m and recurring (undiscounted) annual costs of about £13.5m to £26m per year is compared with no probable change in the number of deaths or major injuries in the period up to 2002.

If the HSE prediction of three lives saved per year from December 2002 is correct, the annual benefit of lives and injuries averted should ultimately outweigh the recurring annual costs, assuming a ratio of 100 averted major injuries for every averted death. Indeed, if this prediction is correct, the value of lives and injuries averted should match the cumulative cost incurred by about 2008, i.e. in the tenth year after implementation. The cumulative benefits should outweigh the cumulative costs from thence onwards.

This study reports approximately thirty five deaths per year related clearly or partly to PUWER 98 / LOLER. There are a wide range of causes of these deaths. However, in principle they are covered by the provisions of PUWER / LOLER. For example, faulty or poorly maintained equipment contributes to about one third of accidents, whilst unsafe systems of work contribute to the majority of accidents. Non-compliant equipment, such as no ROPS or seat belts, was a factor in at least seven deaths in the two years after 1998. Therefore, a 10% reduction in these deaths, equivalent to the three lives saved per year assumed by the HSE, is not unreasonable.

The survey respondents’ perception of costs and benefits is consistent with this study’s numerical comparison of costs and benefits, i.e. they are unsure if there has been any reduction in injuries to date, despite improvements in practices, equipment modifications and employee behaviour.

5.1.5 PUWER 92

A review of contact with moving machinery fatal and major injury statistics suggests that there may have been a decline in injuries after the introduction of PUWER 92. Whilst the injury rate fell before as well as after 1992 / 93, the earlier decline coincided with a reduction in employment whilst the subsequent decline coincided with a rise in employment. Accordingly, once allowance is made for the level of industrial activity, it is possible to suggest that there was a significant fall in injuries, in the order of 600 fewer fatal-major injuries (with a nominal value of about £90m).

The original HSE cost of compliance assessment predicted a low compliance cost of no more than £15m on the assumption that PUWER 92 reinforced and consolidated previous regulations. This assumption is not consistent with this study and the previous evaluation of PUWER 92 study, which reports that the PUWER 92 regulations prompted a higher level of compliance, including expenditure on guarding and other safety devices. Accordingly, the cost of compliance (which is not estimated here) was probably higher than predicted.
5.2 HSE original cost estimates

5.2.1 LOLER

The HSE cost benefit assessment for LOLER quoted three values. The three values related to the three different ways in which in-service thorough examination could be implemented.

The costs were dominated by the requirements for initial and in-service examination. Due to the uncertainty in how firms may respond to the regulations, a wide range of cost estimates were provided. It was thought that the extended sectoral coverage of the legislation may increase costs whilst the risk-based approach may help reduce costs. The ten year cost of compliance was estimated to range from a saving of £109.4m to an increased cost of £112.8m.

<table>
<thead>
<tr>
<th>Table 13 HSE estimates of LOLER costs of compliance (1996 prices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to industry</td>
</tr>
<tr>
<td>Option A</td>
</tr>
<tr>
<td>Option B</td>
</tr>
<tr>
<td>Option C</td>
</tr>
</tbody>
</table>

5.2.2 PUWER 98

The total quantified costs of the regulations were estimated at between £40m and £77m in present (1996) prices for the ten year period 1996 / 7 to 2005 / 06. The main predicted costs included familiarisation (£14m), on-going inspection (£1m to £1.6m per year) and design requirements (£21m to £31m). It was considered that there was uncertainty over the costs, especially those of initial and in-service inspection. There was also uncertainty about the estimated amount of equipment in circulation.

5.3 Costs of implementation identified by respondents

It is clear from the stage 1 and 2 interviews and case studies that firms report that they have incurred significant costs in complying with the LOLER and PUWER '98 regulations. These costs are borne principally by those firms using, inspecting or supplying equipment that were clearly impacted by the regulations (such as dump trucks and fork lift trucks).

It is apparent that, in contrast to the HSE costing:

- Firms have not greatly altered their approach to thorough examination or inspection and hence these costs are unlikely to have changed greatly - they have not taken advantage of the opportunity to vary their period of inspection to match risks, and so reduce costs;
- Firms do appear to have incurred significant equipment modification costs – although not necessarily all of those foreseen by the HSE;
- Firms have expended greater time on administration and training than foreseen by the HSE.

The types of costs reported during discussions and case studies are summarised below.
Equipment users

It was apparent that the main costs of compliance include:

- Equipment modifications, particularly;
  - Fitting of roll over protection and seat belts;
  - Fitting auxiliary devices to improve visibility;
  - Miscellaneous modifications of lifting equipment, such as warning notices, new attachments, etc.
- Development of written instructions for lifting operations;
- Lifting operation risk assessment;
- Developing new safe systems of work for lifting operations;
- Provision of physical evidence of thorough examination;
- There is some evidence of improvement in administration and asset identification systems in response to the regulations;
- Training staff in lifting operations;
- Higher levels of supervision for lifting operations.

There is some evidence that smaller companies have done very little, especially small retail companies. Thus, these costs appear to be borne mostly by larger firms who are more likely to own the types of equipment impacted by the regulations. Indeed, the main survey found that less than 20% of small firms (10 to 50 employees) and only 2.5% of micro firms (<10 staff) carried out additional training compared to 44% of large firms. Training companies report increased work following LOLER and PUWER 98.

Few users report that they have increased the level of inspection.

The main survey found that:

- 39% of mobile equipment users assessed the risk of equipment roll-over;
- 39% of mobile equipment users introduced new measures to separate pedestrians from moving equipment;
- 48% of mobile equipment users completed additional training, as did 43% of lifting equipment users;
- 22% hired in mobile equipment to comply with the regulations, whilst 14% of lifting equipment users contracted out lifting operations;
• 36% of lifting equipment users reviewed lifting operations and gave more time for planning lifting operations;

• 32% of lifting equipment users introduced new administration systems.

These findings support the feedback from the stage 1 and 2 discussions, namely that users did incur training and assessment costs.

**Suppliers of equipment**

Suppliers report that they have incurred significant compliance costs, mainly:

• Modification of equipment – suppliers report that they modified their fleets to comply with PUWER 98 and LOLER;

• Training of staff in thorough inspection as well as general familiarisation;

• Review of inspection and thorough examination schemes;

• Administration of inspection and thorough examination.

A number of large suppliers report that they have increased the frequency of thorough examination from twelve to six months. However, the new frequency is thought to exceed the regulatory guidance and was intended to provide an additional “margin of safety”.

One major hire firm, who have 20% of the UK hire market, reported:

• A 30% increase in the items of hired equipment (including slings and shackles) to be thoroughly examined and an increased frequency of inspection – at a cost of £500,000 per year;

• A one off expenditure of £20,000 on IT to improve tracking of records;

• Training fifty staff to complete thorough examination;

• Approximately 100 to 200 days spent on managing compliance with LOLER / PUWER 98.

**Inspection firms**

The feedback from firms that provide thorough examination / inspection services under LOLER and PUWER 98 is mixed. Whilst some inspection firms report an increased level of thorough examination, others report no change. Indeed, two respondents report that the level of thorough examination has increased “A lot”, one report “A little” increase and seven inspection firms report “No / marginal change” in the level of inspection / thorough examination. On balance, the conclusion is that there has been little change in the level or cost of thorough examination / inspection work carried out by inspection firms. It is reported that firms have mostly maintained former regimes and adopted previous standards as a compliance strategy. Most firms suggest that previous standards were adequate and the potential savings are not enough to justify developing an examination schedule. Any increase in the level of thorough examination is due to the increased range of equipment examined, rather than a change in examination schemes. The increase in the amount of thorough examination is judged by inspection firms to be in the order of zero to 5%.
Inspection firms report that they incurred a number of other costs, including:

- Training and familiarisation of inspectors;
- Producing training / familiarisation schemes for clients;
- Production of new thorough examination written schemes for (a few) clients;
- Completing risk assessments of machinery for some clients;
- Producing guidance for staff and clients.

The level of training for inspectors is typically ½ to one day training.

**5.4 Stage 3 Postal Survey – Self reported costs**

Users and suppliers of equipment were asked which one of a series of statements about the cost (in time and money) of complying with the regulations since 1998 they agreed most with, as noted in Table 14.

It is apparent from Table 14 and Figure 28 that:

- The costs of compliance have had a greater impact on suppliers than users of equipment;
- The vast majority of equipment users do NOT report that the costs affected business decisions, i.e. 95.7% of users;
- A significant minority of suppliers report that the costs caused serious concern (21.7%) with 1.7% reporting that the costs threatened the survival of their business.

The users’ responses have also been presented for Low, Medium and High risk firms, as shown in Table 15. It is apparent that:

- High and medium risk users are less likely to report that there were no extra costs;
- There was minimal difference between Low, Medium and High risk users in the per cent of firms that report that the costs caused serious concern;
- The vast majority of all categories of users report that the costs did not affect business decisions.
Table 14 Users’ and suppliers’ perceived significance of LOLER / PUWER 98 compliance costs (% who agree with each statement)

<table>
<thead>
<tr>
<th>Users</th>
<th>Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>There have been NO extra costs to my organisation of complying with PUWER or LOLER since 1998</td>
<td>6.9</td>
</tr>
<tr>
<td>Costs of complying with PUWER / LOLER have been minimal</td>
<td>42.2</td>
</tr>
<tr>
<td>Compliance costs have been significant, but not enough to affect business decisions</td>
<td>46.6</td>
</tr>
<tr>
<td>High costs have caused serious concern and business decisions have been taken to reduce the impact</td>
<td>3.6</td>
</tr>
<tr>
<td>Costs have been so high that they have threatened the survival of the organisation</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Figure 28 Perceived costs of compliance – users and suppliers

Table 15 Low, medium and high risk users’ perceived significance of LOLER / PUWER

<table>
<thead>
<tr>
<th>Low (%)</th>
<th>Medium (%)</th>
<th>High (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>There have been NO extra costs to my organisation of complying with PUWER or LOLER since 1998</td>
<td>13.2</td>
<td>8.2</td>
</tr>
<tr>
<td>Costs of complying with PUWER / LOLER have been minimal</td>
<td>37.7</td>
<td>42.6</td>
</tr>
<tr>
<td>Compliance costs have been significant, but not enough to affect business decisions</td>
<td>45.3</td>
<td>42.6</td>
</tr>
<tr>
<td>High costs have caused serious concern and business decisions have been taken to reduce the impact</td>
<td>3.8</td>
<td>4.9</td>
</tr>
<tr>
<td>Costs have been so high that they have threatened the survival of the organisation</td>
<td>0.0</td>
<td>1.6</td>
</tr>
</tbody>
</table>
5.5 Compliance cost quantification

The ten year compliance cost derived by this study is presented below, along with the original HSE estimate. Given that firms do not appear to have reduced thorough examination due to risk based regulations, and that our estimate includes a number of costs not foreseen in the original estimate, it is judged that the difference in the cost estimates is unsurprising. The recurring annual costs have been discounted at 5%.

**Table 16 Comparison of original HSE and current cost estimate.**

<table>
<thead>
<tr>
<th></th>
<th>10 year discounted total compliance cost for LOLER &amp; PUWER 98</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HSE estimate</strong></td>
<td>Saving of £69.4m to an additional cost of £182.8m (1996 prices)</td>
</tr>
<tr>
<td><strong>GSB estimate</strong></td>
<td>£200m to £290m (2002 prices) (1998 to 2008)</td>
</tr>
</tbody>
</table>

A more detailed summary of the current cost of compliance estimate is provided in Table 17 and Table 18. It is apparent that:

- The single greatest cost over the ten year period is the recurring cost of training staff, particularly of equipment user staff;

- The main one-off cost comprises equipment modification;

- The change in the cost of thorough examination is very uncertain.

The main equipment modifications costs comprise fitting of roll over protection and seat belts to mobile plant, Forklift trucks, etc. It is pertinent to note that a significant proportion of the cost has been incurred in modifying equipment to meet regulatory requirements for which the transition period ends in December 2002.

The compliance cost can be expressed as an average annual cost of £20m to £30m per year in 2002 prices. This equates to about 1.5% to 2% of the payroll of affected firms, i.e. about £300 per year per operator.
### Table 17 Estimate one-off compliance costs for LOLER and PUWER 98

<table>
<thead>
<tr>
<th>Cost category</th>
<th>Description</th>
<th>Lower estimate</th>
<th>Upper estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equipment users</td>
<td>£16,779,310</td>
<td>£16,779,310</td>
</tr>
<tr>
<td></td>
<td>Equipment suppliers</td>
<td>£2,979,403</td>
<td>£7,545,455</td>
</tr>
<tr>
<td></td>
<td>Inspection firms</td>
<td>£586,869</td>
<td>£883,949</td>
</tr>
<tr>
<td></td>
<td><strong>Sub-total</strong></td>
<td><strong>£20,345,582</strong></td>
<td><strong>£25,208,713</strong></td>
</tr>
<tr>
<td><strong>Equipment modifications</strong></td>
<td>FLT</td>
<td>£16,805,803</td>
<td>£16,805,803</td>
</tr>
<tr>
<td></td>
<td>Dumper trucks</td>
<td>£10,694,631</td>
<td>£10,694,631</td>
</tr>
<tr>
<td></td>
<td>Other people moving equipment</td>
<td>£13,365,572</td>
<td>£13,365,572</td>
</tr>
<tr>
<td></td>
<td>Other mobile equipment</td>
<td>£10,017,289</td>
<td>£10,017,289</td>
</tr>
<tr>
<td></td>
<td>Cranes</td>
<td>£6,740,879</td>
<td>£6,740,879</td>
</tr>
<tr>
<td></td>
<td>Patient hoists</td>
<td>£2,042,597</td>
<td>£2,042,597</td>
</tr>
<tr>
<td></td>
<td>Other people lifting equipment</td>
<td>£10,601,008</td>
<td>£10,601,008</td>
</tr>
<tr>
<td></td>
<td>Other object lifting equipment</td>
<td>£673,382</td>
<td>£673,382</td>
</tr>
<tr>
<td></td>
<td><strong>Sub-total</strong></td>
<td><strong>£70,941,162</strong></td>
<td><strong>£70,941,162</strong></td>
</tr>
<tr>
<td><strong>Replacement of equipment</strong></td>
<td></td>
<td>£13,046,656</td>
<td>£13,046,656</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td>Equipment users</td>
<td>£5,049,751</td>
<td>£5,049,751</td>
</tr>
<tr>
<td></td>
<td>Equipment suppliers</td>
<td>£458,977</td>
<td>£458,977</td>
</tr>
<tr>
<td></td>
<td>Inspection firms</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td><strong>Sub-total</strong></td>
<td><strong>£5,508,728</strong></td>
<td><strong>£5,508,728</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>£109,842,127</strong></td>
<td><strong>£114,705,258</strong></td>
</tr>
</tbody>
</table>
Table 18 Estimated recurring annual compliance costs for LOLER and PUWER 98

<table>
<thead>
<tr>
<th>Cost category</th>
<th>Description</th>
<th>Lower estimate</th>
<th>Upper estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>Equipment users</td>
<td>£12,922,553</td>
<td>£17,436,021</td>
</tr>
<tr>
<td></td>
<td>Equipment suppliers</td>
<td>£318,324</td>
<td>£318,324</td>
</tr>
<tr>
<td></td>
<td>Inspection firms</td>
<td>£252,557</td>
<td>£252,557</td>
</tr>
<tr>
<td></td>
<td>Sub-total</td>
<td>£13,493,433</td>
<td>£18,006,902</td>
</tr>
<tr>
<td>Thorough examination / inspection</td>
<td></td>
<td>£0</td>
<td>£12,500,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>£13,493,433</td>
<td>£25,993,433</td>
</tr>
</tbody>
</table>

5.6 HSE benefit assessment

5.6.1 LOLER
The HSE predicted that the LOLER regulations would have the following benefits:

- “Increased frequency of examination or a more risk-based approach may bring some (modest) improvement in the safety of lifting equipment.
- Marginal operational savings.
- Some operational savings through industry having to take account of just one set of regulations. Likely to be more important in the long term.” (p.15 to 16)

5.6.2 PUWER
The safety benefits predicted in the HSE cost-benefit assessment were:

- Inspection: It was stated that the requirement for checks and on-going inspection of work equipment on a risk-related basis should improve workplace safety where there is not already standard practice;
- Roll-over protection: Significant benefits were predicted although it was uncertain what types of vehicles would be affected and what provisions had already been made. It was assumed that the regulations could prevent ten deaths in the period up to 2005 / 06, accruing from December 2002 onwards;
- Auxiliary devices for driver vision.

5.7 Users, suppliers and inspectors PERCEIVED benefit

5.7.1 Users and suppliers

The stage 1 and 2 discussions explored in an open ended style the perceived benefits and effectiveness of the regulations. The perceptions of respondents are broadly consistent. The main benefits are summarised below. The benefits are primarily related to more effective safety regulations:

- **Rationalised regulations:** The rationalisation of industry specific regulations into two industry wide regulations has reduced some costs, such as the training of safety professionals. The regulations are more user friendly, easily accessible and standard across industries. Also, as the approach is consistent with that contained in the “6 pack” a more common approach can be applied across areas of safety.

- **Less prescriptive – more effective regulations:** The new regulations are thought to offer more scope for interpretation as they are less prescriptive and more risk based than before. This in turn is thought to mean that the regulations are more practical as duty holders can decide how best to comply in their specific circumstances. Also, the guidance in ACoPs is thought to be clearer than before. Hence duty holders welcome the less prescriptive form of regulation.

- **Improved safety practices:** It is thought the regulations have encouraged an improvement in safety practise and compliance amongst some sections of industry. For example, it is reported that the regulations have encouraged customers (of equipment hire firms) to think about lifting equipment, its upkeep and use, along with training to plan lifts and pre-use checks, and planned preventive maintenance. Similarly, contractors’ assessments are more thorough and construction site management demand evidence of thorough examination, thereby leading to better practices by hire firms.

- **Improved safety of the working environment:** the extension of LOLER to other equipment improves effectiveness of the regulations and has led to a higher standard of hired equipment.

- **Better trained / more competent staff:** The increased requirements for competence are thought to have refocused attention on training and have led to a better trained workforce and more assurance of competence of people doing lifting operations, for example.

- **Equipment safety:** The regulations have required and led to improvements in certain aspects of equipment safety, such as ROPS, emergency stops and load limiters.
However, few respondents believe that the regulations have led to noticeable improvements in defects, productivity or breakdown changes. The exceptions include a crane hire firm that notes that it is no longer necessary to do over load testing that can damage cranes as Non-Destructive Testing can be used instead. Also, a lifting equipment trade association noted that regular inspections do identify more faults and potential problems before they become major breakdowns. This reduces maintenance cost, increases machine utilisation and extends machine life. The latter savings outweigh the costs of more frequent examinations in this respondent’s opinion.

Also, few respondents perceive any change in safety performance in terms of fewer accidents or injuries. However, some respondents believe it is too early to judge the impact on safety performance and that accidents may fall in the future.

The low impact on safety performance is ascribed to two factors. Firstly, it is thought that there is an inconsistent level of compliance, with smaller firms in particular displaying a low level of awareness and compliance. However, the second reason is that the regulations largely reinforced / restated previous requirements and most firms have maintained previous regimes.

It is important to note that none of the respondents are able to offer any data in support of their perceptions as they do not record pertinent information, such as breakdowns or injury rates related to lifting equipment. Accordingly, these responses are subjective and it should be recognised that there is no hard evidence to indicate whether breakdowns or productivity have improved or worsened.

5.7.2 Inspection firms

There is a general view that it is too early to tell whether defects have been reduced, although to date there is no observable change in defects. Some firms are of the opinion that there has been a reduction in down time due to break-downs, costs of intervention of statutory authorities, improved stock of equipment in the country, reduced insurance premiums and increased awareness of requirements.

The impact on safety is thought to be minimal.

The regulations are thought to:

- Clarify what equipment requires thorough examination;
- Bring in items of equipment that should have been included in earlier regulations;
- Allow the (rarely used) ability to follow thorough examination schemes that allow more appropriate schedules.

Customers appreciate the goal setting approach. However, only a small minority of customers are thought to have taken the opportunity to review their examination requirements. Accordingly, few clients have sought or explored the benefits offered by the regulations.

Some believe that reduced frequency of inspection in some cases has reduced costs, though others felt that not enough people were aware that this was an option.
The benefits are thought to be less in the case of smaller firms who, due to their lack of awareness of the regulations, have not, as a rule, changed practices. Thus, small firms are unlikely to have realised any benefits, such as improved safety.

5.8 Postal survey view of benefits

The postal questionnaire asked respondents to identify the benefits of the regulations. The results for users and suppliers are summarised together. Due to the very small number of inspection firms (seven respondents) their results are summarised separately.

**Users and suppliers**

Respondents were asked:

“What benefits have you achieved as a result of your compliance with PUWER 98 / LOLER?”

The results are presented in Table 19 (and graphically in Figure 29) as an average score on a scale of 1 to 5. It is apparent that users tend to, on balance:

- Agree that compliance has increased awareness of safety, changed employees behaviour and improved working practices;
- Be unsure if compliance has reduced claims, incidents, productivity, downtime or faults;
- Disagree that compliance has reduced thorough examination costs.

It is apparent that suppliers tend to, on balance:

- Agree that compliance has increased awareness of safety amongst customers, sales of training, changed employees behaviour and improved working practices;
- Be unsure if compliance has reduced claims, incidents, productivity, downtime or faults;
- Disagree that compliance has reduced thorough examination costs or increased the amount of equipment hired out.

It is apparent from Table 19 that users and suppliers tend to be unsure whether compliance with the regulations has provided any benefits beyond improved awareness and working practices.
Table 19 Perceived benefits of compliance

<table>
<thead>
<tr>
<th></th>
<th>Awareness</th>
<th>Behavioural changes</th>
<th>Reduced incidents</th>
<th>Reduced claims</th>
<th>Improved practices</th>
<th>Improved productivity</th>
<th>Reduced downtime</th>
<th>Fewer faults</th>
<th>Lower TE costs</th>
<th>Increased hire</th>
<th>Increased sales</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Users</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definitely disagree</td>
<td>1.4%</td>
<td>2.5%</td>
<td>3.2%</td>
<td>5.0%</td>
<td>1.8%</td>
<td>3.6%</td>
<td>3.5%</td>
<td>2.8%</td>
<td>9.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>8.1%</td>
<td>16.3%</td>
<td>20.9%</td>
<td>28.1%</td>
<td>9.6%</td>
<td>30.7%</td>
<td>26.6%</td>
<td>24.9%</td>
<td>36.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>13.4%</td>
<td>33.9%</td>
<td>41.1%</td>
<td>44.8%</td>
<td>16.0%</td>
<td>52.5%</td>
<td>44.0%</td>
<td>41.3%</td>
<td>43.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>64.0%</td>
<td>42.8%</td>
<td>29.8%</td>
<td>16.7%</td>
<td>65.5%</td>
<td>11.1%</td>
<td>23.8%</td>
<td>27.8%</td>
<td>9.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definitely agree</td>
<td>13.1%</td>
<td>4.6%</td>
<td>5.0%</td>
<td>5.3%</td>
<td>7.1%</td>
<td>2.1%</td>
<td>2.1%</td>
<td>3.2%</td>
<td>1.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average score</td>
<td>3.8</td>
<td>3.3</td>
<td>3.1</td>
<td>2.9</td>
<td>3.7</td>
<td>2.8</td>
<td>2.9</td>
<td>3.0</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total responses</td>
<td>283</td>
<td>283</td>
<td>282</td>
<td>281</td>
<td>281</td>
<td>280</td>
<td>282</td>
<td>281</td>
<td>280</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Awareness</th>
<th>Behavioural changes</th>
<th>Reduced incidents</th>
<th>Reduced claims</th>
<th>Improved practices</th>
<th>Improved productivity</th>
<th>Reduced downtime</th>
<th>Fewer faults</th>
<th>Lower TE costs</th>
<th>Increased hire</th>
<th>Increased sales</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suppliers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definitely disagree</td>
<td>4.8%</td>
<td>3.2%</td>
<td>3.2%</td>
<td>1.6%</td>
<td>1.6%</td>
<td>1.6%</td>
<td>3.2%</td>
<td>3.2%</td>
<td>16.1%</td>
<td>9.7%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Disagree</td>
<td>6.5%</td>
<td>21.0%</td>
<td>19.4%</td>
<td>24.2%</td>
<td>11.3%</td>
<td>21.0%</td>
<td>33.9%</td>
<td>33.9%</td>
<td>51.6%</td>
<td>38.7%</td>
<td>22.6%</td>
</tr>
<tr>
<td>Unsure</td>
<td>8.1%</td>
<td>29.0%</td>
<td>43.5%</td>
<td>50.0%</td>
<td>29.0%</td>
<td>71.0%</td>
<td>40.3%</td>
<td>29.0%</td>
<td>24.2%</td>
<td>43.5%</td>
<td>24.2%</td>
</tr>
<tr>
<td>Agree</td>
<td>59.7%</td>
<td>37.1%</td>
<td>25.8%</td>
<td>22.6%</td>
<td>54.8%</td>
<td>6.5%</td>
<td>21.0%</td>
<td>32.3%</td>
<td>6.5%</td>
<td>6.5%</td>
<td>35.5%</td>
</tr>
<tr>
<td>Definitely agree</td>
<td>21.0%</td>
<td>9.7%</td>
<td>8.1%</td>
<td>1.6%</td>
<td>3.2%</td>
<td>0.0%</td>
<td>1.6%</td>
<td>1.6%</td>
<td>1.6%</td>
<td>1.6%</td>
<td>12.9%</td>
</tr>
<tr>
<td>Average score</td>
<td>3.9</td>
<td>3.3</td>
<td>3.2</td>
<td>3.0</td>
<td>3.5</td>
<td>2.8</td>
<td>2.8</td>
<td>3.0</td>
<td>2.3</td>
<td>2.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Total responses</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
<td>62.0</td>
</tr>
</tbody>
</table>
Figure 29 Perceived benefits of compliance – users and suppliers

**Inspection firms**

Inspection firms’ perceptions of the benefits of compliance with PUWER / LOLER are shown in Table 20. It is apparent that:

- Compliance increased awareness of health and safety amongst clients and improved their working practices;
- The regulations increased the range of equipment examined.

However, it also appears that inspections firms are unsure if compliance has reduced incidents, industrial injury claims, downtime, equipment faults, etc. Indeed, none of the inspection firms agree that the regulations have led to a reduction in incidents, injury or downtime. Whilst the design of the question leaves open the possibility that the number of incidents has increased or remained level, it is clear that respondents do not believe they have reduced. They tend to disagree that TE costs have reduced, especially as the range of equipment examined has increased.
Table 20 Inspection firms’ perception of benefits (n = 7)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Definitely disagree</th>
<th>Disagree</th>
<th>Unsure</th>
<th>Agree</th>
<th>Definitely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased awareness of H&amp;S amongst our clients</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Behavioural changes in customers’ employees</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Reduced numbers incidents involving equipment you inspect / TE</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reduced claims for industrial injury</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Improved working practices by our customers</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Reduced equipment downtime at customers’ sites</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fewer equipment faults</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lower “TE” costs</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Increased range of equipment examined</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Increased sales of examination services to our customers</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

5.9 Accident analysis

5.9.1 Introduction

Our review of the LOLER regulations and changes to the PUWER regulations introduced in 1998 indicates that these regulations should have led to safety improvements that reduce the number of injuries due to:

- People killed by overturning vehicles (fork lift trucks, mobile plant, tractors, etc.) due to lack of adequate rollover protection and seat belts;

- People struck by moving vehicles (fork lift trucks, mobile plant, tractors, etc.) due to the lack of all round vision and lighting, devices to prevent unauthorised start up, and inadequate “measures to prevent pedestrians coming within the area of self-propelled work equipment”\(^{24}\);

\(^{24}\) Both the Workplace (Health, Safety and Welfare) Regulations 1992 and the Construction (Health, Safety and Welfare) Regulations 1996 implemented provisions on the organisation of traffic routes, so the effect of the AUWED provision (see para 45 of the PUWER ACoP) here is likely to be minimal.
• People killed during lifting operations – falls from lifting equipment, being struck during lifting operations, collapse of equipment during lifting operations due to improved inspection and maintenance, safer systems of lifting and improved equipment selection and design.

Many of the provisions, particularly those related to ROPS, did not come into full effect until December 2002. Accordingly, it is reasonable to suppose that the full benefit of these provisions may not be revealed in the form of fewer injuries. On the other hand, it is apparent that a significant proportion of users and suppliers have modified equipment and enacted other measures in response to PUWER 98 and LOLER.

Accordingly, an analysis has been completed of the trend in these categories of fatal injuries. In particular the analysis:

• Estimates the number and rate of fatal injuries that could have been prevented by compliance with the provisions of LOLER / PUWER 98 in the period 1996 to April 2002 using the accident descriptions in the HSE’s Focus database, and;

• Estimates the proportion of fatal accidents in these categories of injury causes (struck by vehicle, struck by load, contact with machinery and falls during lifting operations) that can be attributed to failure to comply with the provision of LOLER / PUWER 98, to determine whether there is a falling proportion.

Secondly, a sample of major injury reports (from these categories of injuries) was taken from the Focus database and assessed i.e. is there a reducing proportion of investigated major injuries due to non-compliance with the provisions of the LOLER / PUWER 98 regulations.

Finally, a semi-quantitative analysis of the causes of injuries in the latter categories has been completed for the period after 1998. The aim of this analysis is to identify what aspects of safety management the HSE should focus on. In particular, the analysis identifies the proportion of fatal and (investigated) major injuries due to:

• Inadequate inspection or maintenance;
• Inadequate equipment design;
• Improper use of mobile equipment by staff;
• Lack of equipment user competence;
• Unsafe systems of work; and,
• Other causes as identified in the analysis.

The results of this analysis can also be used to review the effectiveness of PUWER / LOLER as follows:

• Are there still a significant number of deaths due to factors that PUWER / LOLER was intended to control?
• Have PUWER / LOLER addressed the main causes of deaths associated with equipment?

• Why are deaths still occurring? Is it due to non-compliance with PUWER / LOLER or is it that these regulations fail to address the main causes of accidents?

5.9.2 Fatal injuries associated with PUWER 98 provisions

All fatal accidents involving the kinds of equipment or causes intended to be addressed by the provisions introduced by the PUWER regulations in 1998 have been identified by a review of fatal accident investigation reports. These have been categorised into accidents that were Clearly and Possibly / Partly related to the factors intended to be addressed by the provisions introduced by the PUWER 98 regulations. The number and rate per 100,000 employees of such fatal accidents have been calculated for the period 1996 to 2001. The trends in the numbers and rates are shown below, and compared with the rate of all fatal injuries for the same period.

Table 21 shows the rate of deaths per 100,000 employees for the period 1996 to 2001 for all deaths and for those “Clearly” related to the provisions of PUWER 98. There is no statistically significant change in the rate of fatal injuries associated with the factors addressed by the PUWER 98 regulations. A chi square test of the fatality rate shows no significant difference at 5% level, i.e. it is 95% certain that there is no difference in the fatality rate across the period 1996 to 2001.

Table 21 also shows the number of deaths per year clearly related to PUWER 98, such as fourteen in 1996 / 97. An Analysis of Variance (ANOVA) found no significant difference in the fatality rates between the years at the 5% level, i.e. it is 95% certain that the number of deaths have not changed in the period 1996 to 2001. The ANOVA produces a statistic termed F which would need to exceed 2.87 in this case. The F for the fatality rate is 0.38 which is well below 2.87.

| Table 21 Comparison of fatal injury rate per 100,000 employees for All deaths and those Clearly related to PUWER 98 provisions, and number of deaths per year |
|-----------------|------|------|------|------|------|
|                 | 96 / 97 | 97 / 98 | 98 / 99 | 99 / 00 | 00 / 01 |
| All fatalities  | .91    | .91    | .80    | .67    | .87    |
| PUWER 98       | .18    | .23    | .21    | .18    | .28    |
| No. PUWER 98 deaths | 14    | 20    | 22    | 20    | 25    |
Table 22 shows the number of deaths Clearly and Partly / Possibly related to the provision of PUWER 92 and PUWER 98 for the two years before and after 1998. The results are also presented as a rate per 100,000 employees. The latter rate was calculated for all employees. In some cases the death arose from factors that were covered by both PUWER 92 and PUWER 98. In these cases they are stated to be related to both of the issues of PUWER, and are entered in the row titled “Both”.

A statistical test (called the paired t-test) of the statistical significance of differences in the number of deaths pre- and post-1998 classed as clearly related to the provisions of PUWER 98 (thirty four before and forty five after) shows no significant difference at the 5% level.

<table>
<thead>
<tr>
<th>PUWER related?</th>
<th>Pre - 98 (2 full years)</th>
<th>Post - 98 (2 full years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clearly</td>
<td>Partly/ Poss</td>
</tr>
<tr>
<td>92</td>
<td>87</td>
<td>4</td>
</tr>
<tr>
<td>98</td>
<td>34</td>
<td>3</td>
</tr>
<tr>
<td>Both</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>No. also LOLER</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 23 shows the number and rate per 100,000 employees of Clearly and Partly related PUWER 98 deaths by sector. The majority of deaths occur in the Services and Manufacturing sectors.

**Table 23 Number and rate of PUWER related deaths by sector for employees**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Clearly</th>
<th>Partly</th>
<th>Sub total</th>
<th>Ave rate per 100k emp'ees</th>
<th>Clearly</th>
<th>Partly</th>
<th>Sub total</th>
<th>Ave rate per 100k emp'ees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>3</td>
<td>3</td>
<td>1.40</td>
<td></td>
<td>2</td>
<td>2</td>
<td>.96</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>1</td>
<td>1</td>
<td>.36</td>
<td></td>
<td>1</td>
<td>1</td>
<td>.34</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>.06</td>
<td>7</td>
<td>1</td>
<td>8</td>
<td>.18</td>
</tr>
<tr>
<td>Utilities</td>
<td>4</td>
<td>4</td>
<td>.37</td>
<td></td>
<td>7</td>
<td>7</td>
<td>.53</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>11</td>
<td>1</td>
<td>12</td>
<td>.07</td>
<td>16</td>
<td>3</td>
<td>19</td>
<td>.10</td>
</tr>
<tr>
<td>All</td>
<td>21</td>
<td>2</td>
<td>23</td>
<td>-</td>
<td>33</td>
<td>4</td>
<td>37</td>
<td>-</td>
</tr>
</tbody>
</table>

The types of equipment involved in fatal accidents within each sector reflect the predominant types of mobile equipment used in each sector. Thus:

- Agricultural deaths predominantly involve tractors and, to lesser extents, other agricultural equipment such as harvesters;
- Manufacturing deaths involve fork lift trucks and loading equipment;
- Service sector deaths involve Fork lift trucks and a wide variety of other mobile equipment and vehicles;
- Utilities and construction sector deaths involve dumper trucks, lifting equipment, cranes, tippers and rollers.
Table 24 shows the kinds of accidents before and after the implementation of PUWER 98. The key categories of collapse / overturn and vehicle movement (transport) have both increased in number. As previously stated, the change in the number of deaths pre and post 1998 (where there are eleven more deaths in total post 1998) is not statistically significant.

**Table 24 Number of PUWER Clearly related deaths by kind of accident pre and post 1998.**

<table>
<thead>
<tr>
<th></th>
<th>Collapse / Overturn</th>
<th>Machinery</th>
<th>Transport</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE 98</strong></td>
<td>6</td>
<td>2</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td><strong>POST 98</strong></td>
<td>15</td>
<td>0</td>
<td>30</td>
<td>45</td>
</tr>
</tbody>
</table>

Table 25 shows the number of times each cause appears as a per cent of accidents. Thus, for example, unsafe systems of work contribute to 37% of accidents in the period 1996-1998. It is pertinent to note that:

- The method of working (especially the system of work) contributes to the majority of accidents before and after 1998;
- The second greatest contributor is Operator error;
- Faulty and non-compliance equipment, whilst contributing to about one third of accidents each, are less commonly reported than the method of work and operator error.

This suggests that improvements to the system of working offer the greatest potential for reducing the number of accidents.

Table 26 shows the number of times a cause appears as a percentage of all causes. The pattern of results is the same.

**Collapse / overturn deaths**

As regards the cause of each type of accident, it is difficult to determine whether the apparent increase in collapse / overturn deaths is due to any specific factors. The small number of such deaths (fifteen after 1998) makes it difficult to pinpoint any pattern in the causes of accidents. The cause of post 1998 collapse / overturn deaths included:

- Five cases of non-compliant equipment, including two cases of no ROPS, two lacking seat belt and one lack adequate driver vision;
- Four cases of error or horseplay – including “racing” fork lift trucks;
- Seven cases of defective equipment, such as faulty door catches
- Seven unsafe systems of work,
- Five cases of unauthorised or untrained drivers.
The total exceeds fifteen as some accidents involve multiple causes. These accidents involved seven fork lift trucks, three dumper trucks, three tractors and three other items (jib tower crane, ATC and a work platform).

These causes are similar to those of the six pre 1998 collapse / overturn deaths, such as faulty equipment, operator error and untrained operators.

**Transport deaths**

The transport deaths (where people are struck by a moving vehicle in the workplace) involved a wide range of equipment with no one type of equipment dominating the results. The range includes fork lift trucks, quad bikes, rollers, tractors, telescopic handlers, ATV, RCV, tippers and a loading shovel. The pattern of causes before and after 1998 is similar. The post 1998 causes, which add to more than thirty due to multiple causes, include:

- Three obvious faults, such as no hand brake;
- Twenty two cases of faulty or poorly maintained equipment;
- Eighteen cases of unsafe systems of work or inadequate procedures;
- Two cases of pedestrians inadequately separated from moving vehicles;
- No ROPS in two cases, one involving a 180° overturn;
- Inadequate supervision, untrained operators, operator error, improper use or violation in twelve cases;
- One case of inadequate lighting.
<table>
<thead>
<tr>
<th>Table 25 Number of times causes appear as percentage of accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Unsafe System</td>
</tr>
<tr>
<td>Unsuitable Equipment</td>
</tr>
<tr>
<td>Inadequate Separation of Pedestrians</td>
</tr>
<tr>
<td><strong>Operator</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Untrained/Unauthorised/ Unqualified Violation</td>
</tr>
<tr>
<td>Violation</td>
</tr>
<tr>
<td><strong>Faulty/Defective Equipment</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Known/Obvious</td>
</tr>
<tr>
<td>Lack of Inspection</td>
</tr>
<tr>
<td>Lack of Examination</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>Non-Compliant Equipment</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>No Restraints</td>
</tr>
<tr>
<td>No ROPS</td>
</tr>
<tr>
<td>Inadequate Driver Vision</td>
</tr>
<tr>
<td>Lack of Emergency Stops</td>
</tr>
<tr>
<td><strong>Lack of Info/No Witness/ No Restraints or Not Worn etc.</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Table 26 Number of times cause appears as percentage of causes found

<table>
<thead>
<tr>
<th>Method</th>
<th>96/97/98</th>
<th>99/00/01</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clearly</td>
<td>Partly/</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>Poss</td>
</tr>
<tr>
<td>Unsafe System</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>Unsuitable Equipment</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Inadequate Separation of Pedestrians</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Method</td>
<td>38%</td>
<td>25%</td>
</tr>
<tr>
<td>Operator</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Error</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Untrained/Unauthorised/Unqualified Violation</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Violation</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Faulty/Defective Equipment</td>
<td>16%</td>
<td>25%</td>
</tr>
<tr>
<td>Known/Obvious</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Lack of Inspection</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Lack of Examination</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Compliant Equipment</td>
<td>21%</td>
<td>17%</td>
</tr>
<tr>
<td>No Restraints</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>No ROPS</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate Driver Vision</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Lack of Emergency Stops</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lack of Info/No Witness/No Restraints or Not Worn etc.</td>
<td>25%</td>
<td>1%</td>
</tr>
</tbody>
</table>
5.9.3 Fatal injuries associated with LOLER provisions

Table 27 shows the rate and number of deaths related to the provisions of the LOLER regulations. There is no statistically significant change in the rate of fatal injuries associated with the factors addressed by the LOLER regulations in the period 1996 to 2001. Table 28 shows the number of deaths by sector and for All sectors for the two year period before and after 1998. Again, there are no apparent changes. It should be noted that due to the statistically small number of deaths, it is difficult to determine whether the rate or number of deaths has changed.

**Table 27 Rate of All and LOLER related deaths per 100,000 employees**

<table>
<thead>
<tr>
<th></th>
<th>96/97</th>
<th>97/98</th>
<th>98/99</th>
<th>99/00</th>
<th>00/01</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>.91</td>
<td>.91</td>
<td>.80</td>
<td>.67</td>
<td>.87</td>
</tr>
<tr>
<td>LOLER</td>
<td>.02</td>
<td>.03</td>
<td>.02</td>
<td>.02</td>
<td>.05</td>
</tr>
</tbody>
</table>

Fatal LOLER related accidents involved a range of equipment, particularly MEWPS, cranes, jacking equipment, scissor lift, vehicle lift, patient hoist and FLTs.

**Table 28 LOLER related fatalities by Sector**

<table>
<thead>
<tr>
<th>Sector</th>
<th>PRE</th>
<th></th>
<th>POST</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clearly</td>
<td>Partly</td>
<td>Clearly</td>
<td>Partly</td>
</tr>
<tr>
<td>Agriculture</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Construction</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Utilities</td>
<td>2</td>
<td>-</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Services</td>
<td>8</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>1</td>
<td>16</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 29 and Table 30 show the number of times each cause appears as a proportion of accidents and as a proportion of causes of accidents, respectively. It is apparent that:

- Unsafe systems of lifting are the single largest cause of lifting fatalities, followed by operator error;
Faulty and non-compliant equipment contribute to a significant minority of lifting deaths. Examples of accidents include using inadequate types of chocks for jacking vehicles, using equipment without permission, and using a hoist not fit for patient lifting. The accidents often occurred during the maintenance of inadequately supported vehicles, the operation of object lifting equipment and the operation of people lifting equipment.

### Table 29 Number of times causes appear as percentage of accidents

<table>
<thead>
<tr>
<th></th>
<th>96/97/98</th>
<th>99/00/01</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clearly LOLE</td>
<td>Partly/ Poss</td>
</tr>
<tr>
<td>Method</td>
<td>99%</td>
<td>93%</td>
</tr>
<tr>
<td>Unsafe System</td>
<td>71</td>
<td>81</td>
</tr>
<tr>
<td>Unsuitable Equipment</td>
<td>28</td>
<td>12</td>
</tr>
<tr>
<td>Operator</td>
<td>35%</td>
<td>37%</td>
</tr>
<tr>
<td>Error</td>
<td>35</td>
<td>6</td>
</tr>
<tr>
<td>Untrained/Unauthorised/ Unqualified</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Violation</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Faulty/Defective Equipment</td>
<td>4%</td>
<td>18%</td>
</tr>
<tr>
<td>Known/Obvious</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Lack of Inspection</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Lack of Examination</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Non-Compliant Equipment</td>
<td>1%</td>
<td>12%</td>
</tr>
<tr>
<td>No Restraints</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>No ROPS</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Lack of Emergency Stops</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Lack of info/No Witness/ No Restraints or Not Worn etc.</td>
<td>1%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>96/97/98</td>
<td>99/00/01</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Method</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsafe System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearly</td>
<td>53%</td>
<td>57%</td>
</tr>
<tr>
<td>Partly/Poss</td>
<td>38</td>
<td>49</td>
</tr>
<tr>
<td>Unsuitable Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearly</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>Untrained/Unauthorised/Unqualified</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Violation</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Faulty/Defective Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Known/Obvious</td>
<td>20%</td>
<td>12%</td>
</tr>
<tr>
<td>Lack of Inspection</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Lack of Examination</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Non-Compliant Equipment</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>No Restraints</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Lack of Emergency Stops</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Lack of Info/No Witness/No Restraints or Not Worn etc.</td>
<td>4%</td>
<td>100%</td>
</tr>
</tbody>
</table>
5.9.4 Major injuries and dangerous occurrences

A sample of 150 investigated major injuries in the categories of accidents that should have been impacted by PUWER 98 has been analysed. The sample was sub-divided into three, with fifty major injuries from each category, i.e. twenty five before and after for each category. The analysis estimated the per cent of the sample that was clearly related to the provisions of PUWER 98. The results are shown in Table 31. It appears that for the two main categories, Collapse / Overturn and struck by moving vehicles, the proportion of major injuries attributed to the provisions of PUWER 98 has fallen. The change in the pattern of major injuries is the opposite of that observed for fatalities, where there was an increase in collapse / over turn and transport deaths. However, it should be noted that the increase in deaths was not statistically significant.

Table 31 Percentage of Major Injuries sample clearly PUWER 98

<table>
<thead>
<tr>
<th></th>
<th>PRE</th>
<th>POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collapse/Overturn</td>
<td>44%</td>
<td>28%</td>
</tr>
<tr>
<td>Machinery</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Transport</td>
<td>24%</td>
<td>16%</td>
</tr>
</tbody>
</table>

A sample of fifty lifting incidents (dangerous occurrences and major injuries) have been analysed, twenty five before and twenty five after the implementation of LOLER. The proportion attributed to the provisions of LOLER is shown in Table 32, showing a decline in the percentage attributed to the provisions of LOLER.

Table 32 Percentage of Dangerous Occurrences sample Clearly LOLER

<table>
<thead>
<tr>
<th></th>
<th>PRE</th>
<th>POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting Equipment</td>
<td>92%</td>
<td>84%</td>
</tr>
</tbody>
</table>
5.10 HSE analysis of transport accidents

The HSE completed an analysis of fatal and major employee injuries on transport for the period 1996 to 2001. They reported:

- A fall in being struck by a moving vehicle in 2000 / 01 after an increase in previous years;
- An upward trend in accidents resulting from employees falling from vehicles – particularly in the service and construction sectors;
- A fall in accidents resulting from employees being struck by collapsed or overturned vehicles.

The numbers of fatal and major injuries for the three categories of accidents judged to be related to PUWER are shown in Table 33 below. It should be noted that whilst the HSE report a fall in accidents involving being struck by a moving or collapsed / overturned vehicle, they do not report if the fall is statistically significant. Also, the number of accidents due to collapse / overturn vehicles in 1996 / 97 is fifty three compared to fifty four in 2000 / 01, i.e. no change.

It is difficult to directly compare the HSE’s results in Table 33 with this study’s results in table 24 and 32 because the HSE have merged fatal and non-fatal major injuries. Thus, in the case of collapse / overturn accidents, the apparent increase in fatal accidents noted in Table 24 may be offset by the apparent decline of major injuries in Table 31. The latter cancelling out of trends would be consistent with the trend in the HSE’s data in Table 33.

These changes in the number of injuries are reported in the context of an increased UK workforce, mainly in the service sector, and a decline in the manufacturing, agriculture, utility and extractive sectors.

Table 33: Number of fatal and major workplace transport injuries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Struck by a moving vehicle</td>
<td>938</td>
<td>958</td>
<td>966</td>
<td>986</td>
<td>856</td>
</tr>
<tr>
<td>Falls from a vehicle</td>
<td>617</td>
<td>639</td>
<td>720</td>
<td>676</td>
<td>712</td>
</tr>
<tr>
<td>Collapse or overturn of a vehicle</td>
<td>53</td>
<td>62</td>
<td>62</td>
<td>58</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>1608</td>
<td>1659</td>
<td>1748</td>
<td>1720</td>
<td>1622</td>
</tr>
</tbody>
</table>

The HSE’s data has been translated into a rate per 100,000 employees, as shown in Table 34 and Figure 31. It is apparent that:

- For the three categories of accidents combined, the rate of fatal and major injuries has fallen by 3% between the two year before (1996-1998) and the first two full years after PUWER 98 (1999-2001);

- The rate of falls from and overturn of vehicles has increased by about 3% between the two year before (1996-1998) and the first two full years after PUWER 98 (1999-2001).

It appears that only the rate of struck by moving vehicles has changed. It is also pertinent to note that this fall is limited to one year, namely 2000 / 01. It would be premature to conclude that there has been a sustained fall in the rate of being struck by vehicles on the basis of one year’s data.

**Table 34: Rate per 100,000 employees of transport fatal and major injuries**

<table>
<thead>
<tr>
<th></th>
<th>96 / 97</th>
<th>97 / 98</th>
<th>98 / 99</th>
<th>99 / 00</th>
<th>00 / 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Struck by moving vehicles</td>
<td>4.13</td>
<td>4.13</td>
<td>4.12</td>
<td>4.09</td>
<td>3.48</td>
</tr>
<tr>
<td>Falls from vehicles</td>
<td>2.71</td>
<td>2.75</td>
<td>3.07</td>
<td>2.80</td>
<td>2.90</td>
</tr>
<tr>
<td>Collapse or overturn of a vehicle</td>
<td>0.23</td>
<td>0.27</td>
<td>0.26</td>
<td>0.24</td>
<td>0.22</td>
</tr>
<tr>
<td>All</td>
<td>7.07</td>
<td>7.15</td>
<td>7.45</td>
<td>7.13</td>
<td>6.60</td>
</tr>
</tbody>
</table>

**Figure 30** Trends in workplace transport injuries
The analysis of investigated fatal injuries would not have been influenced by any change in reporting rates as it is assumed that all deaths are reported. Also, the change in RIDDOR reporting levels is cited for the mid point of the study period for PUWER 98. However, it is possible to correlate falls from vehicles and vehicle over turns with employment levels, and thence compare predicted against actual injury rates before and after PUWER 98. This assumes that employment levels are an indicator of industrial activity levels and that injury rates are influenced by activity levels.

Plotting fatal-major injury rates against employment levels gives the following relationship:

- A 3% change in the working age population employed is associated with a 0.15 change in the rate per 100,000 employees of fatal – major falls from vehicles, and;

- A 3% change in employment is associated with a 0.01 change in the rate per 100,000 employees of fatal – major injuries due to vehicles overturning.

This analysis and previous research work has shown that the rate of injury per employee increases when the level of economic activity increases. Thus, when the level of employment increases (in line with increased economic activity) so does the rate of injury per employee. Employment level increased from 1996 to 2001, with an increasing proportion of the working age population in work. Thus, an increase in injury rates would be expected due to the increased level of industrial activity.

It is apparent that the injury rates did not increase in line with the levels that could be predicted by the increase in activity levels after 1998, i.e. they remained level or fell slightly. If you assume that the difference between predicted and actual rates of injury is true, you can calculate forty seven fewer fatal-major injuries for the two years after 1998, equivalent to about £7m benefit in averted major injuries at £150,000 each. However, the number of falls from vehicles is less than would be predicted by employment levels in the two years before PUWER 98, as well as the two full years after PUWER 98. Also, this approach would predict fewer injuries than actually reported in 1998 / 99. Clearly this is a postulated value and must be treated with great caution.

If fatal-major injury rates are considered at the level of industrial sectors, as per Table 35 and Table 36 it is apparent that:

- The number of fatal-major injuries increased between 1996 / 97 and 2000 / 01 – at the same time as the level of construction activity, as indicated by employment levels, rose by 10%;

- The rise in the number of construction fatal-major injuries due to vehicle overturn outweighed a decline in other sectors;

- The number of fatal-major injuries due to falls from vehicles increased between 1996 / 97 and 2000 / 01 at the same time as a 10% increase in service sector employment, again outweighing a decline in other sectors.

Thus, it is possible that the impact of the PUWER 98 regulations on injury rates have been moderated by an increased level of industrial activity in the construction and service sectors.
Table 35 Number of fatal-major injuries due to falls from vehicles

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>29</td>
<td>21</td>
<td>25</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Extraction &amp; utility</td>
<td>24</td>
<td>19</td>
<td>17</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>163</td>
<td>173</td>
<td>175</td>
<td>169</td>
<td>161</td>
</tr>
<tr>
<td>Construction</td>
<td>74</td>
<td>100</td>
<td>107</td>
<td>100</td>
<td>117</td>
</tr>
<tr>
<td>Services</td>
<td>327</td>
<td>326</td>
<td>396</td>
<td>368</td>
<td>393</td>
</tr>
<tr>
<td>Health services</td>
<td>10</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>All</td>
<td>627</td>
<td>647</td>
<td>729</td>
<td>681</td>
<td>719</td>
</tr>
</tbody>
</table>

Table 36 Number of fatal-major injuries due to vehicle collapse/overturn

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>10</td>
<td>13</td>
<td>8</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Extraction &amp; utility</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>82</td>
<td>96</td>
<td>81</td>
<td>60</td>
<td>56</td>
</tr>
<tr>
<td>Construction</td>
<td>40</td>
<td>30</td>
<td>40</td>
<td>39</td>
<td>38</td>
</tr>
<tr>
<td>Services</td>
<td>117</td>
<td>98</td>
<td>106</td>
<td>102</td>
<td>96</td>
</tr>
<tr>
<td>Health services</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>All</td>
<td>257</td>
<td>242</td>
<td>240</td>
<td>212</td>
<td>201</td>
</tr>
</tbody>
</table>

It is interesting to note that the decline in the absolute numbers of non-fatal injuries in Table 36 is consistent with the reduced percentage of non-fatal major injuries related to PUWER 98 cited in Table 31.
5.11 Contact with machinery injuries

The PUWER 92 regulations were introduced in 1993. It is reasonable to assume that if these regulations have had an impact on injury rates, this would be revealed by a change in the rate of Contact with Machinery injuries due to the focus of the regulations on machinery guarding and emergency stops. The guarding and related regulations in PUWER 92 replaced Section 14 of the Factories Act, and hence was not anticipated to have had a major effect in HSE enforced premises. Indeed, the HSE’s cost-benefit assessment of the PUWER 92 regulations did not foresee a major change in injury rates on the basis that the regulations largely replaced existing ones. In the event that a fall in injury rates is observed, it should be noted that the Supply of Machinery (Safety) Regulations, introduced at the same time, would also have contributed to any fall, as they would have led to modifications of new and hired equipment.

On the other hand, the review of the PUWER 92 regulations\(^{26}\) did report that duty holders had enacted many changes in response to these regulations, if only because of heightened awareness of the requirements. In addition, the results of this study’s postal survey indicate that there has been an increase in the level of compliance with the provisions of PUWER 92 since the time of its first evaluation.

The rate of fatal and major, and over three day injuries to employees is presented in Figure 31. It should be noted that a change in reporting criteria in 1995 / 96 led to an increase in the reported number of major injuries. At first sight it appears that there was a downward trend in injuries from 1990 onwards, i.e. commencing two years prior to the new regulations.

![Figure 31 Trends in rate of contact with machinery injuries](image)

\(^{26}\) Consultancy Company Report to the HSE (Feb 1998) “Review of the Provision and Use of Work Equipment Regulations (PUWER) 1992” RSU Ref 3525/R64.030 (unpublished)
However, there are at least three factors that need to be considered to acquire a more valid view of injury rates. Firstly, the majority of machinery injuries occur in the manufacturing sector, approximately 70% of fatal and major injuries. Accordingly, it could be argued that the fall in the all industry injury rates is due to a decline in the manufacturing sector. That is, there has been a fall in manufacturing employment which has been more than offset by an increase in service sector employment. If it is accepted that the risk of machinery accidents is higher in the manufacturing sector than the service sector, the replacement of manufacturing employment with service sector employment could account for a decline in the all industry machinery injury rate. Therefore, the injury rate has been calculated for the manufacturing sector alone. The result is shown in Figure 32. The apparent decline in fatal and major injuries from 1990 is again observed. Indeed, there is a 20% fall in fatal and major injury rates between 1988 / 89 and 1992 / 93, compared with a 12% in the period 1992 / 93 to 1995 / 96. The rate of over three day injuries fell by 6% in the period 1992 / 93 to 1995 / 96 compared to a 1.5% fall in the rate of over three day injuries between 1988 / 89 and 1992 / 93. Thus, there is not a clear picture of an accelerated decline in injury after the introduction of PUWER 92.

Figure 32: Unmodified manufacturing sector machinery injury rates

It is also noted by the HSE that the reporting rate for major and over three day injuries increased during the 1990s. Thus, the apparent decline in injury rates masks an increase in reporting rates. In the case of manufacturing, the HSE report a 25% increase in the proportion of actual injuries reported between 1990 and 1999 / 2000. Therefore, the fatal / major and over three day injury rates have been factored up to reflect changes in reporting rates over the 1990’s, as per Figure 33. This leads to the following changes in rates of injury:

- The over three day injury rate falls by 10% between 1988 / 89 and 1992 / 93, compared to a 14% decrease between 1992 / 93 and 1995 / 96;

Thus, once you allow for an increased level of reporting, the apparently flat rate of injuries after 1996 noted in the unmodified data becomes a downward trend in the modified data. The rates of fatal and major injury decline by ~5% whilst over three day injuries decline by ~8% in the period after 1995 / 96, using the modified reporting levels.

![Figure 33: Modified manufacturing machinery injury rates](image)

As noted above, the apparent increase in fatal-major injuries in 1996 / 97 coincides with the change in the widening of the definition of major injuries, which led to an increased proportion of injuries being classed as major. It is pertinent to note that there was a downward trend in fatal-major injuries in the period 1988 / 89 to 1995 / 96, and a decline in the period after 1996 / 97.

There is a correlation between industrial activity levels and injury rates. Over three days rates are plotted against employment levels in Figure 34 with a best fit line applied to the data points for the period 1988 to 1995 / 96 (when the reporting criteria changed). Similarly an 11% change in employment leads to a 40% change in over three day injuries. A similar calculation has been completed between UK employment levels and the all industry fatal / major injury rate. The all industry fatal / major injury rate increases when activity levels increase with a correlation of 0.67 between the per cent of the working age population employed and the rate of injury. A 14% increase in employment gives a 38% increase in the fatal / major injury rate, and vice versa.

The fatal / major injury rates per 100,000 manufacturing employees are plotted against employment numbers in Figure 35. There is a 0.8 correlation between manufacturing employment numbers and (modified) manufacturing fatal / major injury rates. The same calculation has been completed for Over three day injury rate in manufacturing. This found a 0.55 correlation between manufacturing employment numbers and (modified) manufacturing over three day injury rates.

All of the latter correlations are statistically significant.

If the employment level is taken as an indicator of industrial activity levels, this implies that “as a rule” injury rates increase when industrial activity levels increase.
The manufacturing employment level fell until 1992 / 93, rose thereafter until 1997 / 98, and then fell again. Thus, if injury rates were to only follow employment levels (as a surrogate for economic activity) you would predict a fall in accident / injury rates until 1992 / 93, then a rise, and then another fall. Examination of the actual injury rates indicates that whilst injury rates fell as expected until 1992 / 93, they continue to fall after 1992 / 93 despite an increase in employment. This could be interpreted as:

- The fall in injury rates prior to 1992 / 93 is consistent with (and perhaps ascribed to) a decline in industrial activity;
• The decline in injury rates after 1992 / 93 is counter cyclical as employment increased, and hence may reflect the impact of the PUWER 92 regulations.

According to this approach injury rates should have fallen in 1999-2001 due to the decline in manufacturing employment, which they have.

If the actual number of injuries is compared with the number predicted by employment levels in the period 1993 to 1995, there are 480 fewer fatal / major injuries. At £150,000 per averted major injury and £1.8m per death this is approximately ~£80m of benefit, assuming a ratio of one death per eighty three major injuries. In the period 1996 / 97 to 2001 there are fifty two fewer fatal / major injuries than predicted by employment levels, which equates to ~£8m benefit. This is a total of ~£90m benefit (value of averted injuries) over eight years.

Clearly this is a postulated benefit. However, it is supported by the findings of this and the previous evaluation of PUWER 92, both of which reported an increase in equipment guarding and other safety improvements in response to PUWER 92.

However, it is important to note that the HSE’s original cost of compliance estimate for PUWER 92 of £8m to £15m is not consistent with survey findings. The HSE estimate was based on the assumption that PUWER 92 would not lead to significant equipment modifications as the regulations largely replaced existing ones. Hence, the main compliance cost was assumed to be familiarisation. However, it appears that the introduction of PUWER 92 was associated with an increased level of compliance, suggesting the cost of compliance would be much greater than originally imagined. Similarly, the level of benefit far exceeds that predicted by the HSE, again on the assumption that the regulations would not lead to significant changes. Thus, it appears that both the level of benefit (fewer injuries) and the cost of compliance for PUWER 92 exceed HSE’s expectations.

Notwithstanding the possible decline in machinery related injuries, it is clear that this remains an important area of safety. There are approximately fifteen contact with machinery deaths, 1780 major injuries and 5750 over three day injuries per year. As regards the cause of machinery accidents it is clear that failure to comply with the basic guarding provisions still contributes to a significant number of fatal machinery accidents, of which there are about fifteen per year. A lack of guarding was identified by our analysis of fatal accident investigations in twenty eight fatal machinery accidents in the period 1996 to 2000, along with two deaths involving a lack of emergency stops. It is also clear that, as with mobile plant accidents, unsafe systems of work (twenty two deaths) and operator error / unsafe behaviour (seventeen deaths) contribute to a large proportion of fatal machinery accidents.
6 SMALL AND MEDIUM SIZED ENTERPRISES

6.1 Summary
This section draws together the findings for the SMEs from the rest of the report, and focuses on findings where there were differences between small, medium and large companies.

- Overall, small companies have borne a disproportionately small amount of the cost of compliance, mainly due to them having a small proportion of the key types of work equipment;
- Small firms who do use equipment are the exception to this;
- The main costs have fallen to large companies and suppliers;
- Small companies are less familiar with the regulations, with around a third with equipment claiming not to have heard of the regulations.

6.2 Survey response
As was seen, amongst both users and suppliers, there was good representation of different company sizes. 40% of the sample was from small companies. Medium sized companies represented around 15% of the sample. User respondents also represented a good range of sizes of companies across the different sectors.

6.3 Awareness and familiarity
The view amongst suppliers (backed by the RSU report27) was that small companies were not aware of the regulations. Initial interviews confirmed this, particularly amongst retail and construction companies. This was supported by the survey, but to some extent is explained by smaller companies not having much equipment significantly impacted by the regulations.

The survey results showed that just under one third of small companies with equipment claim not to have heard of the regulations, but less than a fifth of small companies with at least ten employees hadn’t heard of the regulations.

6.4 What people did and did not do
On the whole smaller firms did less, but this is likely to reflect the fact that they have less equipment. Organisations with 10-49 employees did significantly more than those with fewer than ten employees.

Generally the larger the company, the more likely it is that they will have been prompted to take action following the 1998 regulations. It is notable however that organisations with more than ten employees do more than those with less than ten, and in some cases do almost as much as medium sized companies. Indeed, they perceive that they increased the amount of time spent planning lifts more than did medium-sized organisations.

27 Review of the Provision and Use of Work Equipment Regulations (PUWER) 1992 RSU Ref 3525/R64.030
The survey showed no consistent difference according to company size in action taken on thorough examination in response to the regulations, though “micro” firms were slightly more likely to say they used more external providers of TE services.

The interviews suggested that larger hire firms have increased the amount of time they spend on handovers to smaller users, and seek more assurances from larger companies that users are competent. Training companies also reported increased work following LOLER and PUWER 98. From this, it is likely that there is some increase in users’ reliance on training and information provided by suppliers. This is not proved nor disproved by the survey, but it did show that that less than 20% of small firms (10-49 employees) and only 2.5% of micro firms (<10 staff) carried out additional training, compared to 44% of large firms. Responses to a question specifically asking about training every year show that over 40% of all larger firms train staff every year, whilst only 3% of smaller firms do, again reflecting the likelihood that they do not have as much equipment. (Note that this is as a percentage of the whole sample, not just those who thought the question relevant.)

6.5 Understanding

The main LOLER issue arising overall was that some users believe that when they contract lifting out, this leaves them with no responsibility for the safety of the lifting operation. There was some difference in response to questions about this issue by size of company. SMEs were both more unsure about their response and more likely to agree, with twenty one out of fifty one (about 40%) agreeing, but there were still almost 20% of large companies (thirty three out of 181) who agreed with the statement.

6.6 Supply Issues

Smaller companies were much more unsure about the supply issues and were slightly more likely to misunderstand CE marking and its significance. Also, there was a difference between self-assessed understanding of Declarations of Conformity between company sizes. Around 30% of small companies had not heard of Declarations of Conformity, compared with 15% of all users.

6.7 Costs of compliance

Respondents were asked to rate the cost of complying:

“What one of the following statements about costs (in time and money) of complying with the regulations since 1998 would you most agree with?”

1. There have been NO extra costs to my organisation as a result of PUWER and / or LOLER since 1998.
2. There have been MINIMAL costs to my organisation as a result of PUWER98 / LOLER.
3. Costs due to PUWER98 / LOLER have been significant but not enough to affect business decisions.
4. High costs have caused serious concern and business decision have been taken to reduce the impact.
5. Costs have been so high that they have threatened the survival of the organisation.
The vast majority of all sizes of equipment user companies do not think that complying with the regulations costs enough to affect business decisions (See Figure 36). A higher proportion of small firms thought that the regulations had not cost them anything (eight out of thirty nine respondents). Only one quarter of small users thought that the cost was significant, compared with 40% of medium companies and a half of large companies.

As said previously, there was some evidence that smaller companies have done very little, especially small retail companies. Thus, these costs appear to be borne mostly by larger firms, who are more likely to own the types of equipment impacted by the regulations.

6.8 Improvements

The main SME specific suggestions were not unusual. More industry specific ACoPs / Guidance and more case study material in the guidance were requested.

![Figure 36 Perceived costs of compliance, by company size. (Note that size is by numbers of employees and “n” refers to total number of respondents)](image-url)
7 CONCLUSIONS

Awareness and compliance

- A wide spectrum of duty holders have carried out a range of actions to comply with the 1998 regulations (such as equipment modifications), and there is evidence that this was at least in part motivated by the regulations. There is evidence that SMEs have done less, in part because they have less equipment significantly impacted by the requirements (see sections 4.4 and 4.5);

- A majority are aware of the regulations, and there is some evidence that awareness has increased since the 1992 regulations. Most users of the main groups of equipment do, at least broadly, understand the link between LOLER and PUWER 98 (see sections 4.2 and 4.3);

- Few organisations have taken the opportunity to change their thorough examination requirements using schemes of examination (see section 4.4);

- There is evidence of improved and on-going compliance with the requirements originally brought in by PUWER 92, although the occurrence of fatal and non-fatal accidents involving failure to adopt basic safety measures, such as guarding, demonstrates that compliance is not universal (see section 4.10).

Attitude to the regulations

- Duty holders believe that the regulations have led to safety improvements, such as safer equipment and a more competent workforce (see section 5.7);

- Duty holders believe that the regulations are an improvement on previous industry specific regulations and offer many advantages, such as flexibility and practicality (see section 5.7).

Concerns and difficulties

- Duty holders have encountered a number of significant difficulties in the implementation of the regulations, in particular in the interpretation of what is a competent person, the role of CE marking and the meaning of “inspection” / “TE” (see sections 4.3 and 4.7);

- Whilst duty holders demonstrate a high level of awareness of the regulations, there are a few areas where their understanding is relatively low, including:
  - What inspection is, in particular the “non-routine” requirements of the regulations (see section 4.3);
  - The “softer” requirements of the regulations such as planning lifting operations, and a perception that this requirement is unnecessarily bureaucratic (see section 4.3);
• The sectors awareness of the newer requirements, with an apparent reliance on the standards of previous legal regimes to schedule inspections, for instance (see sections 4.7 and 4.9);

• A perception, particularly in construction, that by contracting out lifting operations a client has no responsibility for the lift (see section 4.9).

Areas of improvement

• There is scope for improvement in the regulations and associated guidance. This is primarily to do with the presentation of the regulations, rather than the regulations themselves. However, it may be difficult to achieve greater clarity without changing the legislation where words have commonly used terms understood in a variety of ways.

Issues where clarity could be improved include:

• The purpose and status of CE marking and declarations of conformity require clarification (see section 4.6);

• The meaning of “competent person” (see sections 4.3 and 4.8);

• The use of the terms thorough examination and inspection, specifically the extent to which they do not match terms readily understood by duty holders (see section 4.3);

• The open learning guidance has not reached a wide audience and may be a useful resource if more widely publicised (see section 4.8).

Cost and benefits

• Duty holders, on the whole, do not believe that the costs of compliance with PUWER 98 and LOLER have caused concern and do believe that they have led to improved working practices and safer equipment despite uncertainty over whether the injury rate has fallen (see section 5.7);

• The costs and benefits of compliance with PUWER 98 and LOLER are consistent with the HSE’s pre-implementation assessment, namely that costs outweigh benefits in the initial years following implementation, but that benefits may start to outweigh costs in the future once the transition period for compliance has expired (see section 5.1.4);

• Whilst it is too early to be certain, there may be a decline in the number of major injuries, although there is no evidence of a decline in fatal injuries related to PUWER 98 or LOLER that can clearly be attributed to their implementation - however this is consistent with expectations, particularly given that this study was completed before the
end of the transition period for full compliance with the regulations (see sections 5.9 – 5.10);  

- There is no detectable impact on equipment defect rates or productivity (see 2.1.2 and 5.7.2);  

- The number of contact with machinery injuries has been reduced significantly after the implementation of PUWER 92 in 1993 (see section 5.11);  

- Duty holders recognise the safety benefits of machinery guarding and the need to prevent unsafe use of moving machinery, such as circular saws (see section 4.10).  

It is clear that a very large number of deaths, major injuries and over three day injuries still occur each year due to failure to comply with the provisions first introduced in 1992, as well as those introduced in 1998. These involve non-compliant equipment, such as lack of guarding, faulty or poorly maintained equipment, unsafe methods of work as well as operator error and unsafe behaviour. Whilst PUWER 92, PUWER 98 and LOLER may not have entailed the introduction of a large number of new requirements, it is clear that, on the one hand, they prompted many duty holders to enact improvements but, on the other hand there remains significant scope for achieving a higher level of compliance with the regulations. The impact of PUWER 98 and LOLER on injury rates is unlikely to be detectable for a number of years, in the same way that the impact of PUWER 92 can now be analysed using a 15 year period (6 years before and 9 years afterwards).
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<td>Approved Code of Practice</td>
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<td>Thorough examination</td>
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3M
A H Marks,
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BVPlant Safety
Carter Retail Equipment
CITB
Compass
Construction Confederation
Construction Plant Hire Association
De Vere
Elbee
Elmwood
Fork Lift Truck Association
GMB
Hampshire education and social services departments
HSS
Independent Access Supplies Ltd
Ingersoll-Rand
International Powered Access Federation
K&R Demolition
Killby-Gayford
Morganite
Prismo Ltd
PSI Inspection services
Rimmer Training Services
Roche Products
RTITB
SAFED – Safety Assessment Federation
Sentry Farms
Steve Badcock
UCATT
United Forktrucks (1992) Ltd
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