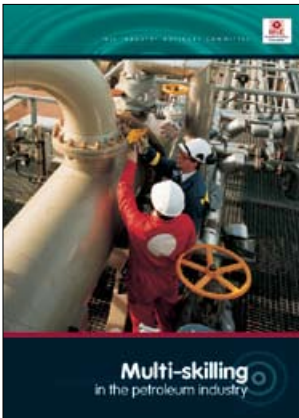


Multi-skilling in the petroleum industry

Oil industry advisory committee



This is a free-to-download, web-friendly version of Multi-skilling in the petroleum industry (Second edition, published 1998). This version has been adapted for online use from HSE's current printed version.

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This is a new edition of the guidance first produced by the Oil Industry Advisory Committee in 1992. It provides guidance on issues that need to be addressed when flexible or multi-disciplinary working practices - such as multi-skilling or multi-roling - are being introduced or developed. It is aimed primarily at employers and at employees and their representatives, both onshore and offshore.

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Introduction

This booklet provides guidance on some of the issues that need to be addressed when flexible or multi-disciplinary working practices - such as multi-skilling or multi-rolling - are being introduced or developed. It is aimed primarily at employers and at employees and their representatives, both onshore and offshore.

The booklet explains:

- what is multi-skilling;
- the benefits of multi-skilling;
- the issues to be addressed when introducing multi-skilling.

The principles outlined in the following pages apply to all forms of multi-skilling, but particularly to cases where:

- operators carry out engineering work and other support tasks (eg logistics, quality control);
- maintenance craftsmen become plant operators;
- people other than fully qualified electricians undertake electrical work.

Throughout, the emphasis is on the 'multi' in multi-skilling; this guidance does not describe or assess the separate individual competencies which might make up a multi-skilling training programme.

While the term 'multi-skilling' is used throughout, multi-skilling is just one form that flexible working can take. Though this booklet does not seek to address all the possible forms of flexible working (eg part-time work), some of the guidance it offers may also be of general use for forms of flexible working other than multi-skilling.

What is multi-skilling?

Multi-skilling describes a way of working where the traditional divisions between work areas and separate disciplines are removed, and individuals are given responsibility for a range of different types of task. For example, operators may well be capable of carrying out maintenance work on their plant, and maintenance staff of operating the plant.

Key features of effective multi-skilling are:

- **broad individual competence:** that is, the ability of a single individual to assess and rectify problems as they crop up no matter what they might be;
- **the full use of capabilities:** because the only limitations on who does what are the skills that an individual has or can acquire, the time available for the task and the demands of health and safety.

Different types of multi-skilling

Multi-skilled workers can be:

- **single function:** work within a single function (eg production or engineering) which is shared. For example, an electrician might do some of the work of an instrument mechanic or process control technician;
- **multi-functional:** tasks which are shared between jobs in different functions. For example, a technician or a mechanic might do some of the tasks traditionally carried out by production operators (or vice versa).

In addition, the single function and the multi-functional worker can have:

- **equal skills:** in this case a worker has two equal jobs, for example mechanical fitter and pipefitter, or technician and production operative;
- **principal and subsidiary skills:** in this case a worker has one primary or core role plus additional 'subsidiary' skills. These skills are 'subsidiary' in that they are used or practised less often, or are covered in less depth. For example, technicians may frequently use a range of electrical skills, but the range of skills and depth of knowledge required may be limited. In these cases, it should be made clear that they can only perform to the limits of their competencies;
- **emergency roles as multi-skills:** any of the above workers can have emergency roles in addition to their other roles.

What are the benefits of multi-skilling

Multi-skilling is generally introduced because it can bring benefits such as higher productivity and more effective use of resources. It also offers the opportunities of a number of other benefits, some of which have direct relevance to health and safety, for example:

- **reduced exposure to risk:** fewer people are involved in any given task, so less co-ordination and fewer communication links are needed. This in turn leads to a reduction in the number of people required to work together in hazardous areas;
- **greater workforce flexibility:** the fact that more people can turn their hand to a wider range of tasks can lead to more flexibility in deployment of the workforce;
- **job enlargement and job enrichment:** multi-skilling offers the opportunity to design jobs so that workers have the opportunity to use a greater variety of skills - 'job enlargement'. It also offers the opportunity to design jobs so that workers have more independence in their work and perform some of the work normally carried out at a more senior level - 'job enrichment';
- **scope to improve job satisfaction:** having responsibility for different functional areas (eg maintenance and production) can help workers to have a better understanding of the 'whole picture', and of where their work fits in. It can also provide them with quicker and more accurate feedback on the results of their actions. This can lead to improved efficiency, safety, and greater worker job satisfaction.

Introduction of multi-skilling: what issues need to be addressed?

The introduction of multi-skilling is not just a redistribution of duties but involves a fundamental change in ways of working. To be successful, it requires greater self-management and co-operation by the workforce. It brings opportunities for new work not previously available under a single-discipline system. This offers great potential benefits but there are also risks.

The duty holder's risk assessment should identify those roles which cannot be combined, eg radio operator and medic. Other issues which need to be considered include:

- job design;
- training for multi-skilling;
- skill maintenance;
- assessing skills;
- working practices;
- safety management issues;
- managing multi-skilled teams;
- interface with contractors.

Job design

Practices and procedures for the new multi-skilled jobs need to be well designed, robust and tested. This will involve:

- **risk-based job design:** it is important that a risk-based approach is used in job design, ie analyse the task, identify any hazards and set out the precautions to be taken. The job design stage offers the opportunity to rethink tasks, methods and techniques to remove potentially unsafe practices (the same opportunity is available when creating new roles). This is preferable to simply extending existing roles because it gives the opportunity to carry out a thorough rethink of all the activities;
- **job specification:** the specification of the tasks to be shared, and the analysis and setting of standards by task for each role. New roles should be defined by strict reference to competence and competence standards;
- **competence-based assessment:** providing a competence-based system for the assessment of performance and for raising levels of competence;
- **participative job design:** taking opportunities where possible to design jobs in ways which will lead to improved job satisfaction. This will mean involving the workforce as much as possible in the early stages of the job design process.

Training for multi-skilling

In the past, attempts to introduce some form of multi-skilling have sometimes run into difficulty because of deficiencies in training. Effective training is critical to the successful development of wholly new multi-skilled roles and to the extension of existing roles to become multi-skilled. Effective training will involve:

Design of initial training

- **task analysis:** the identification and analysis of the tasks to be performed;
- **skills analysis:** the core skills needed and the necessary skill-mix based on the job specification of the tasks to be shared. At this stage it is vital to make sure that the new competencies will be maintained and developed on a regular basis;
- **critical skills:** the task and skills analyses should highlight critical skills, in particular, skills where a failure might cause or contribute to a major accident. 'First-time success' is also important as there may be no opportunity for the worker to rehearse the skill before using it in earnest; many emergency skills may fall into these categories;
- **competence-based standards:** the initial training should be designed around competence-based standards. Consideration will be needed of how to assess competence, particularly in little-used skills. Competence-based standards should be integrated with company schemes. National qualification standards may also provide a guide to duty holders;

Initial training for multi-skilling

- **trainee assessment:** initial training should be based round the assessment of the individual trainee's existing skills, knowledge and experience;
- **initial training:** initial training should ensure that important skills and knowledge are thoroughly mastered. This is the best way of reducing long-term skill loss and the need for retraining;
- **trainee progress:** trainee progress can be assessed by measuring and recording the performance and standard reached during training. This can be used to plan future skill maintenance strategies;
- **health and safety:** training should be structured so that it progressively builds up safe working practices. Specific health and safety training should be included and integrated into the training programme when appropriate, for example when new legislation comes into force or relevant guidance is issued;
- **training for managers and supervisors:** the roles of the supervisor and the manager of multi-skilled workers are likely to undergo many changes. Initial training for multi-skilled workers should be complemented, and integrated where appropriate, with training in the new working procedures for their supervisors and managers;

Other initial training issues

- **learning 'manual skills':** where skills require manual dexterity or hand-eye co-ordination, more practice will invariably lead to better skill retention;
- **teaching knowledge-based or factual material:** such material (eg complex procedures or lists of information) may be learned apparently perfectly and 'by heart' within a training course. However an individual's retention of the material can show significant deterioration within a very short period. It is important to allow for periods of rehearsal, in which trainees can use the material within the initial training period and subsequently;
- **theory versus practice:** it is important to teach theory and practice in a way that is directly relevant to the work a trainee will be expected to perform day to day. Theory and practice should be integrated to support each other. Teaching academic theory should be avoided where the relevance to practice is unclear;
- **on-the-job and off-the-job:** off-the-job training should be integrated with, and made relevant to, the work that a trainee is expected to undertake day to day. A nominated person should be identified as being responsible for the trainee during on-the-job training;

Post-training

- **trainee follow-up:** a system should be set up to monitor and record the development of the newly acquired competencies;
- **evaluation of initial training:** follow-up of trainees through, for example, assessment of their work performance can provide feedback on the success of the initial training in equipping trainees for multi-skilled jobs and can lead to the redesign of initial training;
- **mentoring:** a more experienced multi-skilled worker can be assigned to the new trainee(s) over an extended period. This can prove to be very valuable in helping to consolidate new learning.

Skill maintenance

Some well-learned manual skills can be retained at a fairly high level of competence with no practice for very long periods, in some cases many years. On the other hand, some skills which are based more on knowledge, eg remembering the procedures to be followed in safely dismantling a complex piece of equipment, can show deterioration in performance over short periods where regular practice is not undertaken.

Forgetting skills and relearning them

There are a number of points to consider when assessing skill retention:

- **skill loss - the bad news:** the bad news on skill loss is that some skills may show fairly rapid decay without regular practice. This may result from the skill not being thoroughly learned in the first place;
- **which skills are forgotten, which are retained:** well-learned manual skills or skills involving hand-eye co-ordination can be retained for long periods with no practice. Skills which involve knowledge and memory for complex procedures can deteriorate fairly quickly;
- **skill relearning - the good news:** the good news is that skills which seem to have been lost completely can often be rapidly relearned (particularly if they were well established in initial training), often in a fraction of the time it took to learn them originally;
- **'first-time' success skills:** rapid relearning is good news for many infrequently used multi-skills, but some skills such as emergency procedures may require 'first-time' success. Where 'first-time' success is critical, special attention may be targeted on refresher training and aids to performance such as procedural guides, checklists, etc;
- **multi-skilling - similar jobs or different jobs:** where jobs are very different, skills learned in one are not likely to interfere with those learned as part of an other. However, there are cases where jobs are very similar but the worker is required to do slightly different things. For example, errors can occur where an operator is required to operate a new piece of equipment with a control, which is apparently identical to a control that the operator has used before, but which has a different function.

How to refresh skills and maintain levels of competence

There are several ways in which skill levels can be maintained:

- **practice or rehearsal:** this should help to maintain levels of skill and competence over long periods after initial training;
- **what to practise/types of rehearsal:** while the ideal form of rehearsal involves practice on the actual job, other less obvious types of rehearsal have been found to be surprisingly effective. These include:
 - rehearsing procedures with the aid of prompts (set of instructions, photographs, etc) but without carrying out the actual actions;
 - ‘mental practice’; or
 - merely watching someone else perform the task.

It may also be beneficial to periodically swap staff between jobs. Though these approaches are not likely to lead to effective original learning of a skill, they can be very effective in maintaining skills;

- **how often to practise:** generally, frequent practice sessions of moderate length lead to better retention of skills than long practice sessions that take place very infrequently; and
- **rehearsing emergency procedures:** emergency procedures should be practised as often as may be appropriate. This practice should be as realistic and true to life as possible, without putting personnel at risk. It is essential that the correct procedures are rehearsed, and so full use should be made of checklists, memory aids and procedural guides.

Assessing skills

A number of factors need to be taken into account when assessing skills:

- **assessment as practice:** regular assessment of skills will serve not only to encourage use but can itself serve as a form of practice;
- **assessing ‘rusty’ skills:** assessment should take into account that apparently forgotten skills (manual or knowledge-based) can be very rapidly relearned. Measures based on ‘first-time’ performance can lead to very misleading assessments of likely performance in the real job situation, where some opportunity to practise is often available; and
- **assessing emergency skills:** the approach to assessing emergency, or otherwise critical, skills will be very different. This will require competent performance with little notice. Risks during assessment should be less than during a real emergency. Assessment methods could include tests of knowledge, and of performance in practice situations.

Working practices

A change to multi-skilling can have a number of other implications related to general working practices:

- **peer support:** multi-skilling can lead to the loss of peer support, advice, experience, etc, while on the job, particularly in cases of reduced staffing;
- **'second opinions':** multi-skilling may lead to the loss of the opportunity to obtain a second opinion from, or to have the work checked by, a co-worker. This may be particularly important in critical tasks;
- **reduced team size:** has the team size reduced to the extent that manual handling of heavy components may become a problem? This will have consequences for safety, and may raise issues over the availability of help for moving heavy loads.

Safety management issues

It might be expected that multi-skilling would weaken the control provided by systems of work, which allocate different functions to people with distinct roles. Permit-to-work systems are a case in point. To guard against any weakening of control, possible sources of confusion should be identified and clarified before multi-skilling is implemented. It should be established which individuals can be authorised to issue permits-to-work. Where necessary, the OIAC publication *Guidance on permit-to-work systems in the petroleum industry* should be referred to.

The organisational structure and shift patterns may need to be altered to allow the development, use and maintenance of the skills and knowledge acquired in multi-skilling.

There are a number of key points to be taken into consideration:

- **integration of multi-skilling with safety management systems (SMS):** skill or role combinations should be compatible with SMS;
- **on-the-job inspection and checking:** there may be a loss of informal inspection and checking by co-workers who are no longer present when skills or roles are amalgamated. Arrangements should be made to ensure that similar checks are undertaken as necessary;
- **delaying and delegated authority:** an individual may carry several levels of responsibility at one time. These responsibilities may conflict either in an emergency, or because of countersigning requirements, eg electrician plus offshore installation manager (OIM) on a normally unattended platform. The hierarchy of roles for particular scenarios should be made clear;
- **destaffing and provision of support:** arrangements should be made to provide assistance when called for;
- **need to review procedures:** there is a need to review all the working procedures and to establish whether the formal safety and operating procedures reflect multi-skills or whether they are dependent on old working practices. If the formal procedures are at odds with working practices then serious problems may arise as staff attempt to reconcile the differences.

Managing multi-skilled teams

The introduction of multi-skilling is not an organisational improvement which is restricted to operators, craftsmen and technicians. It has far-reaching implications for the structure of the whole organisation and the roles of staff within it. Supervisors have to be trained so that they can develop new behavioural and managerial skills needed for the supervision of multi-skilled teams.

Recent research in the offshore oil industry has highlighted a number of features which are associated with safer working when supervising multi-skilled teams:

- **the supervisor as a team leader:** when overseeing a multi-skilled team, supervisors must develop team leader's skills. As team leaders, they must understand and support the full range of skills and roles within the team;
- **leadership skills:** it is unlikely that team leaders of multi-skilled teams can offer detailed technical support in each of the skills covered by the team. They can no longer call upon a greater technical ability to command respect from subordinates in the way a supervisor could in the old 'chargehand' model. The team leader should use leadership and facilitator skills to manage the team;
- **broad knowledge base:** there is a particular need for supervisors to identify and highlight core safety issues from the specific technical detail. Where team leaders have detailed knowledge of only one area of the team's expertise, there may be a tendency for them to over-supervise this area at the expense of attending to the full range of work covered by the team members;
- **communication:** the need for a team leader to lead and manage a team with different skill bases and roles places a greater emphasis on communication skills. Both oral and written communication skills may be called upon as the supervisor may not always be in immediate charge of the team.

Interface with contractors

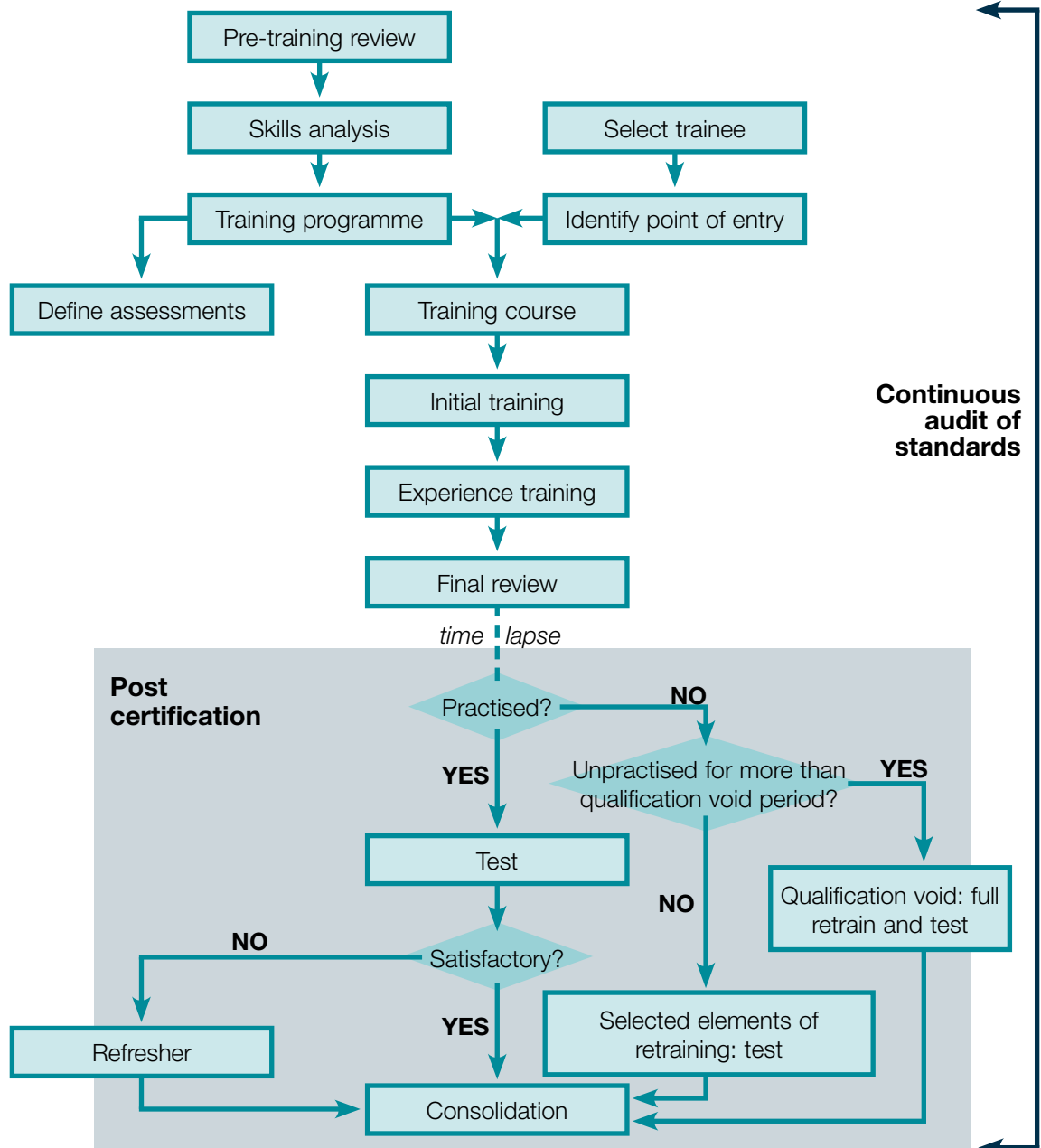
A number of different mixes of single and multi-skilled personnel may be brought about when contractors are used. This will depend on whether the employees of each of the contractors present and those of the workplace occupier are single or multi-skilled.

It is important that there is close communication between a contractor and the site operator, and between a contractor and sub-contractor. Each should make sure that they understand the other's multi-skilling systems, the range of competencies brought within those systems, and how the systems will affect one another's work. The nature of the work itself will have an effect, and the following should be made clear: the content of the work; the contract type; and the arrangements for supervision and communication.

When letting a contract, it is essential to consider the safe performance of the work. More detailed information about working with contractors is given in the HSE publication *Managing contractors - a guide for employers*.

Appendix 1

Training for multi-skilling: steps



Further information

Successful health and safety management HSG65 HSE Books 1997
ISBN 0 7176 1276 7

Management of health and safety at work. Management of Health and Safety Regulations 1992. Approved Code of Practice L21 HSE Books 1992
ISBN 0 7176 0412 8

Manual handling. Manual Handling Operations Regulations 1992. Guidance on Regulations L23 HSE Books 1992 ISBN 0 7176 0411 X

Prevention of fire and explosion, and emergency response on offshore installations. Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations. Approved Code of Practice and guidance L65 HSE Books 1997
ISBN 0 7176 1386 0

A guide to risk assessment requirements: common provisions in health and safety law INDG218 HSE Books 1996 ISBN 0 7176 1211 2

Human and organisational factors in offshore safety OTH543 HSE Books 1998
ISBN 0 7176 1492 1

Managing contractors - a guide for employers HSE Books 1997
ISBN 0 7176 1196 5

OIAC publications

Guidance on permit-to-work systems in the petroleum industry HSE Books 1997
ISBN 0 7176 1281 3

Acknowledgements

Many of the ideas on skill loss, skill maintenance and job design are derived from earlier publications. Readers with a particular interest are referred to:

Annett, J *Skill loss: how quickly are skills forgotten? What can be done to maintain them?* Manpower Services Commission, Sheffield 1983

Hackman, J R & Oldman, G R *Work redesign* Addison-Wesley, Reading, MA 1980

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Further information

HSE priced and free publications can be viewed online or ordered from www.hse.gov.uk or contact HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995. HSE priced publications are also available from bookshops.

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