Managing machinery safety in small plastics factories

Plastics Processing Sheet No 3

Introduction

This sheet was produced by the Health and Safety Executive (HSE) in consultation with the Plastics Processors Health and Safety Liaison Committee (PPHSLC). This committee comprises HSE, employers and employee representatives in the plastics industry. It has been written for the owners and managers of small plastics companies, but it may also be useful to larger companies. It should be read alongside the relevant manufacturing process sheets for your factory.

Plastics Processing Sheets

No	Process
4	Injection moulding
5	Blow moulding
6	Thermoforming
7	Extrusion/haul-off
8	Window frame manufacture
9	Compression moulding
10	Granulators
11	Reeling/winding

This sheet explains why you need to actively manage machinery safety to prevent accidents and it describes a simple system for doing so. In using such a system you will be complying with regulations 5 and 6 of the Provision and Use of Work Equipment Regulations 1998 (PUWER 98) which relate to the maintenance and inspection of machinery safeguards.

Why do accidents happen at plastics machinery?

In preparing these sheets, HSE has reviewed ten years of accident data from the plastics industry. From this analysis, three major causes stand out:

- inadequate safeguarding fitted;
- the safeguarding had been removed or fallen into disrepair; or
- the safeguarding had been overridden, usually for setting.

As a result, the major injury rate for machinery accidents in the plastics processing industry in 1997/98 was 65% higher than that for all manufacturing industry.

Taken together, these three factors account for most major injuries at plastics machinery. Three examples from 1997/98 are quoted below and typify what can go wrong if machinery safety is not properly managed.

Inadequate safeguarding fitted

An operator was feeding a haul-off with a newly extruded run of plastic profile. The extrusion was hot and he was wearing gloves. When he presented the extrusion to the nip, the glove stuck to the plastic and his hand was pulled into the nip. There was no guard at the infeed to the unit, and he suffered a crushed hand and broken wrist.

Safeguarding removed/in disrepair

A fixed guard on a blow moulding machine was removed to clear product blockages and was not replaced. Some time later, on another shift, a university student doing holiday work had his hand crushed and tendons severed by the carriage mechanism when trying to clear another blockage.

Safeguarding overridden

A shift supervisor was trying to clear a blockage at the cutting station on an in-line thermoforming machine. He opened the guard and expected the machine to stop, but the interlock had been rendered inoperative by a setter earlier in the day while fault finding. As a result, the supervisor lost two fingers and his hand was badly crushed.

What do I need to do?

To prevent accidents like these in your own factory, you need to assess the risks and address each of the three main causes in turn, namely:

- provide the right safeguarding in the first place;
- check that this is kept in position and is working effectively; and
- make sure that safe systems of work are followed for setting.

All this may sound daunting for a small company without the benefit of specialist staff, but the eight sheets listed in the Introduction provide the conclusions of generic risk assessments for you.

They detail acceptable safeguarding requirements, contain checklists and describe safe setting procedures where relevant.

These specifications have been discussed and agreed with industry representatives from the British Plastics Federation (BPF), the Packaging and Industrial Films Association (PIFA) and the Plastics Machinery Distributors Association (PMDA). The checklists build on procedures and arrangements already in use within the industry.

Step 1

Compare the safeguarding standards on your own machines against those in the relevant process-specific sheet. As a result of this, you may need to upgrade what you now have in position to currently acceptable standards of safety. (These safeguarding improvements will not require existing machines to be CE-marked.)

You will also need to consider whether the description in the sheet adequately covers all the specifics of your plant. For example, you might have robot feeds, conveyor systems or other customised features to take into account.

Step 2

The process-specific sheets include two sets of checklists. The first contains mainly visual and functional checks for the operator to undertake (usually each day/shift). These should only take a few minutes to complete and can be viewed as part of a start-up or handover procedure.

The operator's checklist has been written in a form suitable for all machines of a given type, so it should first be customised and simplified to make it more directly relevant to your plant. Keep in only those features on your own machines. You should also add any extra detail specific to your machinery (like the robots and conveyors mentioned above), or from the manufacturer's instructions.

The PPHSLC recommends that these machine-specific checklists are then attached to each machine, and that operators are expected to sign that they have completed the check. The checklist will act as a reminder and will show that the operator has an important role to play. (Some companies have also converted these lists into schematic drawings to ease language difficulties.)

The second checklist requires greater familiarity with the workings of the machine and has been designed for completion by a setter or in-house maintenance staff. The PPHSLC recommends a check once a month at first, to be refined in the light of experience. For some machines these will be 'inspections' in terms of PUWER regulation 6(2). This second checklist should also be customised as described above.

This second set of checks could be staggered week by week, so spreading the workload on the individuals concerned. Alternatively, if you have just a few machines, you may choose to carry out all the inspections on the same day so that the task is seen to be done.

Before any such systems are put in place it is essential that all the staff concerned are fully briefed on what they have to do, why they have to do it, and that they will be accountable for this work. Most importantly however, you must explain what they should do when a defect is found. If, for whatever reason, you cannot trust certain staff to fulfil these responsibilities, then they should not be given these tasks and you will need to make alternative arrangements. (You might choose to allocate the responsibilities to a foreman/chargehand for instance, or to a quality controller.)

Step 3

The process-specific sheets also contain guidance on the safe setting of such machinery. You will need to compare this against current practices on your own plant.

As a result, you may discover you need to:

- provide extra facilities for safe setting (eg 'inch' controls, handling aids or means of isolation); and/or
- develop customised safe systems of work with your setters for your own machinery.

Is that everything?

As the owner or manager of a small business you will already be aware that your own contribution is very important for getting things done in the factory. Your priorities and your attitudes set the tone for others to follow. The proactive management system described so far in this sheet will not take hold and will not be maintained unless you are seen to be fully behind it. The final component therefore is your own personal involvement.

Step 4

There are many ways you can show your own commitment to these arrangements, but the basic components are:

- Involve yourself directly in setting up these systems. Enquire into existing safeguarding standards yourself. Brief staff yourself, or be present if someone else does.
- Add a personal message of your own to set the tone. (You could say, for example, that you want to protect the firm's good name.)
- Make a point of checking that your setters are following the agreed safety procedures when you come across them toolsetting.

- Check that your systems are in place and effective when new employees start, new machines arrive or if any warning signs occur (such as a near-miss).

- Make a show of praising vigilance and disciplining lapses.

How will I know if we are managing machinery safety properly?

The answer lies in what your own involvement at Step 4 tells you. If you know that you have systems in place for checking machinery safety using these sheets as your guide, and if you have satisfied yourself that your staff are carrying out their duties conscientiously, then you can be confident that you are managing machinery safety properly.

The following case studies are from companies that were not doing so. Could they be describing your own company now?

Blown film winder

An accident occurred at a blown film line when an operator was caught and trapped by the cross-cutting device at the reel change. Paramedics had to provide treatment on site to keep him alive while company personnel and firemen worked to release the machine. The proximity scanning device provided at the winder had never been made operational because it had not been programmed into the machine controls since its installation four months earlier.

Injection moulding machine

An accident happened at an old horizontal injection moulding machine when the setter had his hand crushed in the tooling as he tried to clear a blockage in the mould cavity. Investigation showed three critical failings:

- The front interlock switch was being held in the ‘guard closed’ position by an accumulation of waste product.

- The remote side of the guard had been lifted off its track through constant fouling on coolant pipes, and the retaining rollers designed to keep the guard on this track had been removed.

- The shouldered bolt holding the mechanical scotch provided at these older machines had been replaced by a fully threaded one which was holding the scotch in its raised position.

Further reading

Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and Guidance L22 HSE Books 1998
ISBN 0 7176 1626 6

Further information

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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