



Manufacturing Intelligence:

Printing



Manufacturing Processes

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Material Damage
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Liability Hazards

We know that your clients take risk management seriously and that it plays a key role in the service you offer. We've produced this guide to highlight the controls and prevention measures your clients can take to help reduce the risks associated with the process and types of machinery used in the printing industry.

Trade overview

Printing remains an important industry in the UK. The most common commercial printing types are offset, lithographic, flexographic and digital printing. Printing can be web (reel) or sheet fed. 3D printing is now developing quickly although it's more closely related to the plastics family of trades and therefore isn't covered in this document.

Process

- Offset printing (offset lithography) works on the principle of using 3 cylinders. The first 'plate cylinder' is etched with the text or image and this is inked via rollers. The 2nd or 'offset blanket cylinder' has a rubber blanket onto which a mirror inked image is transferred. The last roller or 'impression cylinder' turning in the opposite direction presses the paper onto the 'blanket cylinder' to complete the printing process. This process is high quality and fast.
- Lithographic prints without the blanket, originally using a stone but modern methods use a polymer covered plate. Elements of offset and lithographic printing can be combined.
- Flexographic printing is another method used commonly for other materials such as plastic and commonly used for label printing.

Large machines are common in the printing industry and, depending on colour complexity, vary between 1-12 colour presses, although 8-12 colour machines duplicate the process to allow printing on two sides. Inks can be either water or solvent based. Cleaning of printing cylinders with Isopropyl Alcohol IPA, toluene or Methyl Ethyl Ketone "blanket wash" (which are low flashpoint highly flammable liquids) may still be encountered.

Digital print is used for shorter print runs and has become more common. Inkjet or laser printing is normal, using pigment or toner and avoids the need for the production of printing plates. Significant movement of paper and card create manual handling issues. Guillotine work, collating, stitching and binding in print finishing operations includes cutting hazards which need to be carefully managed.



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Business Interruption

As with many commercial processes, large printing equipment can be vulnerable to damage by heat, smoke and other contaminants. Lead times for replacement plant can be extended, although there's a ready market for used equipment.

The multi-colour printing presses take up a sizeable floor space which will need to be a consideration in selecting short term lease premises following any loss.

Printing remains a fiercely competitive market with opportunities for very large contract customers. Any loss sustained can prevent fulfilment of orders and result in client dissatisfaction and even cancelled contracts. Companies with large single contracts are most vulnerable to major business impact or failure following a loss.



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Employers Liability

The main hazards are machinery entrapment and contact with moving presses, guillotines and other folding and creasing equipment. High standards of guarding and good operator training and supervision are required. Maintenance tasks (such as clearing a paper jam) are a common cause of accidents, so well developed and controlled safe systems of work, which include appropriate and secure plant isolation, are particularly necessary.

Print rooms can be noisy environments. Key considerations include plant selection, review of potential enclosures, machine servicing and personal protection. Contact and inhalation of vapours from inks and solvents can cause dermatitis and asthma respectively. Handling chemicals requires careful and adequate ventilation.

Loading of presses and ancillary tasks can be repetitive and require manual handling resulting in the risk of musculoskeletal injury and upper limb disorders. Poor housekeeping, particularly from ink spillages, paper off-cuts and packaging bands are also a concern in any commercial printing business due to the potential for slip and trip incidents. Ultraviolet (UV) light presents a radiation burn hazard if not properly controlled, so print lines with UV curing should have adequate shielding to protect employees.

Public and Products Liability

Public Liability exposure includes issues relating to waste streams and disposal of waste off cuts from the printing process. Traditionally acids or solvents were used for etching printing plates which produced hazardous liquid wastes, although such processes have now largely been replaced by water-based processes. Old waste inks can be a combination of organic dyes and resins, metallic pigments and solvents and require careful containment on-site and safe disposal. Any local exhaust ventilation from print lines into the atmosphere needs to be adequate and maintained to ensure emissions are safe.

With regard to Product Liability, care and review is required to prevent any incorrect information being printed and despatched. For example, technical and safety instructions, incorrect foreign language translations, incorrect information relating to storage and use can lead to issues. Quality control procedures and recall arrangements should be considered.



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Material Damage

The fire risk within printing premises is high due to the nature of material in use (paper, highly flammable inks and solvents). High standards of housekeeping should be maintained, particularly in respect of the handling and storage of flammable liquids and storage of large quantities of sheet or reeled paper. Used cleaning rags and wipes should be stored appropriately or removed from the premises and paper waste shouldn't be allowed to accumulate.

A number of printing presses will dry ink using infrared or UV curing as the printed material passes through. However, some older lamps or new LED UV lamps will generate heat. There have been many incidents of flammable solvent vapours igniting when presses stop suddenly, such as when there's a paper jam.

Inks are water or solvent based although cleaning of the printing cylinders with a flammable Volatile Organic Compound (VOC) 'blanket wash' solvent is common. Proper storage and use of flammable inks and 'blanket wash' is paramount for controlling fire risk, as is the use and containment of wipes. Some cleaning chemicals are oxidising chemicals and may react with combustible materials and produce heat.

The cutting of paper and card means dust is a problem for printing. In large folding and cutting units, dust may accumulate on horizontal surfaces. There are risks of primary and secondary dust explosions if this isn't regularly cleaned.



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The tables below highlight some specific hazards present in the printing industry, along with the associated controls which will help prevent major loss of physical property. Generic risks resulting from arson, electrical sources and waste aren't mentioned here.

Features always present

Hazard	Control
Spontaneous combustion from cleaning wipes contaminated with solvents or oxidising chemicals.	<ul style="list-style-type: none"> Stored in metal bins with self-closing metal lids. Regular removal from site.
Fire from flammable vapours – particularly highly flammable low flashpoint 'blanket wash' and potentially some solvent based inks.	<ul style="list-style-type: none"> Substitute low flashpoint solvents with higher flashpoint alternatives. Up to 50 litres - storage within flammables cabinet within the premises. Above 50 litres - designated storage with 2-hour fire resistance and ventilation to the open air. Provision of Local Extract Ventilation (LEV) at printing units and adequate general ventilation.

Hazard	Control
Ignition of combustible printing material, off cuts and dust accumulation.	<ul style="list-style-type: none"> High standards of housekeeping. Segregation of storage areas. Protection against static electricity build up – earth bonding. Dust collecting on horizontal surfaces should be removed by vacuum cleaning techniques rather than sweeping, compressed air and blowing systems.



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Features sometimes present

Hazard	Control
Ink drying – sudden print stoppage resulting in UV lamps heating the material and subsequently igniting.	<ul style="list-style-type: none">▪ Replace lamps for low temperature output lamps.▪ Ensure lamps are part of safety cut off system when there's a stoppage.▪ Use of a lamp shroud that drops when there's a machine stoppage.▪ Use of drying tunnels with warm air.
Use of metallic powders (i.e. on greetings cards) may introduce an explosion risk.	<ul style="list-style-type: none">▪ High standards of housekeeping.▪ Consider the use of enhanced spraying units to reduce the amount of powder used.
Static electricity can cause damage.	<ul style="list-style-type: none">▪ Consider electrical bonding and earthing of equipment.
Use of high specification computer equipment for graphic design work.	<ul style="list-style-type: none">▪ Good physical and intruder alarm protection.
Over reliance on large single contracts resulting in a large business interruption issue if the contract cancels.	<ul style="list-style-type: none">▪ Consideration of duplication operations, particularly off-site.▪ Formally agreed subcontract arrangements.▪ Business continuity planning.



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The table below highlights some specific hazards present in the printing industry, along with the associated controls to help prevent significant injury or third party property damage. Generic risks arising from slips/trips/falls, warehousing or any work away from the premises aren't mentioned here.

Employer's Liability, Public and Products Liability

Hazard	Control
Potential for entrapment, contact or entanglement with machinery.	<ul style="list-style-type: none"> Where elimination of the hazard isn't possible, good standards of guarding, set, checked and recorded on a daily basis by competent trained staff. Appropriate training and supervision of operators, including frequent workplace checks. Safe systems of work including plant isolation procedures (e.g. captive key systems) for maintenance operations.
Noise induced hearing loss.	<ul style="list-style-type: none"> Consideration at machine procurement stage, noise assessment, provision of enclosures, regular servicing, PPE as a last resort. Audiometric testing of exposed individuals.
Dermatitis or asthma from exposure to inks and solvents.	<ul style="list-style-type: none"> Assessment, ventilation, handling training, appropriate PPE. Health screening and review.

Hazard	Control
Musculoskeletal conditions and upper limb disorders.	<ul style="list-style-type: none"> Manual handling assessments, mechanical aids and safe systems of work.
Exposure to radiation from UV curing plant.	<ul style="list-style-type: none"> Screening/shielding of UV lamps to avoid light leakage and appropriate maintenance of machinery.
Escape of inks/solvents into environment.	<ul style="list-style-type: none"> Adequate storage, containment and safe disposal of waste. COSHH Assessments are required for all substances as well as good awareness and training regarding contact dermatitis arising from contact with any printing inks and cleaning solvents.



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Products Liability

Hazard	Control
Product printed inaccurately.	<ul style="list-style-type: none">▪ All technical, foreign language or safety instructions (whether text or pictographic) reviewed by competent individuals (and documented).▪ Formal quality control procedures (e.g. ISO9001) and recall arrangements in place.
Inadequate print media for application (e.g. paper/card type or quality).	<ul style="list-style-type: none">▪ Adequate procurement and supply chain arrangements.▪ Quality control procedures including random sampling.



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