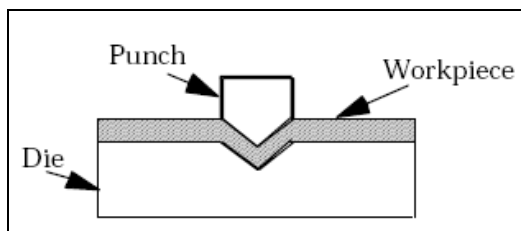


## ***PROCESS DESCRIPTION***

These guidelines relate to companies involved in the fabrication of metal products. This includes the manufacture of structural metal products such as bent metal sections and gates; metal containers and packaging such as tanks, drums and cans; machined parts and fasteners.

Once molten metal has been formed into a workable shape (see Ferrous Metal Processing; Base Metal Smelting & Refining; and Foundry Guidelines), shearing and forming operations are usually performed on it.

- Shearing operations cut the materials into a desired shape and size e.g. by punching and cutting to produce holes/openings or to produce blanks or parts
- Forming operations shape parts by a variety of processes involving a punch and a die, or die rollers.



Forging is a particular type of forming where a heated blank is struck or squeezed into the required shape

Once formed, the work piece may be machined to remove unwanted pieces e.g. by drilling, milling, turning, planing, sawing and grinding.

The shaped piece may then be subjected to various surface engineering processes as described in the Metal Surface Engineering guidelines.

Metal working fluids are applied to either the tool or metal to facilitate the shaping operation, historically these have been oil based but bio-degradable, ester-based fluids are now available and becoming more widely used. Solvents, acids and alkalis are used to clean the surface of the metals, but the trend is to use aqueous non-volatile organic compounds (VOC) wherever possible.

## ***KEY ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES***

### ***Air Emissions***

The principle air emissions are VOCs from degreasing and cleaning operations. These emissions may result through volatilization of solvents during storage, fugitive losses during use, and direct ventilation of fumes.

Dust and particulates may be emitted from grinding operations.

Welding operations may generate gases such as ozone, carbon monoxide and toxic metal fumes.

### ***Soil and Water Contamination***

Contamination may have been caused in the past by discharge of untreated wastewaters to sewers and disposal of metal sludge on site.

Contamination can still occur due to accidental spillages and leaks of solvents and oils.

### ***Noise & Vibration***

Many pieces of equipment and processes, e.g. grinding, hammering steel, guillotining, cutting metal, pressing, disposal of scrap metal can produce harmful levels of noise.



Prolonged/repeated use of hand tools such as grinders, drills etc can cause hand/arm vibration syndrome.

### ***Solid Waste***

Solid waste consists primarily of metal offcuts and chips (swarf) contaminated by cutting fluids and cleaning agents, which should be recycled where possible. Other wastes include metal-bearing cutting fluid sludges and solvent still-bottom wastes. These wastes are hazardous and must be disposed of to registered handlers and if recovery of the metals is not possible, they must be consigned for disposal in compliance with national legislation.

### ***Metal Working Fluids***

Metalworking fluids, which may be oil-based, oil-water emulsions, or synthetic emulsions are used to:

- Control and reduce the temperature of tools and aid lubrication;
- Control and reduce the temperature of work pieces and aid lubrication;
- Provide a good finish;
- Wash away chips and metal debris;
- Inhibit corrosion or surface oxidation.

These fluids become spoiled or contaminated with extended use and reuse. The used fluids contain high levels of metals and sometimes contaminants from other processes, e.g. acids, alkalis, waste oils, solvents.

### ***Wastewater***

Wastewater containing acidic or alkaline wastes, waste oils, and solid wastes, such as metals and solvents, are generated and must be treated prior to discharge.

Oil/water emulsions can be separated by adjustment of pH in a treatment plant known as an “oil splitter”. The waste oil should be tankered off-site for recovery or disposal as appropriate.

## ***OTHER ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES***

### ***Manual Handling and Repetitive Work***

Lifting and carrying heavy or awkwardly shaped objects, such as metal products, can result in manual handling injuries. Purpose built vehicles, forklifts and cranes should be used. Poorly designed workstations can require awkward postures, twisting, bending and reaching motions which could cause injury and musculoskeletal disorders.

### ***Machinery & Hand Tools***

Hand tools such as grinders can cause serious injury, for example, foreign materials entering the eye and kick back resulting in physical injury.

The machinery used in metal fabrication is designed to cut and shape, and is therefore capable of causing serious injury to people. Therefore, it must be fitted with adequate guarding and process interlocks to prevent inadvertent exposure to moving parts. Workers must be trained and competent in its use.



### *Collision*

This often takes the form of people being hit by moving vehicles, flying or falling objects.

### *Slips, Trips and Falls*

These often occur on the same level and are primarily caused by uneven surfaces, inappropriate footwear, lighting, weather conditions, trailing cables and pipe work especially during unblocking, maintenance and cleaning activities.

### *Polychlorinated Biphenyls (PCBs) and Asbestos*

- PCBs are a group of substances which are good electrical insulators. Typically, PCBs may be present as constituents of hydraulic oils or dielectric fluids in electrical switchgear, transformers and fluorescent light starters. Any products that may contain PCBs must be disposed of by licensed contractors in accordance with national regulations.
- Asbestos has been used on a large scale for many years as a fire proofing and insulation material and may be encountered in a wide range of forms including asbestos cement boards, as fire retardant gaskets in pipework and as fire retardant insulation around boilers and furnaces.

Particular attention should be given to buildings constructed before the 1980s

### *Bacterial Infection*

Aqueous oil emulsions used in metal processing may be highly contaminated with various pathogenic bacteria and fungi. Contamination may occur whenever these come in contact with people and various objects involved in the

process. The use of non-potable water in preparation of such emulsions increases the risk of bacterial contamination. Depending on the type of bacteria, these may produce or cause:

- A decrease in pH and decomposition of corrosion inhibitors;
- Foul odours;
- Toxic aerosols;
- Skin irritation and infection;
- Respiratory infections, e.g. bronchitis, pneumonia, and emphysema

### *Permitting*

Metal fabrication facilities in the EU that are also undertaking metal surface engineering using electrolytic or chemical processes may be subject to national regulations under the Integrated Pollution Prevention and Control Directive (2008/1/EC).

Processes relating to degreasing and painting will be covered by the Solvent Emissions Directive (1999/13/EC) and those involving heating metal, e.g. to remove contaminants, may be covered by national regulations to control air quality. Operations outside the EU will still be subject to local regulations.

### **KEY SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES**

#### *Health Surveillance*

Workers in the metal fabrication industry can be exposed to long-term occupational health hazards, such as hearing loss, hand/arm vibration syndrome, dermatitis, ulcers and cancer. A system of health surveillance should



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be in place to protect the health of individual employees that may be at risk. Training to recognise harmful effects and symptoms should be provided. It may be appropriate to screen employees prior to employment for certain roles.

### ***OTHER SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES***

#### ***Transport***

Transport of products by road can be a significant issue. This might lead to road noise and traffic congestion near the plant.

### ***FINANCIAL IMPLICATIONS***

- Many countries are signatories to the Kyoto Protocol and have adopted targets for the reduction of CO<sub>2</sub> emissions. Where Governments have set up carbon emission reduction programmes industrial processes have been required to reduce their CO<sub>2</sub> emissions through the setting of targets. This can result in a need for substantial investment in new/clean technologies to achieve the emission targets. These targets may be reflected in environmental permits.;
- Injuries may lead to increased payroll costs to replace skilled workers and lost production time;
- Capital investment may be required to comply with new environmental, health and safety requirements;
- There is a relatively high potential for soil and groundwater contamination to be present which can be very costly to remediate;

- Fines, penalties and third party claims may be incurred for non-compliance with environment, health and safety regulations.

### ***IMPROVEMENTS***

#### ***Environmental, Health and Safety Improvements***

##### General

- Environment, health and safety training for all employees and contractors;
- Good housekeeping should be maintained at all times in all areas;
- Systems should be subject to frequent and proper inspection;
- Routine plant maintenance to keep small leaks and spills to a minimum and maintain plant efficiency;
- Controls should be implemented to minimise the exposure to gases, fume, dust, noise and vibration, e.g.
  - Mechanical controls such as enclosures, use of filters and PPE;
  - Administrative controls such as limiting exposure time, health surveillance;
  - Operator behaviour through training and instructions.

##### Airborne Emissions

- Installation or upgrade of abatement technology to minimise exposure to hazardous substances and to control the release of emissions, e.g. enclosure of equipment, use of appropriate ventilation



with filters, gas balancing systems, cyclones, filters, and wet or alkali scrubbers;

## Noise & Vibration

- Enclosure of noisy machines to isolate people from the noise where practicable;
- Reduction of exposure times for people working near noisy machinery and provide personal protective equipment where people have to enter noisy areas;

## Wastewater

- Consider feasibility of substitution of hazardous metal working fluids with less hazardous alternatives;
- Segregate rainwater, wastewater and effluent streams to optimise wastewater and effluent treatment;
- Recycle treated wastewater where possible back to the processes or to secondary uses such as for cleaning;
- Maintain on site abatement equipment and wastewater treatment plant;

## Storage

- Bulk containment must be:
  - inspected regularly to prevent leakage;
  - provided with secondary spill containment;
  - installed with automatic alarms and shut off systems;
- Pave stockyards to prevent pollutant infiltration to soil and groundwater.

## Waste

- Return empty containers to the supplier for reuse.

## Health & Safety

- Provision of personal protective equipment (PPE) that is fit for the task to prevent injury and maintain hygiene standards. Staff should be trained in the correct selection, use and maintenance of PPE.
- Redesign manual processes to avoid heavy lifting/repetitive activities;
- Install mechanical lifting aids where possible and rotate work tasks to reduce repetitive activities;
- Separate people from vehicles and machinery where practicable;
  - Ensure that the process layout reduces opportunities for process activities to cross paths;
  - Installation of safeguards on moving parts of conveyor belts to reduce risk of entrapment of employees;
  - Install walkways and signage to separate people from vehicle movements to reduce risk of collision;
- Route cables and pipework under walkways to prevent slips, trips and falls;
- Construct walkways of non slip materials;
- Substitute silica based abrasives with synthetic aluminium oxide based products;



## Energy Efficiency

Manufacturing fabricated metal products is an energy-intensive industry. Therefore, taking steps towards improving energy efficiency will reduce greenhouse gas emissions and running costs.

## ***Social Community and Labour Improvements***

- Implement a programme of routine worker health surveillance;
- Implement a grievance/dispute resolution mechanism for workers and members of the community to raise issues with the Company.

## ***GUIDE TO INITIAL DUE DILIGENCE SITE VISITS***

During the initial site visit, the issues will vary according to the type of process being used and product being produced and depending on the level of environment, health and safety management already introduced. While visiting the site it is important to discuss and review the following:

- Confirm organisational responsibilities and systems for Environment, Health and Safety; confirm that systems cover all employees and contractors.
- Check the condition of the wastewater treatment plant and location of discharge points for wastewater from the facility. Note the colour and appearance of adjacent watercourses;
- Note whether the wastewater treatment plant discharges to a local watercourse or the municipal wastewater treatment works. Higher environmental risks will be associated with facilities discharging to water courses;
- Check the condition of storage facilities for raw materials and finished products;
- Note any odours that might cause a nuisance;
- Note the noise and dust levels at the site to determine whether abatement equipment is in use or might be required;
- What is the standard of “housekeeping” on site? Do areas look clean and tidy? Look for evidence of any recent spills or releases of raw materials/product;
- Are staff wearing Personal Protective Equipment?
- Check signage around the site:
  - Does it convey the health and safety risks?
  - Are fire exits and/or evacuation routes clearly marked?
  - Are there demarcated routes for pedestrians and vehicles?
- Is fire fighting and first aid equipment available? Is there a trained and competent fire fighting resource on site?
- Check the age and condition of equipment, look for signs of wear and tear, degradation, leaks and breaks;
- Check that solid waste storage and disposal (storage equipment) is in a good condition;
- Check that waste storage areas are clear of debris and that skips are covered to prevent waste escaping, for example, check that waste containers have lids or are stored in an area with a roof;

- Have the premises been inspected recently by the regulatory authorities for health, hygiene and environment? What were their findings?
  - Check for automatic safeguards on machinery to prevent accidental injury;
  - Check that wages and working hours are consistent with the average for the sector and national standards;
  - Does the organisation have insurance in place to cover the recall of contaminated/faulty products? Have there been any recent product recall incidents?
  - Does the organisation have insurance to cover any significant damage to the environment/community/operations (this may be covered by public liability insurance or the organisation may be party to an industry insurance scheme). Review the terms of the cover.
  - Has the organisation been subject to environment, safety or quality audits by customers/insurers? What was the outcome of these audits?
  - Have there been any recent incidents on site such as fatalities, fires/explosions, spills? Is insurance in place to cover such incidents?
  - Does the business plan have line items for environment, health and safety improvements as well as asset management and maintenance?
  - If investment or refinancing will lead to restructuring of the organisation what will be the potential impacts on health and safety at the operation and wider community? Have these been considered and assessed by the company?
  - If the company plans to invest in new technology, what will be the impacts and benefits for human resources?
  - Check the conditions and duration of validity for all permits;
- Social, Labour and Community***
- Check that labour standards, contracting and remuneration are in line with national law and are consistent with the average for the sector;
  - Check that hours worked, including overtime, are recorded and staff should receive written details of hours worked and payment received;
  - Check that wages and working hours are consistent with the average for the sector and national standards;
  - Has the Company received inspections from the local labour inspectorate in the previous three years? Have these resulted in any penalties, fines, major recommendations or corrective action plans?
  - Does the organisation have a grievance mechanism which allows employees to raise workplace concerns?
  - Are employees free to form, or join, a worker's organisation of their choosing?
- Take note/ask questions relating to any activities that address the improvements listed in the improvements section of this document.



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### ***ACTION PLANS***

Dependent on the individual business, select appropriate improvements from the list above to include in the action plan. As a minimum, any business should be required to have the following in place:

#### ***Environmental, Health and Safety***

- Operational procedures to manage environmental, health, safety and social risks;
- Monitoring programmes;
- Improvement objectives, targets and project plans;
- Training for personnel;
- Regular inspections, checks and audits with records to demonstrate achievement of the required level of performance against legal requirements and improvement action;
- Emergency plans for environment, health and safety accidents or hygiene non-compliance;
- Management review/demonstrated involvement in environment, health, safety and hygiene management



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