

SECTION 5.10

WOOD BASED ACTIVITIES

SECTION 5.10 WOOD BASED ACTIVITIES

This section outlines best practice guidelines for activities or equipment used by small to medium sized industrial businesses producing wood products.

Section 5.10 Wood based activities is divided into three components:

5.10.1 Background.

5.10.2 Potential impacts on air quality.

5.10.3 Best practice guidelines.

5.10.1 Background

The industry

The wood industry consists of businesses that shape, form, finish or construct with wood. Examples include furniture makers, carpenters, joiners and cabinetmakers.

Each type of wood used has its own chemical components which may affect people and the environment differently. There are also a variety of chemicals used for sealing, coating and polishing wood.

The process

The process involves two main stages.

The mechanical stage, which includes planing, sawing, turning or drilling wood to fit a desired shape or form and the finishing stage, where the wood is then laminated, assembled and finished with the use of glues and adhesives, spray applications, painting and coating, solvent and water based cleaning, staining or sealing.

Mechanical processes

Mechanical activities such as sanding, planing, turning and drilling are undertaken with a variety of different tools and equipment. Most of the tools and equipment used are electric. Sawing is usually the first activity to be carried out. It involves cutting the wood into the approximate dimensions of the part to be assembled. Types of power saws used include circular saws, band saws, scroll saws, radial saws and portable handsaws. After sawing, the surfaces of the wood are planed to create a smooth finish. Planing involves shaving the surface of a piece of wood with a wide edged blade. The type of power planer commonly used is the jointer or jointer planer, which consists of blades fastened to a rotating cutterhead.

Turning and drilling are undertaken to form the wood into the final desired form, for example drilling holes for furniture hinges on cabinet doors.



A mechanical sander located in an industrial business which undertakes woodwork activities.

Finishing processes

Wood products after sanding, planing and drilling are then ready for assembly. Wood products can be finished and assembled or assembled then finished. Usually workpieces are assembled then finished.

The assembly process usually involves the use of adhesives in conjunction with other joining methods such as drilling and nailing. The wood industry uses adhesive formulations containing solvents such as MEK, xylene, toluene and trichloroethane and hot melts, polyvinyl acetate, phenolics, ureas and melamines. The vast majority of adhesives used to assemble non-upholstered wood furniture are hot melts or polyvinyl acetate.

Finishing typically involves the application of stains, lacquers and acrylic urethanes, either by spray painting methods or more traditional painting and wiping methods such as roller, brush or application with a cloth. In the application of stain, lacquer and sealer layers are built up sequentially starting with the sealer, then clear lacquer, then stain, then toner and finally a lacquer thinner.

Priming is another common application used instead of or in addition to the sealing process. Priming is usually completed on work pieces that will remain outdoors and includes the application of a fungicide or water-repellent.

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Stains usually consist of transparent or semi transparent particles (solids) suspended in a volatile liquid solution with a certain amount of binder which helps the spreading, penetration and fixation of colour onto the surface.

An alternative to staining is painting. For information on the application of paint, the spray painting process and best practice guidelines for spray painting refer to **Section 3.3 Spray painting**.



Open faced spray booth with a dry cardboard filter and heat curing lamp used in the finishing process.

Lacquers are used to provide a protection layer. The most commonly used lacquers are acrylic and nitrocellulose. These are available in one or two pack form. The one pack coatings are precatylased and contain nitrocellulose resins and a small amount of urea resin. Because only a small amount of catalyst is added drying time can be extensive and they are not commonly used. Two pack coatings are commonly used. They consist of two packs one containing urea based resin and the other containing a catalyst. The two components are mixed before use. More catalyst is added to two pack coatings so the time required for the paint to harden or cure is short.

Rubbing, polishing and cleaning are the final steps of the production process. Rubbing consists of a very gentle abrasive which is used in conjunction with a lubricant to level or dull the lustre on the surface that has been coated. Polishing consists of the application of soft abrasives or waxy ingredients to increase the surface gloss.

5.10.2 Potential impacts on air quality

Pollutants produced

The two main pollutants produced from wood based activities are:

- Particulate and dust emissions (shavings, sawdust and sanding dust) from mechanical processes such as planing, sawing, drilling and turning.
- Emissions from chemicals including substances used to treat, preserve, paint, remove paint, varnish, stain, lacquer, clean, seal and glue wood products. Odour is also a common cause of complaint arising from the use of these chemicals.

Particulate and dust emissions can create a variety of issues. Some particulate and dust emissions from certain types of timber can be toxic as they may contain formaldehyde. Particulate emissions from hardwoods are extremely fine and respirable. Particulate and dust emissions from old wood may contain toxic paints, preservatives or lead. On some machines with a single cutting, grinding or sanding action particulate and dust emissions can be thrown, drawn or blown from different parts of the machine.

Chemical emissions can be produced from cleaning wood products, paint stripping and using paints and varnishes such as isocyanate based paints or varnishes that emit VOCs. Emissions can also result from using cleaning products that contain solvents. Common chemicals used in wood based activities are:

- Solvents which are used mainly for cleaning, such as thinners and mineral turpentine and paint stripping, such as mixtures or methylene chloride and MEK. Most solvents used in the wood industry are highly flammable and have a high VOC content.
- Coatings which are used to provide a decorative finish and to protect the wood, including two part polyurethane coatings containing isocyanates. See **Section 5.3.1 Spray painting background** for further information on paints containing isocyanates. The three main types of resins used include urea formaldehyde, melamine-formaldehyde and phenol-formaldehyde.
- Preservatives which are used on wood likely to be exposed to fungi and insect attack. However wood used in the industry is generally not treated.

Preservatives used can include CCA, creosote, boron, copper and tin compounds may be used to protect the wood. These are applied before the wood is used by smaller industry. Sawdust from CCA treated timber should never be burnt.

- Adhesives which are used to bond surfaces. These commonly contain solvents such as Methyl ethyl ketone, Methyl isobutyl ketone, xylene, toluene and trichloroethane. Commonly used adhesives include phenolics, ureas, melamines, poly vinyl resin emulsions, hot melts, contacts and mastics. Application of some adhesives requires the use of heat. The amount of VOCs released through the use of adhesives during assembly can be significant. However the wood industry uses predominantly hot melts or polyvinyl acetate which does not contain VOCs.

Sources

The main sources of pollutants include:

- Poorly sealed extraction, ventilation and filtration systems that contribute to fugitive particulate and dust emissions.
- An inadequate filtration system incapable of dealing with the amount of particulate and dust emissions produced.
- Poorly maintained equipment and equipment malfunction or failure.
- Poor replacement of filters in filtration systems.
- Poor housekeeping practices such as irregular sweeping or vacuuming and poor disposal of wood waste in a bin with no closed lid.
- Spills through the use of chemicals.
- Inappropriate storage and handling of chemicals such as leaving lids off containers of products containing VOCs.
- Tearing of waste bags containing particulates and dust in the disposal or transport process.
- Low technical ability of personnel conducting mechanical and finishing operations.

Particular issues of concern

Some hazardous chemicals contained in the wood may be emitted when the wood is sawn, planed, sanded, turned or drilled. Many wood products are not accompanied by an MSDS from the supplier. For example, medium density fibreboard when machined can emit formaldehyde. Some glues and resins can

also emit highly volatile and toxic emissions. Most solvents used are also highly flammable and toxic.

Lead based paints are no longer used in the industry but may be found on old wood. Care should be taken if dealing with wood coated with lead based paints.

The wood industry also uses isocyanate based paints and resins which can emit volatile emissions during the finishing process. Isocyanates decompose in water, so water scrubbers or water bath filtration is a preferred option when dealing with isocyanate base paints and lacquers.

For further information on painting and isocyanate paints refer to **Section 5.3.1 Spray painting background**.

5.10.3 Best practice guidelines

All activities should adhere to the best practice guidelines in **Section 5.1 General background guidelines** and **Section 5.2 General activity guidelines**.

For best practice guidelines on activities commonly undertaken by businesses involved in the manufacture of wood products such as spray painting, refer to **Section 5.3 Spray painting**.

There are five main areas where best practice should be used to prevent environmental harm, these include:

- General guidelines.
- Equipment.
- Cleaning and disposal.
- Personnel training.
- Finishing activities.

General guidelines

- Freshly treated wood should be stored in a well ventilated area to allow for dispersion and dilution of fumes.
- All used solvent should be recycled onsite using a solvent recovery unit. If this is not economically viable the solvent should be disposed of at a solvent recycling facility or via a licensed waste contractor. Solvent should not be placed in the general waste. **Under no circumstances should evaporation be a means of disposal for waste solvents.**

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- Piping for ducting purposes should be of a type that does not encourage static charge. Metal ducting should be used at all times. PVC piping should not be used for ducting as static charges can accumulate and result in explosion.
- Particulate, dust and all other emissions including odours should not cross the premise boundary.

Equipment

- All machines should be enclosed or fitted with effective local exhaust ventilation. This involves placing an extraction outlet as close as possible to each source of particulate and dust emissions. Movement of air and wood particles through the system is provided by an extraction fan that is driven by an electric motor. The advice of a suitably qualified air quality consultant should be sought prior to installation.



Portable sanders with extraction units fitted to collect particulate and dust emissions produced during the sanding process.

- Particulate and dust emissions produced by mechanical processes should be collected by cyclone or fabric filter dust collectors. Baghouse filters are generally the most efficient. Small portable pieces of equipment such as sanders should have a portable filter and filter bag attached. For dust with a large particle size a cyclone filter should be used. For fine particulates a filter with a woven cloth such as a baghouse filter should be used. This can be fitted with a pre cyclone filter to prevent clogging of the baghouse filter with large particles. See **Appendix 2.2 Filtration systems** for an explanation of the filtration systems mentioned.



A baghouse filter fitted to a local exhaust ventilation and extraction system on a piece of woodworking machinery. The bottom fabric bag has been replaced by a thick durable plastic bag which aids the cleaning process, reducing dust and particulate emissions.

- All equipment should be routinely checked weekly to ensure they are working efficiently. In particular holes and leakages in the ductwork should be identified and quickly sealed.
- All equipment should be maintained and serviced according to the manufacturer's specifications. All equipment including extraction, ventilation and filtration systems should be maintained in efficient working order at all times.
- A level indicator should be located on receive bins or the hopper of filtration systems to warn when the amount of dust or particulates captured reaches the outlet from the cyclone or baghouse filter. Periodic maintenance should be scheduled to maintain efficiency.

- All ventilation and extraction systems should be vented through a stack. See **Section 5.2.1 General activity guidelines ventilation and exhausting of emissions** for best practice guidelines on stack configuration and guidelines on ventilation and extraction.

Cleaning and disposal

- Suction cleaners or an industrial vacuum should be used to clean floors and equipment. Compressed air should not be used.
- Filter bags should be emptied in an enclosed environment away from work areas to prevent the escape of fugitive emissions.
- Particulate and dust emissions should be prevented from accumulating on surfaces and equipment through regular cleaning. See **Section 5.2.9 General activities guidelines prevention, reduction and disposal of dust** for further best practice guidelines on cleaning and disposal.

Personnel training

- Education, training and supervision should be provided to all personnel employed by the business on the hazards of particulate and dust emissions, VOC emissions and odours.

Finishing activities

- Adhesives should be applied with a roller or brush to reduce usage and emissions of hazardous air pollutants. If adhesives are applied by spraying the best practice guidelines in **Section 5.3.3 Spray painting best practice guidelines** should be followed.
- Water based adhesives should be used wherever possible.
- Hot glue melts or polyvinylacetate should be used instead of contact adhesives containing VOCs.
- Solventless wood polishes should be used.
- Water based finishing materials should be used wherever possible. The potential exists for the wood finishing industry to use water based finishing materials. However, these coatings are currently only suited to particular applications. For example, water based lacquers do not have the rub ability of nitrocellulose lacquers and the finish is therefore less glossy. Water based coatings may also require a modified drying method.

