Environmental Best Management Practices for Small Businesses

Introduction

An environmental best management practice (BMP) is an action or combination of actions implemented to reduce the environmental impacts of business operations. There are two types of pollution prevention: source reduction and recycling. Source reduction reduces or eliminates the generation of waste. Recycling takes used materials, modifies their form, and makes them available for future reuse. The BMPs provided in the fact sheets listed below are a combination of source reduction and recycling strategies, which provide economic as well as environmental and safety benefits.

Each BMP fact sheet focuses on a particular sector, and draws information from several sources, which are listed in the endnotes section of each fact sheet. The BMPs listed in each fact sheet may be used as a guide for your business. Depending on your business' individual needs and technical and financial capacities, the BMPs may require modification. When adapting a BMP to your business, it may be necessary to contact your local regulatory agency to determine permit requirements. It is important to note that the BMPs listed in these fact sheets are intended as a starting point for your business' environmental management plan, and are not all-inclusive. Further information is available through links at the end of each fact sheet. For additional information about regional specific BMPs, or BMPs not covered in these fact sheets, contact your local authorities and regulating agencies. It is not expected that each BMP will work in all situations; each small business must factor in their own needs, resources, and capacities to find the ones that work best for them.

The fact sheets are intended to work in conjunction with the Environmental Protection Agency's *Practical Guide to Environmental Management for Small Business* and its companion book, *Documenting Your Environmental Management Plan.* For copies of these guides, please refer to the links provided on this website.

Each fact sheet is divided into five sections:

1) Sector Introduction: Provides basic background information on environmental impacts associated with the sector.
2) Best Management Practices: Divided into two or more subsections. Each subsection consists of a paragraph describing a particular environmental impact, followed by a list of BMPs which address the problem.
3) Investments in Technology: Supplies additional information on technologies mentioned in the BMPs or provides information on new technologies to consider when making your choice of BMPs to use. Information about returns on investment is provided where possible, but the true payback period will vary greatly, dependent upon your situation. To determine if a particular technology is right for your operations contact a local vendor for more information.
4) Case Study: Demonstrates the effectiveness of a BMP used in a business.
5) Other Sources: Provides links to BMP information listed in the fact sheet. Also provides additional resources available to small businesses.

Best Management Practice

Furniture Finishing

Sector Introduction

The wood finishing industry consists of furniture and cabinet finishing and reupholstering facilities, and repair shops. The majority of the furniture being refinished is made of wood, but metal furniture also requires finishing. Each furniture business has developed its own unique procedures for completing its work, but the basic steps in all finishing processes are practically identical.

• Finish on the old piece is removed • The raw surface is sanded, stained and bleached • Pores are filled	• A sealer is applied; and • Several coats of transparent or colored film are applied for protection and appearance

The BMPs listed in this fact sheet are a starting point for your business. Additional suggestions for a wider range of activities can be found using the links in the "Other Sources" section.

Best Management Practices

Volatile Organic Compounds (VOCs)

Many of the chemicals used by the furniture finishing industry contain materials that are regulated. Most coatings used in finishing contain Volatile Organic Compounds (VOCs), which may be carcinogenic. VOCs are toxic air pollutants released from a wide range of industrial processes, including cleaning with solvents and the application of paints and finishes to furniture pieces. Additionally, VOCs contribute to the formation of smog and can contaminate water due to their high solubility and mobility. VOCs are very difficult to remove once they reach the environment.

- The wood furniture Maximum Achievable Control Technology (MACT) standard allows for the use of low-volatility Hazardous Air Pollutant (HAP) coatings and cleaning solutions. A finishing company can work closely with suppliers to identify substitutes for raw materials containing solvents. For example:
  - High solids coatings are solvent-borne coatings with at least 50 percent solids content.[3]
  - Water-borne coatings contain water as well as some solvent. They are used in the industry on open-pore and lighter woods.[1]
  - UV-curable coatings can be 100 percent reactive liquids, and require UV light for curing.[1]

- Use adhesives that are low-VOC or VOC-free.[3]

- Keep material containers closed tightly when not in use to reduce evaporation.[8]

- Determine the most efficient air and fluid pressure for spray guns. The ideal setting should provide good atomization, but minimize overspray and blowback.[2]

- Train employees to use proper coating techniques to reduce waste. Skillful use of spray guns can significantly and consistently increase transfer efficiency of coating materials while reducing product consumption and VOC emissions. Practices could include:
  - Adjusting spray patterns for different sized pieces.[2]
  - Holding the spray gun 8-10 inches away from the piece.[2]
  - Holding the spray gun perpendicular to the piece and spraying using a sweeping motion.[2]
  - Stopping the spray of material after the end of each pass; and[2]
  - Making strokes overlap each other by 50%.[2]

Waste Reduction

An additional challenge for furniture finishing companies is the large number of different products needed. There are numerous types of finishing materials, and each comes in a wide variety of colors. Each job is likely to require a different product than the job before, which produces challenges for cleaning equipment between jobs.

Sometimes, products expire or otherwise deteriorate before they are used. Ensuring that your company does not have excess amounts of finishing materials which may expire within the same time frame will help reduce wasted materials.

- Create a system to inspect supplies when they are received so that unacceptable or incorrect products can be returned immediately.[2]
- Institute a dating system for products so that the oldest materials are used up before new ones are opened.[7]
- Store materials in containers with air-tight lids to reduce evaporation, and make sure that these lids are securely in place when materials are returned to storage areas.[7]
- Perform a monthly leak inspection of all equipment used to transfer or apply finishing materials, adhesives, or solvents. Record the date and results of each leak inspection and any repairs made.[2]
- Work with suppliers who are able to offer quick delivery times, so that fewer products are stored on hand. The increased initial cost of using a local supplier can be offset by cost savings from reducing the quantity of unused material and the costs of disposing of these wasted materials.[2]
- Look for suppliers who will take back used, unused, and outdated materials for reformulation, and make arrangements to do so prior to ordering their products.[2]
- Find multi-purpose solvents to reduce the need for different solvents. This can facilitate recycling and reduce the cost of managing waste.[2]
- Evaluate cleaning practices to determine if cleaning is needed after each job. It may be possible to eliminate some cleaning completely.[2]
- Consider aqueous-based solvents for degreasing and cleaning instead of hazardous chemicals.[11]
- Organize jobs throughout the day so that lighter colored finishing materials are used first, and darker finishing materials are used last. This minimizes the need to clean equipment between jobs.[1]
- Reuse solvent from previous cleanings for initial cleanings.[8]
- Reuse or recycle blasting media, when possible. Collecting the media deposited on tarps or within a containment area will allow for quicker cleanup and disposal.[10]
- Use solvents until they lose their effectiveness, instead of when they appear dirty.[2]
- Flush equipment first with dirty solvent before final cleaning with virgin solvent, or pre-clean items with rags before cleaning with solvents.[2]
- Pre-clean equipment with rags to remove the bulk of residual product before cleaning with solvents.[2]
- Use a solvent distillation unit to recover solvents for reuse. Solvent stills are available in a wide range of sizes, and can recover approximately 70% reusable solvent from used solvent.[1]
- Investigate the potential to work with a contractor to recycle and exchange spent solvents and thinners.[2]

Finish Removal

Chemical methods of finish removal employ either caustic or solvent solutions. Solvent solutions are most popular, and include such chemicals as methylene chloride, acetone, and alcohol, with methylene chloride being the most common active ingredient. Formulations of these chemicals are used extensively in both flow-over and immersion (dip) tanks in furniture finishing operations. Methylene chloride is regulated as a toxic air pollutant by some states. Various states also have drinking water regulations that apply to methylene chloride. Methylene chloride waste is considered hazardous under the Federal Resource Conservation and Recovery Act (RCRA) and many state laws. The waste must be stored, transported, and disposed of in accordance with applicable RCRA and state requirements.

- Keep dip tanks and reservoir tanks covered when not in use.[7]
- Maintain stripping solution at appropriate temperatures, usually around 70°F. At the correct temperature, wax in the solution will form a vapor barrier to prevent the solution from evaporating too quickly.[9]
- Avoid using solvents to remove furniture finish by using mechanical methods, such as hand scrapers, sandpaper, and electric sanders.[12]
- Place secondary containment under stripping tables or work areas to capture spills. This will keep spilled

materials from reaching floor drains and make it possible to use captured materials.[7]

- Make sure that water used to rinse pieces after finish is removed meets criteria for discharge to the sewer system. Pieces may need to be pre-wiped before they can be rinsed. Pre-wiping pieces reduces the amount of methylene chloride contained in the rinse water and makes it suitable for discharge. Dispose of your waste from pre-wiping appropriately.[2]

Investments in Technology

A more technical approach to pollution prevention activity is achieved by modifying your production process. This includes training employees, substituting or modifying equipment, increasing automation, and/or redesigning or reformulating your end product. You can start by making modifications in the equipment used to apply coatings to your wood surfaces.

- High Volume/Low Pressure (HVLP) – HVLP spray guns are effective for both solvent- and water-borne materials, and increase transfer efficiency up to 40-70 percent.[2]

- Airless Spray Equipment – Airless spray systems atomize the coating by increasing the coating's fluid pressure (ranges from 500-6,500 psi) without introducing a pressurized airflow. Transfer efficiency ranges from 36-65 percent.[2]

- Air-Assisted Airless Spray Equipment – These systems combine compressed air atomization with airless atomization. About 85 percent of the coating is atomized by fluid pressure (150-800 psi), and 15 percent is atomized by air pressure (5-30 psi) supplied at the nozzle. Transfer efficiency ranges from 40-70 percent.[2]

CASE STUDY
Thomson Crown Wood Products

Thomson Crown manufactures wood and wood-finished television cabinets. Cabinet parts were coated using air-assisted airless spray guns (high air pressure up to 55 psi), causing poor transfer efficiency and generating large amounts of VOC emissions. The company purchased HVLP spray guns to replace existing guns.

Cost—$21,350
Waste reduction—13,300 gal/year
Savings—$137,448 annually
Payback period—Less than one year

Source: Kansas Small Business Environmental Assistance Program Website, http://www.epa.gov/compliance/resources/publications/assistance/sectorsnotebooks/wood.html

Other Sources of Information

1 U.S. EPA Office of Compliance Sector Notebook Project, *Profile of the Wood Furniture and Fixtures Industry*, http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/wood.html

2 Kansas Small Business Environmental Assistance Program, Wood Furniture Makers, *Compliance Options and Regulatory Requirements under the Clean Air Act: A Guide for Small Businesses,* http://www.engg.ksu.edu/ENGGEXT/ppi/publications/furni.html

3 CabinetMaker Magazine, March 1997, *VOC-Free Adhesives Are Here*, http://www.cabinetmakeronline.com/

[4] Indiana Department of Environmental Management, Office of Pollution Prevention and Environmental Management, *Compliance Manual for Indiana's Wood Furniture Manufacturers*, http://www.in.gov/idem/ctap/wood/index.html

[5] Kansas State University Pollution Prevention Institute, *Reducing Wood Wastes from Wood Shops*, http://www.sbeap.org/ppi/publications/reducing_wood.pdf

[6] Louisiana, Department of Environmental Quality, *Fact Sheet NESHAP for Wood Furniture Manufacturing Operations*, http://www.deq.state.la.us/assistance/sbap/factwood.pdf

[7] New York State Department of Environmental Conservation Pollution Prevention Unit, *Environmental Compliance and Pollution Prevention Guide for the Wood Furniture and Fixture Industry*, http://www.dec.state.ny.us/website/ppu/ecppwood.pdf

[8] Ohio Environmental Protection Agency, Office of Pollution Prevention, *Woodworking and Refinishing Pollution Prevention Opportunities*, http://www.epa.state.oh.us/opp/woodworking.pdf

[9] Centers for Disease Control and Prevention, *Questions and Answers - Methylene Chloride Control in Furniture Stripping,* http://mancomm.com/osha/freeforms/1910/CDC%20booklet.pdf

[10] Texas Commission on Environmental Quality (TCEQ), *Quick Tips for Surface Coaters,* http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-418_191140.pdf

[11] Texas Natural Resource Conservation Commission, *Pollution Prevention Guide for Surface Coating Operations,* http://www.tnrcc.state.tx.us/exec/oppr/p2_info/coatings.html

[12] City of Los Angeles Board of Public Works, *Factsheet: Furniture Refinishers – Regulatory Requirements,* http://www.p2pays.org/ref/07/06201.htm