



Cleaner Production Self Assessment Guide Metal Finishing Industries



**The UNEP Centre for Cleaner Production
and
The CRC for Waste Minimisation and Pollution Control, Ltd**

May 1998

CLEANER PRODUCTION

SELF ASSESSMENT GUIDE

Contents

1. WHAT IS CLEANER PRODUCTION?	3
2. HOW TO USE THIS GUIDE.....	3
3. THE BENEFITS OF CLEANER PRODUCTION	3
3.1 SAVING MONEY.....	3
3.2 PREVENTING POLLUTION	4
3.3 COMPLYING WITH ENVIRONMENTAL LEGISLATION	4
4. THE IMPACTS OF METAL FINISHING WASTES.....	4
5. HOW DO I ACHIEVE CLEANER PRODUCTION?	5
5.1 ELIMINATE	6
5.2 REDUCE	6
5.3 REUSE.....	6
5.4 RECYCLE.....	6
5.5 TREAT AND DISPOSE.....	6
6. CLEANER PRODUCTION ASSESSMENT CHECKLISTS	7
7. SOURCES OF INFORMATION	7
8. CONTACTS	7

CLEANER PRODUCTION

SELF ASSESSMENT GUIDE

1. What is Cleaner Production?

Cleaner production aims to prevent pollution, reduce the use of energy, water and material resources and minimise waste profitably, all without reducing production capacity.

It involves rethinking conventional methods to achieve ‘smarter’ products, product components, and production processes.

All metal finishing operations use materials that are potentially harmful to the environment, the health of their employees and the community. The direct costs of treating and disposing of these wastes can be high and the trend is towards increasing costs for business and for the community. The true cost may be much higher still when costs such as cleaning up contaminated sites and health are taken into account.

Treatment and disposal of waste generally only address the symptoms of an inefficient process. Waste may be an indicator that you are losing money unnecessarily.

Cleaner Production aims to reduce waste and inefficiency at source.

It can save you money!

2. How to Use this Guide

This Self Assessment Guide is designed to help you explore the opportunities for *Cleaner Production* in your organisation. This Guide suggests the following five simple steps to implement Cleaner Production in your operation:

- Measure use of chemicals and consumables and measure the waste generated;
- Identify causes of waste generation;
- Identify opportunities to reduce waste;
- Evaluate the viable options; and
- Implement the best options and review the improvements.

The tables and checklists which make up this guide have been provided in a tear out section to assist you in carrying out these steps. Once changes have been implemented you can use the tables again to check your progress.

Many of the commonly recognised areas for reducing waste in the Metal Finishing industry are listed in the Guide to get you started. Extra space is provided for you to include information that is specific to your operation and any *Cleaner Production* ideas of your own.

3. The Benefits of Cleaner Production

The major benefits from a Cleaner Production program are:

3.1 Saving Money

Cleaner Production can save you money through better use of your valuable resources. For example, savings can be achieved in the areas of:

- wasted raw materials;

CLEANER PRODUCTION

SELF ASSESSMENT GUIDE

- water and energy consumption;
- waste treatment and disposal.

Cleaner Production strategies typically cost less than treatment and disposal (so called ‘end-of-pipe’) technologies. Complying with the discharge limits set by Council through on-site treatment can be a significant cost, may require specialist knowledge and generally provides no profit for the organisation.

Cleaner Production, on the other hand, focuses on improving your core business. Companies can often perform better than their environmental requirements as an outcome of running a profitable and efficient business. Many strategies, such as *housekeeping* and *process improvements*, can be implemented at a low cost and can have **immediate benefits**. Changes to plant and equipment will require capital but many Cleaner Production projects that have been undertaken show that they can pay for themselves in less than one year.

3.2 Preventing Pollution

Cleaner Production is about preventing pollution, reducing the use of energy, water and material resources and minimising waste, without reducing production capacity.

Businesses are encouraged to review work practices and processes throughout the entire operation to identify ways to reduce waste at the source rather than trying to control pollution at the ‘end-of-the-pipe’.

3.3 Complying With Environmental Legislation

Cleaner Production will assist in maintaining or improving compliance with relevant environmental legislation. This can bring a number of benefits such as reduced regulatory intervention, possible reduced licence fees and charges and better control over your business.

Regulations regarding the transport and disposal of wastes are becoming tougher. In Queensland, regulations are being formulated to include waste minimisation and Cleaner Production under the Environment Protection Act 1994 (EPA) so these issues are rapidly becoming a reality for industry.

4. The Impacts of Metal Finishing Wastes

The four major sectors in the Metal Finishing industry are anodising, electroplating, galvanising and powder coating. All of these processes produce wastes, some of which are extremely hazardous. Typical wastes generated from metal finishing operations include:

Liquid wastes

This is the major form of waste generated by the metal finishing industry and most companies spend substantial amounts of money for treatment and disposal of liquid waste. Liquid waste falls into two categories - sewerable and hazardous liquid wastes. Wastewater can be disposed to sewer but is subject to strict council limits. Metals are of particular concern as they cause serious problems for sewage treatment plants. Hazardous liquid wastes require special treatment and disposal and include:

- waste plating solutions containing metals
- spent cleaning solutions (e.g. sulphuric, hydrochloric, chromic acid and sodium hydroxide); and

CLEANER PRODUCTION

SELF ASSESSMENT GUIDE

- salts and heavy metals in solution.

Air emissions

Air emissions from metal finishing activities can be volatile substances, referred to as Volatile Organic Compounds (VOC), which evaporate to atmosphere and contribute to overall air pollution. Some VOCs, can also be ozone depleting.

Air emissions can also contain very fine particulate matter which can cause health problems for people living near these activities, and which also deposit on surfaces to be subsequently washed to waterways.

Air emissions from the metal finishing industry include:

- acid and cyanide vapours
- ammonia
- overspray from aerosols
- process dusts and metallic particles

In densely urbanised areas these emissions place pressure on the air quality. It is therefore important that individual businesses attempt to reduce air emissions as much as possible so that the combined effects of industry as a whole do not push air pollution beyond tolerable thresholds.

Solids

- precipitated metal salts (principally hydroxide sludges);
- reject product;
- polishing residues;
- paint and powder coat residues; and
- packaging and general industrial wastes.

Of particular concern are highly toxic or cancer-causing materials. These include:

- Cyanide - from zinc, copper, brass, bronze and silver plating solutions.
- Chromium metal ions
- Cadmium salts
- Other metals - Nickel, Zinc, Tin, Silver, etc
- Concentrated Acids, and Alkalis

5. How do I Achieve Cleaner Production?

In adopting a Cleaner Production philosophy, try to consider how wastes were created rather than how they can be treated. Record keeping of raw material inputs and outputs, assisted by a monitoring program (perhaps regular audit checks) may help better manage raw materials, and help identify areas where improvements can be made.

Minor improvements in housekeeping and procedures may be all that is required to reduce unnecessary losses of raw materials from leaks and spills. In other cases more significant changes to the process, equipment or layout may be required to achieve improvements.

CLEANER PRODUCTION

SELF ASSESSMENT GUIDE

Considering the Cleaner Production hierarchy helps to focus on options to eliminate or reduce waste at source.

5.1 Eliminate

Elimination the need to use hazardous materials can greatly operating costs and reduce the potential environmental harm. For example, by substituting hazardous materials with less harmful alternatives and standardising the range of chemicals used.

5.2 Reduce

Where use of certain materials can not be eliminated, try to minimise their use. In metal finishing this can be achieved reduced by minimising chemical drag-out, optimising bath chemistry, using water restricting devices, and using manual cleaning techniques rather than chemical cleaning agents.

5.3 Reuse

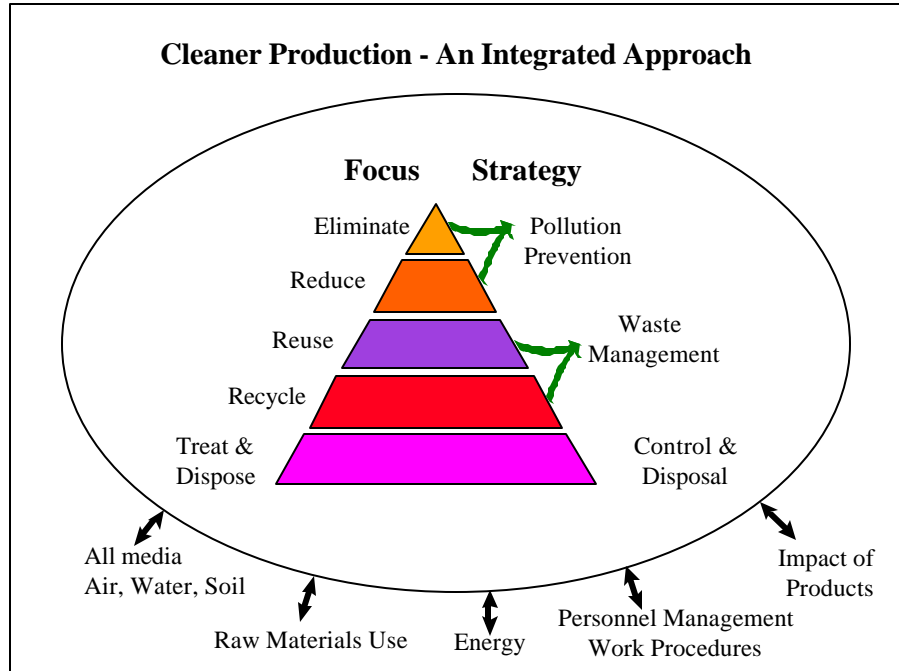
There are many opportunities to reuse 'waste products' in the metal finishing industry. This will reduce the demand for raw materials and the cost of treatment and disposal. Water from final rinses, for example, can be reused in earlier rinse baths and then added to the process bath to replace water lost from evaporation. This also returns chemicals that have been dragged-out to the process tank rather than losing them down the drain.

5.4 Recycle

Are the wastes identified by your assessment really 'wastes'? Can some of these be reclaimed through simple treatment processes that enable them to be reused on-site. Other by-products that cannot be used on site may be able to go off site for recycling. In these cases there may be the potential to sell recyclable items and also save indirectly by the avoiding disposal costs.

5.5 Treat and Dispose

This option should only be considered after the other options have been exhausted. Generally these options are typically a cost to industry. However it may be essential to consider this as a part of your overall Cleaner Production strategy.



CLEANER PRODUCTION

SELF ASSESSMENT GUIDE

6. Cleaner Production Assessment Checklists

The first step in developing a Cleaner Production program is to get a good picture of the resources used and the wastes that are generated in your organisation. This will help you to identify the areas that are costing you money and harming the environment and will help you assess the costs and benefits of implementing Cleaner Production options.

This Guide has been designed to help companies meet their requirements under the new Environment Protection Program (EPP) for Waste to develop and implement a Cleaner Production Plan. By undertaking the steps recommended by this Guide companies can help improve their bottom line and their environmental performance.

7. Sources of Information

You will already have access to most of the information you need to carry out your Cleaner Production analysis. This information will help you to calculate the quantity and full cost of your raw materials and wastes including materials, labour, maintenance, cleaning and utilities. Some of the major sources of information will include:

- process descriptions and specifications;
- equipment specifications;
- quality assurance procedures and records;
- purchasing, invoice and inventory records;
- production and scheduling records;
- trade waste agreement and council rates notices;
- cleaning contract records;
- flow meters;
- Materials Safety Data Sheets (MSDS);
- information from suppliers; and
- specific monitoring programs.

In many companies, these systems are designed to account for production and sales - not wastes. Therefore, it may take some work to get a good picture of waste. Are there opportunities to improve these systems to better account for resource use and wastage?

8. Contacts

If you would like any further assistance or information please contact one of the following people:

Name	Organisation	Telephone
Bob Pagan	UNEP Working Group for Cleaner Production	3365 1594
Ernst Bruynius	Queensland Cleaner Production Taskforce	3227 7381
Chris Burgess	CP Plating	3268 3044
Dr Bill Clark	The CRC for Waste Minimisation and Pollution Control, Ltd	3365 6464
Jack Cossart	Brisbane City Council	3879 1734

CLEANER PRODUCTION

S E L F A S S E S S M E N T G U I D E