ON-SITE TECHNICAL ASSISTANCE PROGRAM FOR MANUFACTURERS

» **Pollution Prevention Case Study**

Metal Finishing

COMPANY OVERVIEW

This case study shares the experience of an Ontario based metal finisher, and its participation in The Bloom Centre for Sustainability (BLOOM) On-site Technical Assistance Program for Manufacturers. The facility applies decorative and protective coating and film systems on steel, aluminum and stainless steel metal products. The two main process lines are paint and electro-galvanizing.

P2/TR/E2 ASSESSMENT PROCESS

The key participation driver for this metal finisher was Ontario's *Toxics Reduction Act, 2009* (TRA). Management recognized a valuable opportunity to meet TRA requirements and gain exceptional business value through a holistic analysis of their manufacturing processes. Through the BLOOM program, they retained a pollution prevention consultant, Enviro-Stewards, to complete an integrated pollution prevention, toxics reduction and energy efficiency (P2/TR/E2) assessment of their facility.

The assessment process involved an on-site training seminar for facility staff, in-plant studies, and an engineering assessment of alternatives. The detailed final report provided the facility with a clear road map outlining the findings and opportunities recommended for implementation.

SUMMARY OF FINDINGS

The toxics substances of concern at the facility are xylene, toluene and sulphuric acid, which are considered Phase I substances under the TRA and Regulation 455/09.

The paint line is cleaned periodically with cleaning chemicals containing the solvents xylene and toluene. During the cleaning procedure, xylene and toluene volatilize and are captured by the on-site ventilation system and diverted to the on-site incinerator for destruction. A portion of the used wash-up solvent is collected and disposed of off-site for recycling. The consultant recommended that the facility explore opportunities to minimize the consumption of wash-up solvent by improving operating practices, maintaining good housekeeping measures, and controlling processes. This would reduce total wash-up solvent consumed in the plant by 5% (3,350 kg/year, equivalent to $8,600/year). This would also incidentally reduce 0.7% of xylene (350 kg/yr) and 3% of toluene (480 kg/yr) contained in the wash-up solvent. The consultant also recommended that a recycler be installed on-site to recover and reuse the waste solvent, rather than shipping it off-site for recycling. This would achieve a 90% reduction of total wash-up solvent consumed in the plant (60,300 kg/year, equivalent to $154,000/year). This would also incidentally reduce 13% of xylene (6,250 kg/yr) and 56% of toluene (8,590 kg/yr) contained in the wash-up solvent.

On the electro-galvanizing line, reinstituting an acid purification system to treat waste sulphuric acid, a TRA and CEPA toxic substance, will recover 69 tonnes of sulphuric acid for reuse annually, and reduce the equivalent amount of hazardous waste (class 212C) that would require disposal. This also reduces approximately 90% of their sulphuric acid purchase quantity, saving $33,000 annually.

There were numerous recommendations provided by the consultant to reduce toxics, particulate, hazardous waste, process waste, water, energy consumption, greenhouse gases and costs, which are highlighted in the table on the following page.

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P2/TR/E2 Solutions, Environmental Results and Related Cost Savings

The table below summarizes select P2/TR/E2 projects being undertaken by the metal finisher from the list of recommendations outlined in the assessment report. When implementation is complete, the P2/TR/E2 measures are projected to reduce annually:

- **85 tonnes TRA toxics**
- **87 tonnes CEPA toxics**
- **16 tonnes VOCs**
- **0.1 tonnes fine particulate**
- **133 tonnes hazardous waste**
- **167 tonnes process waste**
- **23 kilotonnes water**
- **1,614,000 m³ natural gas**
- **809,000 kWh electricity**
- **2,400 tonnes GHGs**

Total quantified annual savings of **$730,000** and an overall payback of **7 months**.

PROCESS	P2/TR/E2 SOLUTIONS	ENVIRONMENTAL REDUCTIONS	COST SAVINGS & PAYBACK
PAINT LINE Targeted Pollutants/Waste: **Toxics (TRA/CEPA)** **VOCs** **Particulate** **Hazardous Wastes** **Water** **Natural Gas** **Electricity** **GHGs**	Install temperature control system in quench water supply line	3.6 kilotonnes/yr water 0.5 tonnes/yr GHGs	Annual savings: $5.6 K Capital cost: $6 K Payback: 1.1 years
	Install temperature controller in jacketed paint mixing tanks	840 tonnes/yr of water 0.1 tonnes/yr of GHGs	Annual savings: $1.3 K Capital cost: $2 K Payback: 1.5 years
	Install variable frequency drives of finish and prime oven fan motors	0.1 tonnes/yr fine particulate 1.8 tonnes/yr CEPA toxics (NO_x) 1,114,308 m3/yr natural gas 534,073 KWh/yr electricity 2252 tonnes/yr GHGs	Annual savings: $266 K Capital cost: $247 K Payback: 0.9 years
	Tie prime oven floater operation and final blow-off motor to production line speed	274,864 KWh/yr electricity 58 tonnes/yr GHGs	Annual Savings: $22 K Capital cost: $22 K Payback: 1 year
	Minimize wash-up solvent use and recycle wash-up solvent	16 tonnes/yr VOCs 16 tonnes/yr TRA/CEPA toxics (xylene and toluene) 64 tonnes/yr hazardous waste (class 212H)	Annual savings: $163 K Capital cost: $68 K Payback: 5 months
ELECTRO-GALVANIZING LINE Targeted Pollutants/Waste: **Toxics (TRA/CEPA)** **Hazardous Waste** **Water** **Natural Gas** **GHGs**	Flow restrictor in conductivity roll rinse water line; and flow restrictors and conductivity controls in rinse water line	18 kilotonnes/yr water 2 tonnes/year GHGs	Annual savings: $28 K Capital cost: $15 K Payback: 6 months
	Acid purification system (put back into operation)	69 tonnes/yr TRA/CEPA toxics (sulphuric acid) 69 tonnes/yr hazardous waste (class 212C)	Annual savings: $33 K Capital cost: 0 Payback: immediate
	Insulate spray cleaner cells	79 kilograms/yr CEPA toxics (NO_x) 49,417 m³/yr natural gas 95 tonnes/yr GHGs	Annual savings: $10 K Capital cost: $9 K Payback: 10 months
COMBINED PAINT AND ELECTRO-GALVANIZING LINES Targeted Pollutants/Waste: **Scrap metal process waste**	Use lean manufacturing techniques to minimize scrap metal	167 tonnes/yr process waste	Annual savings: $202 K Capital cost: $80 K Payback: 5 months

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