

An investment grade audit of a plant in Chesterfield, Michigan, shows how even small, relatively inexpensive process changes can start paying off in less than a year, and over the long term return many times their initial cost.

A 50,000-square-foot paint stripping facility in Chesterfield, Michigan, is a major supplier to the automotive industry, and its quality management system meets international standards (ISO 9000 certified). The plant performs two types of processes: paint stripping of metal parts, and chemical blending. Paint is removed thermally (by pyrolytic ovens), chemically, and physically (by blasting with zinc shot or water). Electricity and natural gas run these processes. Maintaining the temperature of the chemical baths and running the paint-stripping ovens are the primary energy uses in the plant, although energy is also used to heat the facility.

The following table summarizes the facility's energy, water, and chemical use.

Parameter	Annual Usage	Unit Rate	Annual Expenditure
Electricity	896,000 kWh	\$0.0976	\$ 87,400
Natural Gas	379,900 CCF	\$ 0.80	\$300,000
Water	1,985 kgal	\$ 3.97	\$ 7,700
Water Treatment	1,093 kgal	\$ 28.61	\$ 31,330
Chemicals	31,679 gal	variable	\$260,000 (approx.)
Waste	160 yd ³	\$ 550 per 20 yd ³	\$ 4,400

case study [Automotive Industry Supplier](#) Chesterfield, Michigan

Delta P2E2 Center engineers came up with twelve recommendations to help the company operate more efficiently. Of these, technical underwriting eliminated six projects as infeasible. A cost/benefit analysis of the remaining six looks like this.

Project	Implementation Cost	Annual Savings	Payback (years)
Filter rinse water	\$60,250	\$14,025	4.3
Upgrade lighting	\$21,300	\$ 2,790	7.6
Pyrolysis Oven - Warm Air and Tank Heating ¹	\$13,000	TBD	TBD
Subtotal	\$93,550	\$16,815	—
Eliminate air compressor leaks	\$ 1,500	\$ 3,470	0.4
Retrofit caustic tank	TBD based on use of existing equipment	\$ 6,400	<1
Perform berm maintenance	\$ 4,000	\$ 5,020	0.8

¹Does not include the cost of capital for materials or labor during implementation. Only encompasses costs for further analysis, design, and coordination.

Company managers are hesitant to implement the first three projects on grounds that the payback period is too long, and projected savings insufficient, to justify the cost. Projects 4-6, however, are extremely affordable. Each project will pay back the initial investment many times over during the next five years.

The first two projects promise the most significant environmental benefits, as shown below. The Delta P2E2 Center has offered to arrange a financing package to make these projects more affordable.

Project	Environmental Benefits
<p>Filter Rinse water Use a package filtration system to filter rinse water used to clean parts after the caustic treatment process.</p>	<p>Savings of 301,900 gallons of water used for rinsing parts. Represents approximately 15% of plant water use and 75% of the 400,000 gallons of rinse water used per year.</p> <p>Reduced raw material use in caustic treatment tanks: Butyl carbitol: 60 gal/yr Sodium gluconate: 11 gal/yr Potassium Hydroxide: 19 gal/yr Potassium Hydroxide: 19 gal/yr</p> <p>Reduced raw material use of wastewater treatment chemicals: Ferrous sulfate: 1,400 lbs/yr Alum chloride: 260 lbs/yr</p>
<p>Upgrade Lighting Replace 55 metal halide fixtures with 75 T-8 fluorescent fixtures.</p>	<p>Electricity savings: 28,512 kWhr/yr (3% of total facility electrical use)</p> <p>Potential emissions reductions: CO2- 28 tons NOX- 118 lbs. SO2- 255 lbs.</p>