

# ROSENBOOM MACHINE AND TOOL



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## COMPANY BACKGROUND

Rosenboom Machine & Tool, Inc. manufactures custom hydraulic cylinders for a variety of markets. The Sheldon, Iowa plant is home to the corporate headquarters and also includes a 200,000 square foot manufacturing plant. The company has added a 250,000-square-foot plant in Spirit Lake. These two plants operate 22 hours per day, six days per week. Raw material enters the plant and is turned, milled, welded, and assembled into cylinders. The cylinders are then pressure tested and painted per customer requirements.

## PROJECT BACKGROUND

The intern conducted an energy audit at the Spirit Lake and Sheldon manufacturing plants. An energy profile of the plants shows the amount of electricity and natural gas consumed per year and identifies areas of energy use. After identifying major energy consumers, the intern focused on identifying opportunities to improve efficiency of individual systems.

## INCENTIVES TO CHANGE

Rosenboom Machine & Tool teamed with the Pollution Prevention Intern Program to strengthen its environmental stewardship and to lower operating costs at its Spirit Lake and Sheldon facilities. Reducing energy use at the source is often overlooked, but is the most effective way to minimize waste.

## RESULTS

**Energy Audit:** An energy audit at each of the plants identified major consumers of electricity and natural gas. This information can be used to identify opportunities to increase efficiency and reduce utility bills. Areas of high consumption include plant lighting, compressed air, cooling and ventilation.

**Lighting Retrofit:** Almost 1,000 metal halide lamps illuminate the Spirit Lake manufacturing facility. These fixtures consume almost half of the total electricity supplied to the plant, at 2.9 million kilowatt-hours. Replacing the metal halide lamps with efficient light-emitting diode (LED) fixtures would significantly reduce electricity consumption and maintenance costs.

**Lighting Maintenance:** The Sheldon facility is currently lit by T8 fluorescent fixtures. When the facility replaced its high-



intensity discharge lamps with these fixtures, six times the number of lamps was required. An optimized maintenance plan could increase lighting levels by 20 percent while also reducing workload on the maintenance personnel who need to monitor all of the fixtures.

**Air Leak Detection:** Implementing a leak detection plan can keep air leaks under control in the most efficient way possible. An ultrasonic leak detector (ULD) can identify leaks quickly and accurately. A ULD amplifies the noise created by air rushing out of the high pressure air lines and provides a reading that can be used to estimate the size of the leak. Repairing leaks could reduce compressed air use by 44 percent at Spirit Lake and 30 percent at Sheldon. Purchasing a ULD would allow maintenance personnel to carry out an ongoing maintenance plan to keep the system operating efficiently.

**Heat Recovery:** Any heat that leaves the building envelope must be replaced by the natural gas-fired makeup air units. At the Sheldon facility, heat freely leaves the building through exhaust fans. A heat recovery ventilator (HRV) transfers heat

from the exhaust air to the intake air, and therefore reduces the load on the burners. Installing a HRV could reduce natural gas consumption in the Sheldon plant by 40 percent.

**Thermal Storage:** The chilled water system uses two 500-ton chillers to provide enough cooling capacity to keep the plant at a set temperature of 77°F. Running two chillers creates a large electricity demand, and utility companies charge extra for energy demand during peak daylight hours. Adding thermal energy storage (TES) would allow the chillers to run overnight to create ice, which can be melted during peak hours to reduce or eliminate the need to run the chillers. Installation of a TES could reduce the plant's peak energy demand by 22 percent in the summer months.

## CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN STANDARD TONS

Total for all sectors					
CO <sub>2</sub>	SO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CFC	PM-10
2,187.00	11.06	100.68	0.18	25.21	0.25



PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
LIGHTING RETROFIT	\$150,000	1.8 MILLION KWH	RECOMMENDED
LIGHTING MAINTENANCE	\$3,000	--	RECOMMENDED
AIR LEAK DETECTION	\$40,000	582,000 KWH	RECOMMENDED
HEAT RECOVERY	\$20,500	34,000 THERMS	RECOMMENDED
THERMAL STORAGE	\$30,000	360 KW PEAK REDUCTION	RECOMMENDED

