

MERCURY Marine Saves Energy by Improving Compressed Air Performance

CASE STUDY

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Mercury Marine, the world's leading manufacturer of marine propulsion located in Wisconsin, broke new ground with the installation of its innovative central compressed air system - perhaps the most energy efficient one in the country, if not the world. This is an example of how a company can achieve significant energy and dollar savings. Mercury Marine assessed and evaluated its current decentralized system and then carefully planned, installed and commissioned its new centralized system - cost-effectively.

The new system includes five 300 horsepower (hp) IR two-stage rotary compressors for base load, two 200 hp IR Nirvana VFD compressors for trim load and a 30,000 gallon storage tank. The system was installed in the summer of 2004 and is operating as expected.

The system eliminates 1,057 cubic feet per minute (CFM) in non-use air loss (leaks). Compressed air system performance rose from 3.5 CFM per kilowatt (kW) to its current average of 5.5 CFM per kW, a substantial gain in efficiency. The system saves 1,079 kW of demand and 9.2 million kilowatt-hours (kWh) of electricity annually. As a bonus, heat recovery from the new system lets Mercury Marine avoid 135,000 therms of natural gas for space heating each year.

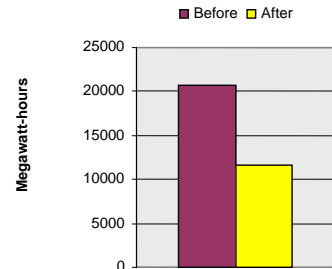
The controlled pressure adequately and reliably meets work-floor demand, permits hp supply to follow actual demand and no longer wastes energy for unused compressed air.



Left to right: Marc Dufour, President-Ingersoll-Rand Solutions (IR); LaMonte Wilder, Plant Engineering Manager-Mercury Marine; Robert Dorill, IR; Jerry Eaton, Plant Engineering-Facilities, Mercury Marine; Joe Fumo, IR; Brent Becker, IR; Bill Gerlach, IR.

PROJECT SUMMARY	
Project Cost	\$1,850,000
Energy Savings	\$541,000
Focus Incentive	\$60,000
Energy Payback	3.3 years
Total Payback	2.6 years

Electricity Savings



Note: The system also saves 135,000 therms per year.

THE OPPORTUNITY

Mercury Marine's system was similar to many other large industrial systems comprised of remote compressors serving various points in a fragmented distribution system. There was little or no control between compressors, insufficient system response and significant leakage. The leaks caused inadequate capacity during peak demand and pressure fluctuations. A routine audit identified numerous problems, including pressure fluctuations, slow system response, distribution leaks and not enough storage. Mercury Marine had no systematic way to identify and correct leaks and inappropriate uses.

THE SOLUTION:

The new system serves Mercury Marine's needs altogether and saves over \$540,000 in annual energy costs. Plant-wide, compressed air pressure is now controlled at +/-0.2 pounds per square inch (psi) of demand pressure.

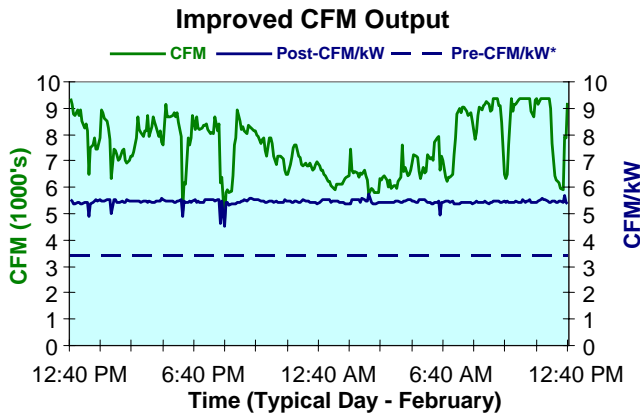
Mercury Marine, a division of Brunswick Corporation of Lake Forest, Illinois, leads the world in the manufacture of marine propulsion systems. Mercury Marine's operation includes energy intensive manufacturing and aluminum casting processes. Since 2000, Mercury Marine and Focus on Energy have partnered on many projects, lowering annual energy usage by almost 17 million kilowatt-hours and 135,000 therms - about \$925,000 in annual energy savings. Mercury Marine can save an additional 2.3 million kWh per year, through an aggressive plan to fix the remaining leaks, saving an estimated \$115,000.

PROJECT BENEFITS

According to Jerry Eaton, Mercury's Project Manager:
"We now have a central compressed air system that is less costly and that is truly reliable. Maintaining a set pressure of +/- 0.2 pounds per square inch throughout is important to us."

The new Compressed Air Central Plant reduces Mercury Marine's annual electricity usage by 9,193,080 kWh and cuts power demand by 1,079 kW. The graph below shows the load following characteristic of the new system. As demand for CFM changes, so does the power requirement.

Mercury Marine also installed heat recovery units on all seven new compressors. The recovered heat displaces 135,000 therms of natural gas that the company would otherwise have to purchase for space heating - enough gas to heat almost 150 Wisconsin homes.



* Calculated average CFM/kW before installation, from plant data.

The total expected annual savings for the new system are:

- Electricity - \$460,000
- Heat Recovery - \$81,000
- Water Savings - \$60,000
- Parts/Inventory - \$100,000

The total cost for the system was \$1,850,000. An estimated savings of \$700,000 per year, the total system payback is 2.6 years.

PROJECT TEAM

- Mercury Marine** - Project management
- Ingersoll-Rand** - Feasibility study, design and installation
- Focus on Energy** - Feasibility study grant, tech support, project grant
- Plant Air Technologies** - Feasibility study support
- Air's-a-Gas** - System commissioning
- Alliant Energy** - Shared savings financing



New Baseload Compressors

HOW CAN FOCUS ON ENERGY HELP YOU?

"I would encourage other companies interested in becoming more energy efficient to check into Focus on Energy's technical services, vendor ally referral and project grants."
 - Jerry Eaton

Focus on Energy provides specialized Best Practice support for Wisconsin industries, including project evaluation assistance, measurement and evaluation of savings, financial assistance for stalled projects, training opportunities, tools to manage energy and third party review.

The program has helped Wisconsin's businesses and residents cut their annual utility bills by almost \$86 million.

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