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Pretreatment chemical change reduces energy, water consumption and waste stream

The Member
JTEKT Automotive Tennessee-Vonore Co. has been in operation in Vonore, TN since 1989. The 375,000 sq. ft. facility employs 604 associates and is located on property adjoining Tellico Lake. JTEKT produces over 6,000 rack and pinion steering systems and 11,000 high-pressure hose assemblies per day for original equipment vehicle manufacturers. JTEKT is a member of the Tennessee Pollution Prevention Partnership at the Performer level. JTEKT is also a member of Monroe County Beautiful, Loudon County Beautiful, TRC, and SERDC. In addition, JTEKT is ISO 14001:2004 certified and has a very positive attitude toward environmental management and protecting the environment. JTEKT is committed to reducing and/or eliminating waste to landfills by investigating and categorizing all waste materials generated at the facility.

The Story – Pretreatment Chemical History
Pre-treatment for final (powder) coating of parts had many burdens for JTEKT. Since conception of the plant, an iron phosphate chemical was used for the process. In 2007, JTEKT increased the number of parts entering the powder coating operation by 250%. Based on a deep awareness that environmental conservation is one of its most important duties as a company, JTEKT sought an alternative process to reduce waste from the pre-treatment operation. An investigation into the waste burden was launched and the analysis revealed the following main (3) contributors: (1) The pre-treatment process relied on a high level of energy due to the large, temperature controlled baths; (2) the process required a constant water-overflow and frequent change-out of both the chemical and rinse baths due to sludge and soil build-up; and (3) the waste-water treatment process was time consuming and costly.

New Idea
Long-term chemical supplier and partner, Houghton International, assisted JTEKT with their quest to better the process by providing a pre-treatment alternative. There was extensive testing and evaluating before the decision was made to change the process. After careful review, beginning May 25, 2007, JTEKT Automotive started utilizing an alternative to iron phosphate called the Houghto-Prep ZP. An average temperature requirement near 130 degrees Fahrenheit was required with the iron phosphate system. With near ambient temperatures needed with the new pre-treatment process, JTEKT anticipated a substantial reduction in BTU requirement. The previous process averaged water use of about 1,100,000 gallons annually, while the new process allowed for a near closed loop system. With this in mind, JTEKT anticipated a massive reduction in pre-treatment water consumption. Additionally, the lower water requirement would alleviate the waste-water stream and much of the chemical needs.

The Success
The entire system now operates at ambient temperature. In addition, water consumption and its waste-stream burden have been alleviated by more than 90%. These reductions were made possible by the new pre-treatment chemical Houghto-Prep ZP, which is biodegradable and Volatile Organic Compound (VOC) free. Meanwhile, the new process is providing a superior coating on an increased production load.

Pollution Prevented
Based on more than 1,440,157 gallons of water consumed annually in 2006, (specific to the pre-treatment wash process), total water consumption has now been decreased to 98,436 average gallons annually or a 93% reduction. Annual BTU consumption has dropped by more than 70%. Waste-treatment chemicals have been reduced by 81%. In addition, land-fill dumps have been minimized as the new chemical contains no heavy metals and produces a minimal amount of sludge. The conversion to the Houghto-Prep ZP has saved JTEKT operating costs while providing a positive impact on the environment through the use of less energy, water and fewer chemicals. The total annual reduction in costs went from $248,000 to $78,000-a 70% reduction. All of this was achieved while improving the quality of the process and increasing the part load by 245%. In addition, CO2 emissions were tracked beginning in January 2007 and averaged 1,698 tons per month. From January – June of 2008, emissions had dropped to 1,000 tons per month, or a 42% reduction from 2008 levels.

Future Activities
Through monthly environmental audits and increased employee involvement, new ideas are being investigated and evaluated for feasibility. In addition, a new Ultrafiltration and Centrifuge system for coolant and oil recycling/recovery is currently being implemented. Opportunities for landfill reduction include grease bucket recycling, home recycling including employees and local schools initiatives.

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