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# Full Steam Ahead for GM

Save Energy Now Program Yields \$750k in Savings

by Howard W. Penrose, Ph.D., CMRP, Robert Varcoe, UAW,  
Rick Rosine, UAW & Robert Johnson, GM

**O**n December 12-15, 2005, the US Department of Energy (US DOE) worked with General Motors' World-Wide Facilities Group (WFG) and the United Auto Workers (UAW) on identifying key opportunities for steam conservation at the GM Flint Assembly plant. Even in this Steam-System Award-Winning facility, significant findings and continuous improvement opportunities totalling over \$750,000 in savings were discovered because of the combined efforts of the UAW/WFG Joint Task Teams, GM Energy and Utilities Services Group, Flint Assembly UAW Local #598 and Management and the US DOE.

The UAW/WFG Joint Task Teams were formed during the 1999 National Negotiations between GM and UAW-GM. The focus of the Joint Task Teams include: Construction and Building Maintenance, Tools, Truck Repair & Battery Operations and General Cleaning and Specialty Cleaning. The teams are made up of UAW and management representatives from WFG, who work jointly to develop best practices. The Construction and Building Maintenance team is tasked with construction and building maintenance best practices that are intended to improve the effectiveness of the UAW skilled trades workforce and address related maintenance costs.

In July, 2005, the Construction and Building Maintenance Joint Task Team shifted its focus from the development of construction best practices to maintenance best practices. In the last quarter of 2005, the Joint Task Team developed a series of best practices with information obtained from site visits, industry best practices and US DOE best practice software tools and materials. The US DOE tools identified so far include: MotorMaster Plus 4.0 Diagnostic Tool for electric motor systems; Airmaster Plus Diagnostic Tool for compressed air systems; Pumping System Assessment Tool for pumping systems; and, Steam System Assessment Tools for steam systems.

In November of 2005, the US DOE contacted the Construction & Building Maintenance Joint Task Team to offer an opportunity to have a UAW Represented GM facility selected as one of the first six of 200 sites to take part in a new Steam and Natural Gas initiative called 'Save Energy Now.' The UAW/GM Joint Leadership Council eagerly accepted the offer. The UAW/WFG team was tasked with coordinating the opportunity and the GM Energy and Utilities Services Group was tasked with selecting a site. The Flint Truck Assembly Plant was selected. The plant had previously been awarded the 2001 Chairman's Honors award for their development

of a Steam Team, which reduced steam usage by 21% and reduced water consumption by 20% between 1999 and 2000. The focus was Truck Assembly GMT-800 and GMT-560 Lines.

## US Department of Energy Best Practice Tools

The US Department of Energy's Industrial Technologies Program (ITP) maintains an industrial best practices website that contains materials and software developed in cooperation with industry. A number of these tools and best practices have been adopted as UAW/WFG Best Practices for application within all General Motors facilities. While these tools and best practices focus on energy applications, they also have a significant impact on reliability and maintenance improvements as well as the benefit of greenhouse gas emission reduction.

The Best Practice tools selected by the UAW/WFG, at the time of this article, included:

- **MotorMaster Plus:** An energy-efficient motor selection and management tool, MotorMaster Plus software includes a catalog of over 27,000 AC motors with complete information such as cost, efficiency, nameplate, current draw and other important reliability information. The tool includes such motor management features as inventory, maintenance log tracking, efficiency analysis, savings evaluation, energy accounting and environmental reporting capabilities. In 2000, an industry-funded modification to MotorMaster Plus allowed for the data entry of condition-based maintenance data and the search of motors by condition.
- **AirMaster Plus:** A comprehensive tool for assessing compressed air systems including modeling existing and future system upgrades. The tool allows for the ability to evaluate savings and effectiveness of compressed air strategies within a facility.

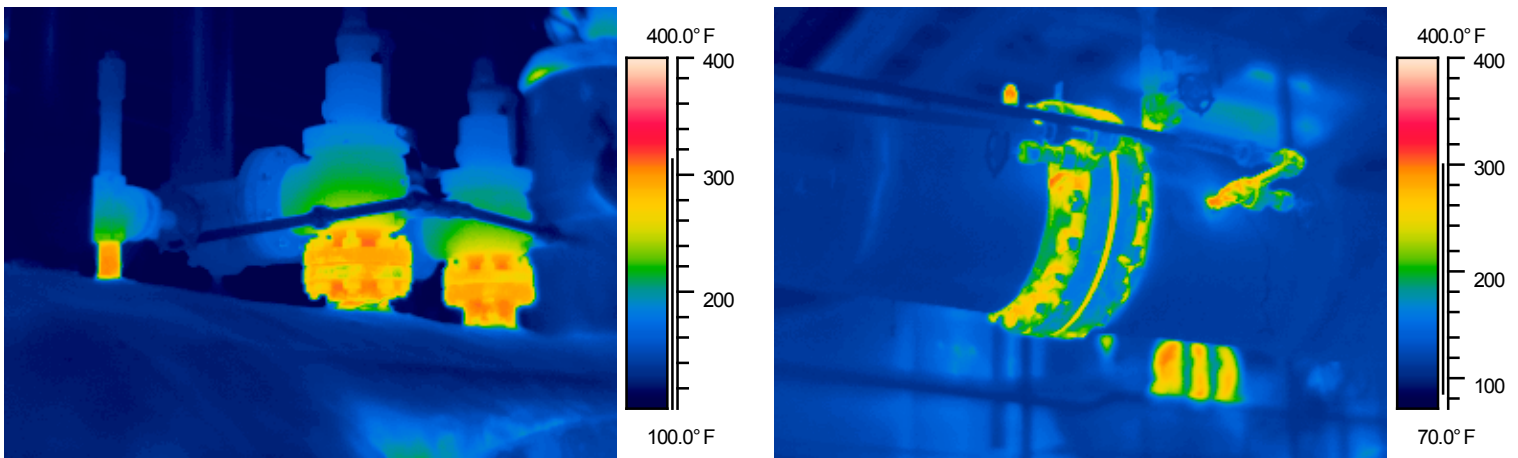


Fig 1 - Images of power house taken during steam system assessment at GM's Flint Truck Assembly Plant

- **Pumping System Assessment Tool (PSAT):** This tool assists industrial users in assessing the efficiency of existing and potential pumping systems. PSAT utilizes pump performance data from the Hydraulic Institute and Motor-Master Plus database information to calculate energy and associated cost savings.

- **Steam System Tool Suite:** This suite of software tools is designed to assist the steam system owner in improvements in both energy and reliability and includes:

- Steam System Scoping Tool:** Is designed to provide an initial self-assessment of a plant's steam system through a series of basic questions that are compared to a data base of industry-recognized best practices.

- Steam System Assessment Tool (SSAT):** This tool allows steam analysts to develop approximate models of real steam systems. Utilizing these models, the magnitude, energy, cost and emissions can be evaluated and options identified. It includes such features as steam demand savings projects; user-defined fuel models; boiler stack loss worksheet for fuels; a boiler flash steam recovery model; and steam trap models.

- 3E Plus:** This tool provides simple calculators for determining optimum insulation systems based upon user inputs and a database of insulation materials.

Additional information, as well as the tools and materials, can be downloaded from the US DOE ITP best practices website: <http://www1.eere.energy.gov/industry/bestpractices/>.

### The Save Energy Now Program

In November, 2005, a national campaign called 'Easy Ways to Save Energy' was unveiled by Dr. Samuel W Bodman, the US Secretary of Energy in order to identify ways that Americans could save energy in the aftermath of Hurricanes Katrina and Rita. One part of this program is the 'Save Energy Now' program, which is designed to provide process steam and heat surveys in approximately 200 energy-intensive industrial users. The focus is to identify immediate opportunities for energy and cost savings within USA industry that can be achieved within 2006.

US DOE provides support by sending trained steam experts to both train the facilities in the use of the tools and to perform, as part of a team, a steam and process heat applications assessment of up to three days. The US DOE has identified these types of systems as consuming nearly 80% of the natural gas energy used by industry. The first round of applications opened on November 8, 2005 and closed on January 20, 2006, combined with a selection of six initial sites for analysis in December, 2005.

"The US DOE reports that aggregate results of the first twelve energy savings assessments identified over \$51 Million per year in potential energy cost savings and potential reduction in natural gas consumption of more than 6 Trillion BTU per year," according to a US DOE spokesman, "That amount of natural gas is equivalent to the quantity consumed by more than 80,000 typical US homes."

### The Flint Assembly Plant Assessment

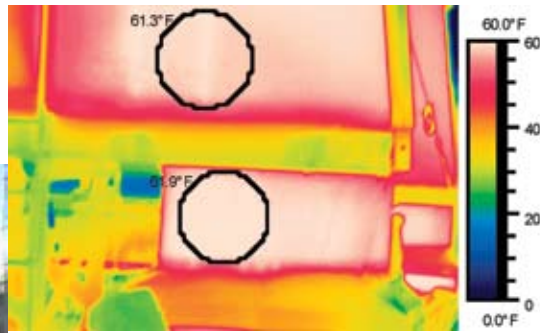
The steam assessment at the Flint Assembly Plant was performed from December 13 to 15, 2005, with training and support provided by the US DOE consultant, Riyaz Pappar, PE, CEM of Hudson Technologies, Texas.

On December 13, 2005, a kick-off meeting was held and a schedule was approved for the three-day assessment. The first day consisted of a review of the powerplant system including losses from the boilers. The second and third days involved a look at the steam use throughout the facility, where the team noted a temperature differential in different areas within the facility that were identified as opportunities. On the evening of December 14th, the team reviewed Air Supply Houses (ASH) located on the rooftop and there identified a number of unexpected opportunities that would require minimal to no investment.

The boiler assessment and plant survey required accurate surface temperature data for steam tool calculations. A Flir P65 infrared camera was used to scan and collect boiler insulation data on the first day. Normally used for evaluating rotating machines, conveyor bearings and robots, GM Quality Network Planned Maintenance (QNPM) personnel used the camera on two of the boilers in use at the time of the survey. For the remainder of the plant survey, a Raytek hand-held infrared thermometer was used for data collection of exposed steam piping and condensate return lines. The data was used within the US DOE SSAT tool to establish energy and payback op-



**Fig 2 - Air Supply on roof of Flint Truck Assembly Plant (Visual below, Infrared right)**



joint UAW and management team, they have shown immediate and significant impact on R&M, profitability and productivity where they have been implemented throughout the General Motors World-Wide Facilities Group.

For more information on this article, please contact Dr. Penrose at [info@motordoc.net](mailto:info@motordoc.net) or phone 860 575-3087.

opportunities through the application of pipe insulation systems.

On the afternoon of December 15, 2005, the close-out meeting was held. Initial recommendations identified savings of over \$750,000 within a six month period (winter) if followed. A very conservative \$500,000 of these savings was directly related to the air supply houses which yielded an immediate return. Additional findings were identified and presented, some of which represented continuous improvements from existing initiatives.

With the findings at this site, the UAW/WFG Joint Task Team are working with the GM Energy and Utilities Services Group to identify additional plants to perform similar surveys. The US DOE agreed that two additional GM sites would now be included in their program.

### Conclusion

The 'Save Energy Now' program initiated by the US DOE has the potential to have a significant impact on energy costs within energy-intensive industries. The benefits that can be identified within the 200 facilities, including the improvement of steam and process heating opportunities in world-class facilities, such as the GM Flint Assembly plant, should encourage other sites to adopt the best practices provided, at no cost or obligation, by the US DOE.

The UAW/WFG Joint Task Team has identified the opportunities for reliability, maintainability and incidental energy and environmental improvements through the application of the US DOE ITP best practice tools. While these tools make up a few of the many Best Practices adopted by the

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