ENERGY SOLUTIONS
NC STATE UNIVERSITY
MECHANICAL & AEROSPACE ENGINEERING

www.mae.ncsu.edu/energy

DanChem: Chemical Manufacturer Implements Steam System Measures

Benefits:

IAC Assessment enabled DanChem to experience:

* Efficiency gains and lower energy costs
* Reduce mechanical stress
* Address performance issues
* Payback returns within one month

Assessment Partners:

NCSU Industrial Assessment Center

Virginia's Philpott Manufacturing Extension (VPMEP)

Contact:

NCSU Energy Solutions
Kevin Martin, *MBA, PEM*
911 Oval Drive, Campus Box 7910 Raleigh, NC 27695-7910

E-mail:

kevin_martin@ncsu.edu

Summary

Through the Department of Energy's Industrial Assessment Center located at North Carolina State University, DanChem, a specialty polymers manufacturer, was able to improve its energy efficiency and reduce energy cost. Seven of twelve recommendations were implemented. In the future, several others will be addressed as production changes.

Company Background

DanChem is a custom manufacturer of polymer chemicals located in Danville, Virginia. Production is spread out over several buildings, with each area devoted to a specific type of product. Chemicals are produced in various types of reactors where precise input of raw materials, heating, cooling, and mixing are required. The finished product is put into barrels and other small containers and shipped to the customer.

Assessment Approach

A team of faculty and students from the North Carolina State University Industrial Assessment Center performed an Industrial Assessment in June of 2008. The assessment was performed in collaboration with Virginia's Philpott Manufacturing Extension Program (VPMEP) and with Mr. Kevin Martin of the City of Danville Utilities. The assessment was led by Center Director, Dr. Herbert M. Eckerlin and Assistant Director, Dr. Stephen D. Terry, both faculty members in the Department of Mechanical & Aerospace Engineering at NC State University. Two IAC graduate students and one undergraduate student participated in the assessment, collecting data, analyzing potential conservation measures, and preparing the report.

Energy Conservation Awareness

The assessment team noted a strong commitment to energy conservation from the plant engineering staff on-site. Plant personnel were already aware of many of the opportunities identified in the IAC report. The assessment provided an objective quantification of the potential energy savings. This helped DanChem get the necessary funding to proceed.

Boiler and Steam System Measures

One team focused on the boiler and steam system. During the assessment, it was noted that the deaerator was malfunctioning and hot condensate was not being returned to the boiler. Boiler stack efficiency was also measured by the team. The assessment team recommended (i) repair of the deaerator, (ii) a boiler burner tune-up, and (iii) installation of a feedwater economizer, all of which were implemented. The team also recommended that the facility switch between the two large boilers on a quarterly basis, rather than weekly, to reduce thermal stresses.

Compressed Air, Lighting, and Motor Systems

The second team focused on the remaining plant systems, including compressed air, lighting, and motors. The team recommended several measures on the compressed air system, including recovery of compressor waste heat, reduction of system pressure, and repairing compressed air leaks. Due to the specialty nature of the process, the plant is not able to reduce pressure and is instead considering heat recovery from the process equipment first.

The team also recommended replacement T8 lights with electronic ballasts. The company is working with a consultant to change the lights during the summer of 2009. The plant is now evaluating the cost savings associated with installation of high efficiency motors rather than rewinding them. The IAC report provided guidelines for personnel to follow when a motor fails and needs rewinding.

Assessment Team Recommendations:

-repair of the deaerator
-a boiler burner tune-up
-installation of a feedwater economizer

ENERGY SOLUTIONS
NC STATE UNIVERSITY
MECHANICAL & AEROSPACE ENGINEERING

www.mae.ncsu.edu/energy

Implemented Measures at DanChem

Recommended Measure	Resource Savings	Cost Savings, $/yr.	Implementation Cost	Payback, months
Tune boiler burner	1,128 MMBTU	$16,582	$1,000	1
Install economizer	2,895 MMBTU	$42,557	$50,000	15
Repair deaerator	310 MMBTU	$4,551	$200	1
Switch boilers quarterly	1,257 MMBTU	$18,474	$0	0
Install high efficiency motors	537,248 kWh	$31,199	$46,355	18
Repair comp air leaks	43,443 kWh	$1,623	$100.00	1
Install T8 lighting	68,363 kWh	$3,375	$5,241	19

The facility has received the Danville Utilities E^2 Award, highlighting local industries who have implemented significant energy projects as a result of the IAC assessment.