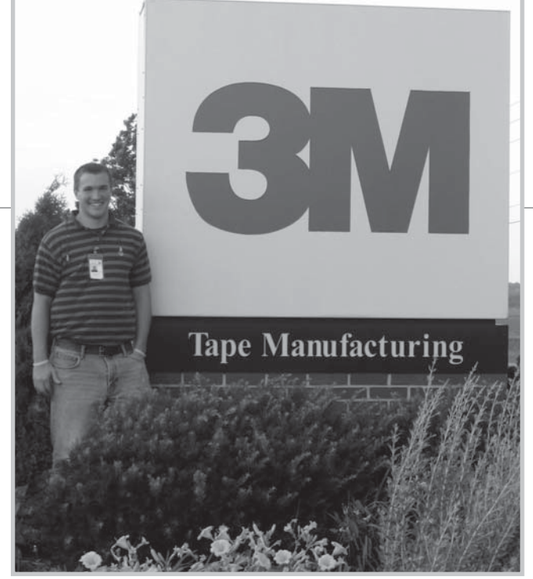
3M KNOXVILLE

COMPANY BACKGROUND

The 3M plant in Knoxville, Iowa specializes in creating pressure sensitive tapes and adhesives.The majority of these tapes and adhesives are developed on a custom basis to meet the demands of the individual customer. The applications of these tapes range across many industries, from attaching parts in the automotive industry, to tape for use in diapers, to the fasteners used to hold up the mirrors in the walkways of Chicago O'Hare Airport.

KNOXVILLE



HEATH VIGNES
MECHANICAL ENGINEERING
UNIVERSITY OF IOWA

PROJECT BACKGROUND

The project at 3M Knoxville consisted of recapturing heat from their regenerative thermal oxidizer with a waste heat boiler. The process would then provide the plant with "free" steam during the summer months and supplemental steam for their boiler during the winter months, when the plant requires more steam for its heating and processes.

INCENTIVES TO CHANGE

3M Knoxville undertook the opportunity to partner with the IDNR Pollution Prevention Intern Program based on the desire to cut costs at their plant. The reduction of pollutants was an added bonus since they were already well under their allowed permits for pollution. The need to cut energy costs was their main motivation with the rising prices of natural gas and oil. 3M Knoxville is currently experiencing the highest prices they have ever paid for natural gas and the prices are only expected to increase with the onset of winter.

RESULTS

Waste Heat Boiler: 3M Knoxville's regenerative thermal oxidizer produces exhaust air of 850°F to 1500°F to the atmosphere. The goal was to determine the most efficient method to recapture this heat and put it to a constructive use for the company. It was determined that the best option for effectively recovering this heat was to install a waste heat boiler to the hot air by-pass that comes off of the regenerative thermal oxidizer.

The regenerative thermal oxidizer does not consistently produce enough hot air that the hot air by-pass is continuously in use. Initially it was thought that it might be cost-effective to simply over-fire the burners in the regenerative thermal oxidizer to maintain a consistent flow of hot air to the waste heat boiler. This, however, was determined to be infeasible since it would cost the plant a substantial sum of money and natural gas to produce steam in this manner.

Because this option was not practical, the final recommendation was to install a 25,000-pound waste heat boiler with its own fuel line. This would allow for fluctuations in the amount of hot air bypass. The installation of a waste heat boiler would allow the plant to turn off both of its 60,000-pound boilers during the summer months and supplement the 60,000-pound boilers in the winter enough so that only one would need to be turned on.

It was also determined that the efficiency of the regenerative thermal oxidizer should be increased from 90 percent to 95 percent to gain even more energy from the waste heat. To do this, an additional 18 inches of ceramic media should be added to the regenerative thermal oxidizer, which should increase the efficiency to 95 percent.

Air Pollutants Diverted in Tons

	Total for all sectors
SO2	0.818
CO	1.51
NOX	0.875
VOC	1.86
PM	0.081

Green House Gases Diverted in Tons (CO2 Equivalent)

	Total for all sectors
CO2	2519
CH4	482
N2O	1.22
CFCS	3.67

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
WASTE HEAT BOILER	$317,172.91	264,310 THERMS	RECOMMENDED