SCA Tissue North America Public Report (ESA-042)

1. Introduction:

   This plant processes approximately 400,000 tons/year of wastepaper to produce about 240,000 tons/year of tissue, toweling and napkin paper on bulk rolls. Mechanical and chemical processes reduce the waste paper to a slurry in which de-inking and brightening are achieved. Tissue paper is then formed on four paper machines. Saturated steam produced at 240F in three boilers used for heating a variety of process aqueous streams and for drying the produced tissue paper.. About 30% of plant consumption of natural gas is use in direct-fired air heaters used in the paper drying process. The steam system does not utilize any steam turbines and no electricity is produced on-site.

2. Objective of ESA:

   The objective of this ESA was twofold:
   a) To train company/plant personnel in the use of the DOE Steam Tool software.
   b) To perform a "training assessment" of plant equipment and processes leading to the recommendation of measures for achieving substantial plant energy savings.

3. Focus for Assessment:

   The ESA focused on plant steam production and plant-wide use with an emphasis on the reduction in the use of natural gas boiler fuel.

4. Approach for ESA:

   The ESA Expert worked directly and continuously on-site with the Plant Lead (Hughson) and six representatives of sister plants at other company locations. The Expert guided group discussions of plant processes using steam, practices at other company plants and the use of SSAT for simulating steam system performance and for evaluating the savings associated with energy use reduction measures. The facility steam system manager and other process operators supplied technical data and information needed to analyze over 20 prospective energy use reduction actions. A plant inspection provided the opportunity to observe process operations and to acquire information needed for SSAT simulations. SSAT was used by the Expert and three groups of participants to evaluate the proposed projects to arrive at a final list of recommendations.

5. General Observations of Potential Opportunities:

   a) Purchased energy annual consumption and cost:

      <u>Natural gas</u>
      Consumption (2005): 1,704,861 x 10^6 BTU/yr.
      Cost: $13,490,768 ($7.91/10^6 BTU)

      <u>Electricity</u>
      Consumption (2005): 299,698,452 kWh/yr.
      Cost: $14,100,644 ($0.047/kWh)

b) SSST Results:

Steam system profiling: 90/90 pts. = 100% (DOE database plants: 59%)
Steam system operating practices: 114/140 pts. = 81% (DOE database plants: 74%)
Boiler plant operating practices: 78/80 pts. = 98% (DOE database plants: 62%)
Distribution, end use, recovery, operating practices: 22/30 pts. = 73% (DOE database plants: 54%)
Overall score: 208/340 pts. = 89% (DOE database plants: 66%)

6. Energy Saving Opportunities:

1. Install condensing economizer on boilers to heat process water

All three utilized boilers were originally constructed to include economizers used to preheat feedwater. Stack gas exits the economizers at approximately 350F resulting in both a latent and substantial sensible heat loss to atmosphere. Meanwhile, there are two main plant process make-up water supply lines (passing through the boiler room) carrying cool water to downstream processes requiring steam heating. With the installation of a condensing economizer at the single stack serving all boilers, a large fraction of the thermal energy presently vented can be recovered. The plant has recently received a proposal for the installation of a condensing economizer which would be a good reference source for further investigating this measure. (**Medium-term opportunity;** potential gas saving: 5%)

2. Use hood (Air Cap) waste heat to heat paper machine water

A gas-fired burner system heats air to about 800F to effect drying of product passing over large rollers (Yankee dryers). Air carrying away water vapor is passed through an air-to-air heat exchanger and a glycol system for two stages of heat recovery. Plant personnel reported that the current exit temperature of air passing to atmosphere is about 250F. The installation of a tertiary heat exchanger would provide substantial energy for heating of process water. (**Medium-term opportunity**; potential gas savings: 3%)

3. Allocate steam costs to operating units:

Currently there is a policy in place to allocate metered electricity use and natural gas used in the Yankee dryer systems to the separate operating units in the plant. However, the cost of steam production is charged to a separate account not reflected in the financial summaries of the various operating units. Company personnel participating in the ESA all felt that there would be immediate attention given to currently wasteful practices if the penalty for such were made to appear in the financial accounting of each operating unit. It was felt that steam use would be reduced at least in a moderate amount if the recommended practice were implemented. Savings would result from a minimization of over-heating of process streams and the loss of heated streams. (**Near-term opportunity**; potential gas savings: 0.6%)

4. Recover vented low-pressure condensate:

On one of the Paper Machine's, a substantial (15 -20 gpm) condensate stream was observed (during the plant inspection) to be vented to the floor drain. It is recommended that piping be installed to return this low-pressure condensate to the boiler to achieve a modest energy saving.

(**Near-term opportunity**; potential gas savings: 0.4%)

5. Implement a steam trap maintenance program

   Reportedly, the last comprehensive survey of plant steam traps was completed about five years ago. Based on industrial data imbedded in SSAT, a substantial energy saving (due mainly to the elimination of steam leaks) would result from the institution of a high quality steam trap maintenance program. It is recommended that an experienced outside vendor be employed to set-up a steam trap maintenance program and to test and repair system traps. (**Near-term opportunity**; potential gas savings: 0.3%)

6. Install humidity sensor to reduce gas use in hood drying system

   Currently, the control of air heating in the Yankee drying system is effected by process operators and is not based on a measurement of humidity levels in the drying hood. The installation of a humidity sensor and burner and air-flow control system would minimize burner natural gas use. The plant has obtained literature on a suitable sensing system. The fact that such humidity sensing is being done in a company plant in Germany gives evidence for the technical feasibility of this recommendation. (**Process Heating Measure; Medium-term opportunity;** potential gas savings: 0.3%)

   Summary of potential gas savings:
   Near-term measures: 13,939 x 10^6 Btu/yr.
   Medium-term measures: 147,292 x 10^6 Btu/yr.
   Long-term measures: 0%

7. Management Support and Comments:

   The Engineering Manager and several visiting company representatives from other company plant sites met with the ESA Expert continuously during the assessment. Additionally, several plant process operators participated in discussions sessions to clarify plant procedures and to supply data needed for project analysis. The group worked as a team to arrive at a list of proposed energy-saving projects which were analyzed using the DOE SSAT software. Plant management personnel were highly supportive of the ESA and rated the value of the assessment as substantially useful in guiding energy conservation and associated cost reduction actions.

8. DOE Contact at plant/company

   Plant: Thomas M. Hughson, Electrical Engineer and Plant Energy Manager: Plant address: 190 3rd Street, Menasha, WI 54956; Mailing address: P.O. Box 2400 Neenah, WI; (920)727-2911; tom.hughson@sca.com

   Company (SCA Tissue North America): Michael J. Dillon, Manager, Environmental & Risk Management, 1451 McMahon Drive, Neenah, WI 54957-2400; (920)720-4585; michael.dillon@sca.com