C&A Floorcoverings' Strategic Approach to Energy Management

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ABSTRACT

C&A Floorcoverings has long had a business strategy of environmental stewardship. So when its management heard of the new ANSI national standard for the management of energy, it was a natural extension of both corporate environmental policy and the desire to plan and sustain the savings from energy projects.

ANSI/MSE 2000: A Management System for Energy, is a management standard that provides both the support and the flexibility needed to institute and sustain an energy management system that aligns management energy policy, energy goals, targets, and projects with business objectives. A dialogue between a developer of the standard and an implementer of the standard in an industrial facility highlights the successes and difficulties encountered along the way.

MSE 2000 was developed and written by expert staff from the Georgia Tech EDI Energy and Environmental Management Center (EEMC) to address common problems seen over its 25-year history. As a member of the EEMC Advisory Board, C&A Floorcoverings was exposed to MSE 2000 while it was still in a draft format. Because this approach fit in so well with its overall business objectives, management supported implementation of the standard in the plant. Resulting

changes to energy efficiency and conservation efforts are highlighted, including the development of documentation and follow-up of project results.

Implementation has been slow, due to the difficulties in focusing tight resources on the implementation, but management has actively participated in the development of a formal energy policy and approved energy goals and targets. This involvement guarantees that management objectives will drive the energy management system. Regular management reviews of results are held to ensure that this alignment continues. The result has been sustainable savings in energy consumption and costs, as well as continued improvement in energy operations. Because of the alignment with management objectives, the system has other benefits as well, such as a measurable decrease in environmental impacts and the active encouragement of sustainable energy sources.

INITIAL FOCUS

Energy management has long been considered a technical problem, approached with capital projects to incorporate new technology. Plant engineers and/or maintenance personnel generally propose a project and upper management participates only in approval or disapproval of the particular project. Usually, there is no direct connection between the business objectives of the company and any specific project.

Collins & Aikman (C&A) Floorcoverings decided to further its company commitment to energy and environmental goals by implementing ANSI/MSE 2000, a management system for energy. Estimates showed that significant savings on energy consumption and a subsequent reduction in associated emissions were probable. This directly supported the business goals of reducing energy costs and consumption and reducing environmental impact. Because of the company's emphasis on environmental stewardship, the environmental impact of the system was the primary selling point to management.

Implementation Team

C&A Floorcoverings teamed with the Georgia Tech EDI Energy and Environmental Management Center (EEMC), which provided courses and coaching on MSE 2000 implementation.

C&A Floorcoverings is a major carpet and flooring manufacturer, with five plants in the Dalton, Georgia, area. This industrial sector is energy intensive, as shown in Table 1. While the company had long been active in energy conservation efforts, they found that the savings tended to disappear over time as operations occasionally reverted to previous behavior and conditions. Based on an annual energy bill of $1.7 million and NO_x emissions of 10.6 tons, company management felt that MSE 2000 could identify and, more importantly, sustain substantial savings.

Because resources were not available to implement ANSI/MSE

Table 1. Operations are Energy Intensive

	ELECTRIC	
PLANT	*CONSUMPTION*	*COST*
Yarn & Dye	5,280,000 kWh	$199,000
Tufting	3,044,000 kWh	$116,600
Finishing	8,829,000 kWh	$352,000
Service Center (Dist)	1,968,000 kWh	$108,000
Env. Center (Recyc)	1,955,000 kWh	$88,300
TOTAL	21,075,000 kWh	$863,900

	NATURAL GAS	
PLANT	*CONSUMPTION*	*COST*
Yarn & Dye	8,784 mcf	$71,400
Tufting	4,748 mcf	$33,200
Finishing	109,489 mcf	$609,100
Service Center (Dist)	4,043 mcf	$27,000
Env. Center (Recyc)	12,778 mcf	$83,800
TOTAL	139,842 mcf	$824,500

2000 in all five plants at once, C&A Floorcoverings decided to focus on the two largest plants. The yarn & dye plant is 162,000 square feet, and finishing is 250,000 square feet. Both include a variety of highly energy-intensive equipment.

The Georgia Tech Energy and Environmental Management Center, part of the Economic Development Institute, has been providing energy expertise to industry for over 25 years. EEMC has conducted energy assessments and technical assistance for over 2500 manufacturing and institutional facilities. Over the years, EEMC has seen average results of a minimum of 15 percent initial savings on energy costs and consumption. However, staff members have been frustrated that the savings tend to be lost within a few years as the energy picture reverts to its previous levels.

EEMC saw the need for a method to permanently sustain the savings. In addition, staff members wanted to assist companies with continual improvement of their energy profiles. Based on the proven record of management standards in the quality and environmental arenas, staff developed MSE 2000: A Management System for Energy.

What is ANSI/MSE 2000?

ANSI/MSE 2000 is an American national standard encompassing a total approach to energy management. It covers both technical and management aspects of a system to manage and control the purchase, storage, use, and disposal of energy and water utilities. The standard provides structure for the system, but allows the flexibility to develop an appropriate and relevant approach.

As Figure 1 illustrates, a major advantage of the system is that it aligns energy management projects with company goals and objectives.

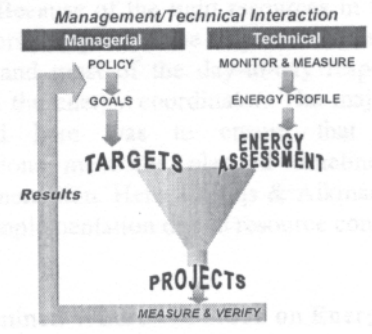

Figure 1. MSE 2000 Provides Full Integration between the Management and Technical Aspects of the System.

This ensures that the projects undertaken are carefully selected to help fulfill business objectives and provide maximum direct and indirect benefits. The result is a system that engenders full management support and sustainability of project savings.

RATIONALE FOR IMPLEMENTING ANSI/MSE 2000

As a result of his participation in the EEMC Advisory Board, Kent Benson was aware of the benefits of implementing MSE 2000. He recognized that the system resulting from implementation of the standard would directly support C&A Floorcoverings' commitment to energy and environmental stewardship. This commitment is reflected in specific business objectives, highlighted in Table 2.

Table 2. C&A Floor Coverings is Committed to Specific energy and Environmental Objectives

Produce a high quality product using as few virgin raw materials as possible, including energy.
Produce as few disposable by-products as possible, including direct and indirect emissions from energy usage.
Lower production costs by using less energy.

The importance of these business objectives to the company served as a pre-commitment from upper management. That alone virtually guaranteed the success of the implementation. In addition, management decided to formally register to the ANSI/MSE 2000 standard, so that its use and results could be used as a marketing tool to emphasize C&A's position on energy and environmental issues.

Because resources within the two plants were tight, C&A and EEMC developed a scope and timeframe for the project that reflected these business realities. Collins & Aikman Floorcoverings has completed the system implementation and will become the first company formally registered to ANSI/MSE 2000 in December of 2003.

HOW WE GOT STARTED

Working with personnel from the Energy and Environmental Management Center of Georgia Tech's Economic Development Institute, C&A Floorcoverings personnel determined the first steps to take. Throughout the implementation project, EEMC provided courses and coaching designed to assist in a smooth and successful implementation.

Gained Commitment

The first requirement for getting started on the implementation was to gain broad support for the project, especially from upper management. This required educating upper management on the elements and benefits of the standard and tailoring this information to emphasize its support of corporate environmental and cost savings goals. Support for the project was top-down, which encouraged support from managers and supervisors within the plants. We also developed broad support by tailoring the message to address issues and concerns of various stakeholder groups.

Selected the Energy Coordinator

As required by the standard, upper management appointed an energy coordinator, Kent Benson, and determined that he would also lead the implementation effort. It was important that the energy coordinator be in-house and familiar enough with plant operations to work well with the MSE team. He also had to meet the other requirements of the standard for the energy coordinator, including having the necessary skills and training and holding the responsibility and authority to function within the system.

Selected the MSE Team

The first approach to assembling the MSE team was to use an already existing group, but maintenance people on that team had no additional time for the implementation project. The reasons for the MSE 2000 requirements of a broad-based team and necessary resource support (including time) became clear. By June 2001, a team of 10 people from upper management, engineering, maintenance, purchasing, and technical services were appointed as the MSE team. Because of the tight resources in the plant, members worked on the implementation as they could and most of the day-to-day responsibility fell on the energy coor-

dinator. The major lesson learned here was to ensure that resource allocations meet the planned timeline of the implementation. Here, Collins & Aikman chose a slow implementation due to resource constraints.

Determined Where We Stood on Energy

At the beginning, the requirement to develop an energy profile of the facility was seen as a huge engineering project. It quickly became clear that the energy balance and energy profile were much easier than expected. Software provided by Georgia Tech EDI made developing a database of energy information simple. The program automatically prepares charts and graphs related to the data for trend analysis and informational uses. The energy balance used available information on energy consumption and the expertise of operators and maintenance personnel to fill in the holes. Details of the energy balance were then used to develop a list of significant energy users in the plant. At first, we tended to include far too much in the significant users list. Later we pared it down to a workable list consistent with Pareto's 80/20 rule. (Twenty percent of the equipment will account for 80 percent of the energy used.) The lesson learned here was to choose significant equipment wisely, as this list was used later to help select potential energy management projects. To ensure meaningful communication, the team selected appropriate energy indicators to assist in evaluating progress.

Developed Initial System Purpose and Metrics

As required by the standard, upper management participated in developing an energy policy. This policy serves as the reflection of management concerns and objectives in this area.

Once upper management had approved the energy policy, the MSE team began developing initial energy goals. These goals, listed below, served to align energy management projects with management and business objectives. Implicit in the energy reduction goals are a reduction in associated emissions.

- To reduce the consumption of electricity per unit of product on an annual basis at each plant.

- To reduce the consumption of natural gas per unit of product on an annual basis at each plant.

- To reduce the consumption of water per unit of product on an annual basis at each plant.

Based on the elements of the energy policy, the significant energy users list and knowledge of plant operations, specific targets (equipment or energy systems) were developed. Reductions in cost per unit of product and emissions per unit of product served as the metric used to determine if the energy goal was reached. Once goals and targets were established, monitoring and measurement, the energy profile, and the energy assessment all provided data on the current status of the system and potential opportunities. A structured process was used to analyze potential opportunities and select those best matched with the targets and showing the best combination of benefits and costs. Part of the process is to evaluate the results of each project. These results are fed back into the system and result in an update of current goals or spur the development of new goals.

HOW WE DEVELOPED THE SYSTEM

With the basic components of the management system for energy in place, we began developing the system and program documentation.

Wrote Energy Manual

Using the guide provided, the energy coordinator developed policies appropriate to each element of the standard and wrote the Collins & Aikman Floorcoverings' energy manual. While the energy coordinator wrote the first draft of the manual, all the MSE team members participated in reviewing it and giving feedback on the ramifications of the policies and any changes needed. The energy manual serves as the guiding document for the entire energy management system for all five plants. The body of the manual is only nine pages, allowing flexibility for operational differences within the plants.

Developed Procedures and Work Instructions

To tailor the system to the particular facility, we formalized or developed written procedures for those operations affecting energy cost, consumption, or disposal (including emissions and waste streams). Initially, this was intimidating, as we felt we would have to write proce-

dures for the entire plant. Later, we pared the number of procedures down by concentrating on significant energy users and those processes necessary for operations. In a number of cases, we had sample procedures as guides or other documents (such as the MSE Procedures Guide) to assist us. For clarity, we formatted each procedure to include information needed for document control and revision. Work instructions were prepared only when necessary, such as in an area with significant worker turnover. The total of all procedures and work instructions for the largest plant stand less than one inch. In addition, many of the system procedures are applicable to all five plants and do not have to be redeveloped.

Implemented Procedures and Programs

As we selected the methods to address each element of the standard and developed the procedures and work instructions, we implemented each program in turn. Because we were anxious to move into the core of the system, energy management projects, we first developed the procedure for completing an energy assessment. EEMC had already provided the *Energy Assessment Workbook*, which guided an experienced staff member through the process of identifying potential opportunities for savings.

Next, we used the structured system presented by EEMC to develop our program for energy management projects. This approach ensured that energy projects would address business objectives and goals of the company and that any changes made as a result of a project are incorporated into system documentation and training.

The corrective and preventive action system provided a method to track and effectively solve any problems with either operations or the management system for energy itself. In an atmosphere of continual improvement, staff members report problems on a form, which is then used to identify the approach to be taken to solve the problem and check for the effectiveness of the solution once it has been implemented. It also identifies whether any changes are needed in MSE documentation.

The training system pertains only to personnel who significantly affect energy purchasing, storage, usage, or disposal. Thus, the system is not unwieldy. It includes a training needs analysis and documentation that the training was completed. Training can range from OJT to training sessions part of a larger meeting to formal education. Because so many of our employees are veterans and already well-trained, we found rela-

tively few instances where training needs assessments were extensive. But the thought put into the needs assessment also can feed directly into job descriptions and new-hire qualifications.

Once a year, we hold a formal management review meeting. This meeting includes upper management and keeps them appraised of progress towards goals through energy management projects. It also affords an opportunity for them to examine results from internal audits of the system and corrective and preventive actions.

The internal audit system concerns the management system for energy itself, rather than operational questions. Six internal auditors examine the system on a scheduled basis throughout the year to verify continued conformance to the standard, check implementation, determine effectiveness of the system in meeting business objectives, and identify opportunities for improvement. Our audit schedule calls for a half-day audit of particular elements of the system four times a year. Findings from the audits are presented in the management review meeting and are addressed through the corrective action system.

TRANSFORMED THE WAY WE LOOK AT PROJECTS

From stand-alone projects developed by single individuals, we have developed an approach that ensures that energy management projects are:

- Aligned with management policies and goals;
- Appropriate to the plant and the problem;
- Effective in solving the problem or making the improvement;
- Reflected in permanent changes to operational policies and procedures;
- Considered in revised goals and targets.

Energy management projects address both opportunities and problems. Opportunities usually arise during the energy assessment or from an analysis of the appropriateness of a new technology. Problems surface through the corrective and preventive action system. In each case, the process ensures that only the most beneficial projects are selected for implementation.

In the past, too many times we would complete a project to find

that we did not have the baseline or operational data to judge whether the project was successful. The MSE system ensures we track and evaluate each energy management project. To complete this evaluation, it is crucial that appropriate metrics be selected early in the planning stage. Regular monitoring and measurement provide much of the data needed for the evaluation. In each case, the energy coordinator verifies the effectiveness of the project after implementation and the resulting operational changes.

The MSE also ensures that we feed back any operational or policy changes into the documentation. The document control system is electronic, so the most current procedures and work instructions are always available. By referring to the training needs assessments, we know exactly which operators are affected by the change and can immediately schedule them for appropriate training.

Results are disseminated to all stakeholders, but are always meaningful to individuals. This means upper management concentrates on the overall effect on the energy indicators, technical personnel get more detail on specific projects that concern their areas, and operational personnel see the energy and environmental results and get information on any operational changes from the project. We communicate results against the baseline energy profile through posters throughout the plants.

Through the structure of the MSE, we ensure that all energy management projects directly address the business objectives of the company. Business objectives, energy policy, energy goals, targets, and projects are consistently aligned. Regular management review meetings provide maximum visibility of results for management, and the communication plan ensures that meaningful information is provided for personnel throughout the company.

SUMMARY AND CONCLUSION

C&A Floorcoverings successfully implemented a flexible tool for the management of energy, ANSI/MSE 2000. The system clearly provides consistent, relevant, sustainable results from the energy management projects we select.

For example, since ovens are significant energy users within the carpet industry, our first projects concentrated on developing energy

management projects for these targets. First, we selected a project to reduce the burner chamber temperature on the regenerative thermal oxidizer at the Environmental Center, our recycling facility. It had been running at 1525°F. We determined that we could reduce the temperature to 1200°F with no increase in VOC emissions or visible opacity. Reprogramming costs were just under $10,000, but we saved $9,500 and 1600 mcf of natural gas per year. While the simple payback is one year, we feel confident that the savings will be sustained over the coming years, as the operational changes have been incorporated into operations.

Next, we examined the curing ovens in the precoat range at the finishing plant, which was operating at 325°F. We experimented with lower temperatures and settled on 270°F, a 55° decrease. This saves $14,100 and 2400 mcf per year, with minimal implementation costs. An added benefit is longer conveyor belt life with the lower temperature.

During development of work procedures, we discovered that the thermal oxidizer on the vinyl curing range was running at 1400°F. Since opacity was the only emissions concern, we experimented with lower temperatures until we arrived at 950°F as the ideal operating temperature. Annual savings are $55,000 and 9200 mcf. An indirect benefit is that internal components will last much longer with this 450° temperature reduction.

Of course, with the increased cost of natural gas, we are saving even more on energy costs. For this reason, we are concentrating on energy management projects for our other significant natural gas users.

In the 24 months we have been implementing energy management projects, we have already seen a 10 percent reduction in natural gas usage and cost. We have no doubt this trend will continue.

From our experiences in implementing ANSI/MSE 2000, we can confidently state, "We did it; so can you!"

ABOUT THE AUTHORS

Kent Benson is an environmental engineer for C&A Floorcoverings, Inc. in Dalton, Georgia. The firm is a national leader in combining high quality, attractive floor covering products with environmentally responsible manufacturing processes. Kent also serves as the MSE 2000 energy coordinator and as chairman of the company's MSE implementation team. In addition, he holds a position on the Georgia Tech EDI Advisory Board.

Kent is from the northwest Georgia town of LaFayette. In 1992, he graduated from Georgia Tech with a bachelor's degree in civil engineering. Since then, he has worked in most of the major disciplines of civil engineering in the Chattanooga and Atlanta areas, including transportation, structural, geotechnical, environmental, and surveying.

Ginny Key is a senior research associate with Georgia Tech's Energy and Environmental Management Center. She has more than 30 years of experience in training, curriculum development and technical writing, and over ten years of experience in the energy field. A primary developer of the MSE 2000 standard, she serves as both a course developer and an instructor for MSE 2000 courses. Ms. Key has extensive experience developing management system training, including ISO 9000 and ISO 14000.

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