

The Electric Motor Management workshops have strived, with the use of the em2 software, to bring a disciplined methodology to the capture of the pertinent information on a company's motors fleet, creating a database of data that enables companies to effectively manage that fleet to its optimum level of efficiency. There are many different ways to institute the procedures suggested at the workshops and each company adapts in its own way and at its own pace. The report that follows illustrates the various ways some companies have chosen to implement the plans. However different the processes may be, the benefits are apparent to all.



Motors Database: Saving Companies Time, Money and Aggravation

Since 1999, the Electric League of Pacific Northwest, with support from the Northwest Energy Efficiency Alliance, has managed the Electric Motor Management (EMM) program. EMM workshops are designed to increase the efficiency of motor operations by providing instruction on em2, a motor data collection and efficiency analysis software used in the repair/replace decision-making process. The tool supports creation of a motor database and enables users to calculate motor operating costs.

There have been many stories detailing specific successes of the knowledge gained from the EMM workshops where the results from a specific motor change-out are discussed. But how does this knowledge both fit into and enhance the day-to-day operations of a company? How do companies adapt the information-gathering process to their own particular operations? And finally, what benefits do they believe they have achieved?

Visiting with satisfied users, both new and veteran, gives some answers.

Oldcastle Materials Northwest Group

Oldcastle Materials is a vertically integrated company that supplies aggregates, premixed concrete, crushed rock and asphalt for building and infrastructure projects throughout the United States. In the Northwest Group, Utility Specialist Steve Beaulieu is organizing a motor management database of the company's operations in Washington, Oregon and Idaho. In addition to the multiple stationary plants each of the seven companies within the Northwest Group operates, several "portable" plants are used as well and can pick up to relocate to a site as needed.

With so many sites to oversee, Beaulieu recognized the benefits of organizing the motors data to take advantage of the flexibility of the motor inventory. Earlier this year, he was notified of an EMM workshop to be given in his area, but was unable to attend. He then contacted Avista, Oldcastle's local utility and

EMM seminar sponsor, and they put him in touch with the area's EMM field consultant.

Beaulieu began the data gathering process in August by distributing blank inventory sheets in a spreadsheet format to the operating managers at all of Oldcastle's sites within his purview. He found that several of the site managers had already begun the process themselves, which was a pleasant surprise. The process can be tedious, with name and info plates sometimes a bit dirty from their intense processes and often located in hard-to-reach places. But by early December, over 940 motors – ranging from .5 Hp to 400 Hp had been entered into the database, which represents an estimated 70% of the entire population.

The company had a sample evaluation performed on two sites comparable in operation to many of the Oldcastle site operations. The evaluation, performed by EMM Field Consultant Steve Dunnivant of EMP2, included 80 motors at the two sites. The results were rather dramatic. Simple paybacks ranged from immediate, with and without utility incentives, to an overall simple payback of 3.3 years for all motors analyzed. In some cases, the cost of the new motor was less than the rewind cost, even without a utility incentive. Here the recommendation was to replace the motor with the premium efficient option at failure. In other cases, when an available utility incentive was applied, the cost of a new motor was also found to be less than the rewind cost, thus driving the replacement of the motor with a premium efficiency replacement as soon as possible to take advantage of the incentive savings.

Total # of Motors	Total Hp	Investment Costs (\$)	Utility Incentives (\$)	Net Project (\$)	Annual Savings (\$)	Annual Savings (kWh)	Simple Payback (Years)
80	3,568	\$109,335	\$21,119	\$88,216	\$26,400	527,996	3.3

n.b. Investment Costs are total costs of the new motors, not incremental costs.

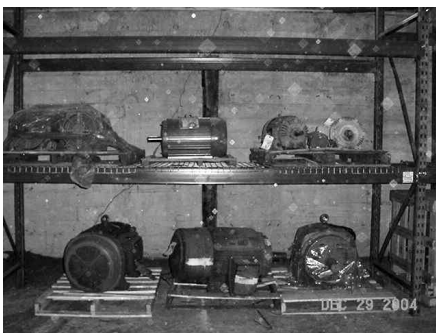
As a result of the pilot study the company has adopted em2 evaluations for all Northwest operations and is considering applying the same methodology across all US facilities. It is expected that as the evaluations are completed, the customer will use the data to further improve system operational efficiencies and maintenance practices.

Since motors are currently replaced on an "as needed" basis, with the relative infancy of the database inventory, Beaulieu has taken action based on the repair/replace analysis capabilities of the em2 software in only one case. He knows the power of the data being so readily available and anticipates widespread use of the program. If a motor fails at one site and a comparable one can be accessed from another location's spare motors, downtime is minimized and that saves money. Beaulieu ultimately believes that the motors database will help them reduce energy costs, take advantage of motor efficiency rebates, and expedite motor repair/replace decisions and site audits. Summing it up, he says that, "Getting an inventory of our motors was already on my to-do list. The em2 software, with help from EMM's field consultants, helped me put together a strategy and method to get it done and organized."

Sun Mountain Lumber

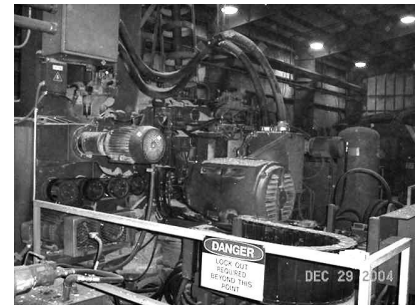
Sun Mountain Lumber (formerly Louisiana Pacific) in Montana was an early convert to the EMM methods. For almost four years, the company has been gradually gathering and entering data into a motors database. Head electrician, Bob Borgen attended an EMM workshop co-sponsored by the Electric League and Montana Power where he was introduced to the em2 motor database software and believed it would be a great solution to get control of Sun Mountain's scattered motor inventory.

Prior to the introduction of the database methodology, the millwrights were the only source for motor details - and then, only within their particular sphere of operation. Word went out that data collection would be an integral part of operations and the process began with the 2.0 version of em2, using both hard copy worksheets and Palm Pilots to gather the motors data. While the millwrights were at first reluctant to have their spare motors as part of a central inventory, they quickly found that when a motor failed, knowing where a suitable spare is located could save them a lot of time.



But time is an issue from another perspective. While almost 200 motors have been tagged, they still have an estimated 500 more to enter, ranging from .5 Hp all the way to 600 Hp. Information is entered as it is acquired during routine maintenance and repairs, so the process is gradual. Sun Mountain recently purchased the Belgrade Sawmill equipment and is cataloging the newly added motors to determine where they can be incorporated into their facility.

Technician, Mona Anderson, coordinates the data entry from both the Palm Pilots and worksheets. Although the whole population is not yet accounted for, the benefits are already apparent. According to Anderson, "With this program, we know what we have up and running, when to check and service, and where spares are located." Repair history is also recorded and they found this useful when the program indicated that there had been



several unexplained motor failures for a particular 2 Hp motor. The millwrights determined that the motor was underpowered for its function and switched it out for a 5 Hp motor and the frequent failures stopped.

When a motor goes out for repair, the motor nameplate data stats go with it, as well as any repair history available. Dale Olsen, contact at Sun Mountain Lumber's primary motor service center, Montana Electric Motors, recently attended another EMM workshop introducing the em2 software as a motor repair/replace

analysis tool. Olsen views the tool as a useful way to keep tabs on the various motors serviced. He sees it as a means to work with his customers to provide a more complete history of each motor's repairs, aiding in repair/replace decisions.

To Sun Mountain Lumber, it is a building process. The electricians and millwrights understand and appreciate that even with a partial motor database, there are benefits. So the building continues.

Washington Department of Fish & Wildlife

Steve Conly, electrical inspector at the Washington Department of Fish & Wildlife, first heard about the EMM motors database method several years ago when he came across a copy of Energy Matters magazine. He liked the concept, but lacked the time needed for such an undertaking. When he moved to the engineering office, he revisited the idea of a motors database and contacted EMM field consultant Duane Lewellen to find out more about the em2 software and to devise a way to simplify data collection.

The Fish & Wildlife Department has about sixty facilities statewide for which they provide motor, pump and screen maintenance and repair, with motors ranging from fractional to 400 Hp in size. In the field, most of the time was dedicated to putting out fires. If there was a problem with a motor or a pump, it was automatically reconditioned. "We simply wanted to make sure we had a reliable system before going to the next fire," says Conly. When he decided to institute a motors database, Conly worked with Lewellen to upgrade the department's motor repair

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*Mona Anderson,
Sun Mountain Technician*

specs and to develop a motor information repair sheet that would make data collection an integral part of the daily work routine. The use of Palm Pilots in the field facilitated data capture.

While they are still in the process of creating the database, savings can already be calculated. One example comes from the Humptulips Hatchery, which has nine 40 Hp pump motors that each run about 3000 hrs/yr. Each motor consumes 71,616 kWh/yr at a cost of \$4,300 (current rates). Upgrading to NEMA premium motors on these nine pumps is projected to save 28,000 kWh/yr total - or about \$1,700 for nine motors at just the one site.

"In a 'wait until breakdown' maintenance mode, we were adding a step that didn't need to be done. Now we have the ability to compare information and eliminate unnecessary expenses. Hopefully, we will get to the point that we can better anticipate needed repairs and costs, and have scheduled maintenance time to repair equipment at not only a lower cost, but before it fails," says Conly on the goals for the program.

Taking Time to Save Time

Gathering motors data is something that tends to be put on the back burner while day-to-day operations and putting out fires take precedence. But often it takes stepping back and assessing those operations to realize that time put in now can mean even more time saved later. In manufacturing, saving time is saving money. Use of the em2 software facilitates:

- Maintenance scheduling
- Identification of problem motors
- Location and availability of spares
- Motor stat and history documentation to share with motor service centers for repair/replace decisions

The analysis features of the software are also valuable and can be used to:

- Assess nameplate motor efficiencies (at varying loads);
- Compare improved motor efficiency against rewind costs or replacement.;
- Evaluate the efficacy of changing the hours of operation for an existing motor;
- Keep tabs on changes in kWh cost of operation for existing motors;
- Prioritize motor (and system) costs for future system improvements; and
- Track motor failures for improved maintenance.

The companies surveyed here decided that data collection would improve operational efficiency and, even though they are only part way through their data collection, they already recognize and reap the benefits.

Participants:

- Electric League of the Pacific Northwest
- EMP2
- Northwest Energy Efficiency Alliance
- Montana Electric Motors
- Oldcastle Materials Northwest Group
- Sun Mountain Lumber
- Washington Department of Fish & Wildlife

Additional information on motor efficiency can be accessed at the following sites:

- The Electrical Apparatus Service Association:
www.easa.com
- Motor Decisions Matter:
www.motorsmatter.org
- The U.S. Department of Energy Office of Industrial Technology:
www.eere.energy.gov/industry



Electric Motor Management is a Drive Power Initiative.

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