

MOTOR DECISIONS DO INDEED MATTER— BIG TIME!

CEE/NEMA Repair-or-Replace Campaign Saves Energy, Dollars and Downtime

Jack McGuinn, Senior Editor

“Based on U.S. Department of Energy data, it is estimated that the NEMA Premium motor program would save 5,800 gigawatts of electricity and prevent the release of nearly 80 million metric tons of carbon into the atmosphere over the next 10 years. This is the equivalent to keeping 16 million cars off the road.”

— *National Electrical Manufacturers Assn. (NEMA)*

Not since this nation’s oil crisis of the mid-1970s has awareness of that ever-precious resource been so prevalent in the news media and among citizens, industry and government—both federal and state. (Remember when oil was a commodity? And \$60 for a barrel of crude was just four years ago the record high?)

Anyone old enough to remember those days of block-long lines at the gas pumps and rationing for gas stations will tell you that it was not only the height of inconvenience but more than a little unnerving as well. Despite that wake-up call 30 years ago, we as a country have done—or sacrificed—little in an attempt to become oil independent. Shortly after the crisis passed—after resolution of the Iranian-U.S. embassy hostage drama and Ronald Reagan’s 1980 election—two things happened: gasoline was once again flowing at reasonable prices and the whole episode was, for all practical purposes, forgotten, at least at the consumer level.

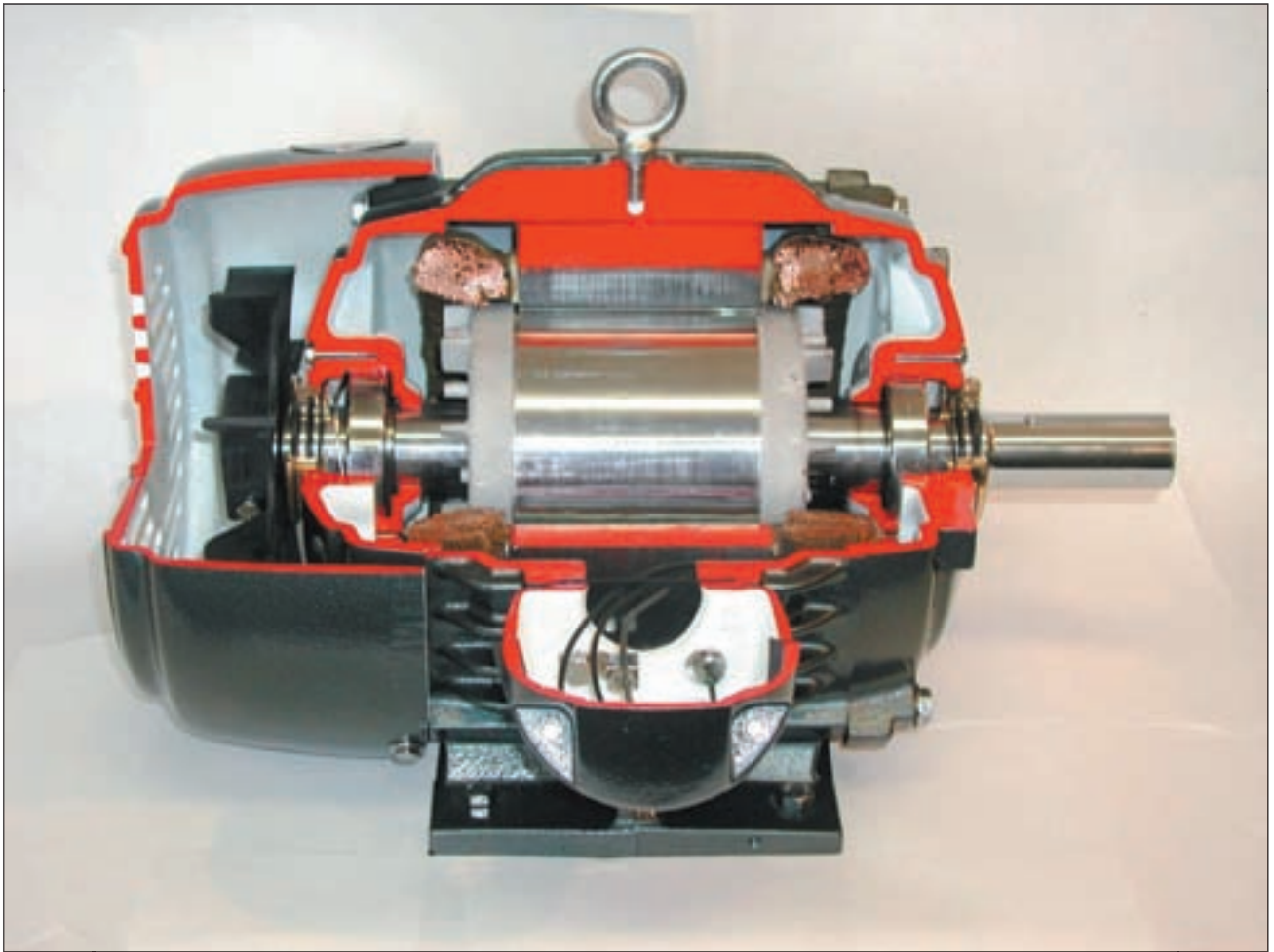
Today, it is encouraging to know that although we as citizens have yet to be asked by our leaders in Washington to do anything even remotely approaching sacrifice, American businesses and industries have in some important ways (with some prodding and incentives from government—especially at the state level) taken the lead in energy conservation. Terms like “global warming,” “fossil fuel,” “carbon footprint” and “green-

house gases” are now on the lips of CEOs everywhere across the land. Cynics would say it doesn’t require a charter member of the Sierra Club to know that being “green” has become an essential if not unavoidable marketing platform for industries of all kinds—pressured, some would say, by customers and environmental groups of all stripes.

But there’s much more to it than that. A variety of manufacturers are making honest efforts to establish or maintain their reputations for being responsible corporate citizens, and believe that being environmentally proactive is in their view a commonplace “best practice” endeavor in running their business, making a profit and supplying their customers.

That has never been truer than is the case with both U.S. motor makers and the industries that they supply. Motor manufacturers have for the last decade been working at reengineering motors of all sizes with the goal of making them as dependable and energy-efficient as reasonably possible, without any compromise in power. And their end-users—whether they use motors in, for example, their distribution facilities or in their automated packaging plants—are jumping on the environmental bandwagon in significant numbers. Why is this happening now?

One reason is the passage into law last December of the Energy Independence Security Act (*EISA*—<http://energy.gov>).



As more robust motor efficiency standards are mandated, NEMA Premium-grade motors such as this one from Emerson Motor Co. will require an increase in copper packing.

senate.gov/public/_files/RL342941.pdf), which, among other things, sets forth new, more robust efficiency standards for general purpose and many other industrial motors used in a multitude of automated applications. The legislation, although stripped just prior to passage of most of its tax and production incentives for alternative sources of energy, is a step—however uncertain—forward on the long road to energy independence.

The other reason—and a more compelling one—is the work done over the years by two organizations, readily known in the motor world: the Consortium for Energy Efficiency (CEE) and the National Electrical Manufacturers Association (NEMA).

Founded in 1991, the Boston-based CEE is a not-for-profit, North American organization with approximately 100 members—primarily electric utilities and various non-profit regional entities—dedicated to promoting energy-efficient products, technologies and services that impact in a positive way upon residential and commercial energy usage. A small sampling of CEE members includes Idaho Power, New England Gas and the Ontario Power Authority.

NEMA, located in Rosslyn, Virginia, was founded in the 1920s; it is an American trade organization of about 450 members critical to the “generation, transmission, distribu-

tion, control and end-use of electricity,” in the United States. Members include such familiar names as Baldor, Bodine, SEW-Eurodrive and many more.

Awareness key to decision making. A very important part of what both organizations do is the Motor Decisions Matter (MDM) campaign, conceived in part and sponsored by the two groups—along with their collective hundreds of member company co-sponsors—and in conjunction with the U.S. Department of Energy (DOE). As the CEE’s website puts it, the campaign co-sponsors represent “300 years of combined motor experience” relative to motor manufacture, sales and repair centers, utilities and government agencies.

In brief, the national public awareness campaign exists to help answer a central question manufacturing facility managers and personnel have long struggled with regarding motors in their daily operation—replace or repair? And by virtue of the data, guidelines, standards and recommendations developed over the years by both the CEE, NEMA and their member companies, motor end-users (i.e., factories, most any other physical plants and numerous other applications) now have the proper tools and information to answer that question in a clear and reasoned manner.

NEMA and especially the CEE are very much involved in

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other related arenas having to do with energy conversion, as well as its use and conservation. But the focus here is on the Motor Decisions Matter effort—what it is, how it works, why it is important—and how that applies to the newly imposed EISA standards for motor efficiency. It's news you can use, and it may enable you to gain a step on your competition, although for now it appears to be a fairly well-kept secret.

"It's curious in that we haven't seen much in the trade press yet about the (new) standards," says Ted Jones, senior industrial program manager for CEE. "They're out there, but no one seems to be really aware or talking about it much. One of the first things we're going to do is raise awareness that the standards are out there. The focus of MDM has been on motor management, and a lot of that is focused on the repair/replace decision-making regarding a failed motor."

Why motor decisions matter. Beyond "awareness," what in essence matters most in the campaign is this: manufacturers and facility managers can offset skyrocketing energy costs, conserve energy consumption and reduce greenhouse gases by implementing sound motor management and planning. Becoming familiar with MDM's goals has led companies to see the campaign as an opportunity, and not solely to make money. Rob Boteler, director of marketing for Emerson

Motor Company and chairman of the NEMA Motor and Generator Marketing Committee, explains.

"We as a company saw that our products had the potential to make a difference. We all have our own personal feelings about climate change, but I think from a motor manufacturer's point of perspective. We like to say that our motors are large converters of electricity; we convert electricity into rotating torque and we saw a way to produce higher performance products that would ultimately reduce greenhouse gases."

Valone A. Gomes, national OEM sales and product manager, low-voltage motors, for WEG Electric Motors Corp., also welcomes the new EISA standards as well as the MDM campaign. He looks at both as opportunities for WEG to show the market how far they've advanced in the production of efficient motors.

"MDM is good for WEG because we have the product that a lot of competitors don't. It's going to prove to the market who actually has the (most efficient) product, who has invested in technology and who is actually on the cutting edge of technology to have motors with high efficiency. It will differentiate us from most of the market."

We've thus far discussed why the MDM campaign is a good thing, but what, exactly, is it? How does it work? What are its specific goals?

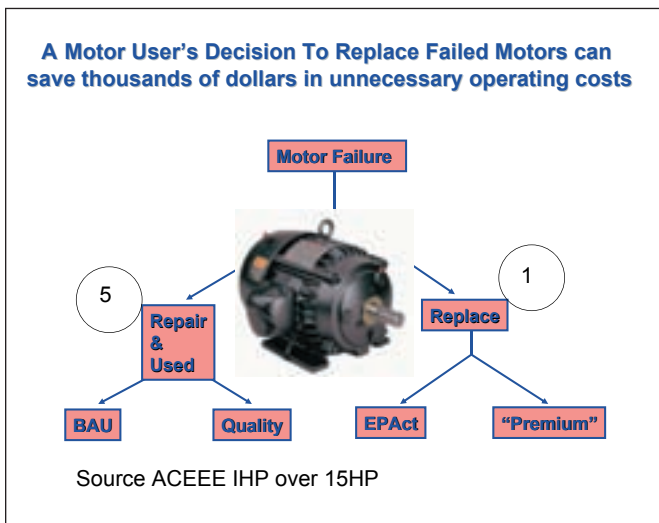
In one sense, it's all about repair-or-replace and the NEMA Premium motor. But other factors also apply, like penny-wise, pound-foolish thinking.

"The key thing with MDM is when you're looking to make that repair-or-replace decision, are you focused solely on that 3-5 percent first cost," says Jones. "And trying to translate that from technical-speak to business-speak is a large part of what MDM is all about. And having that message and that lifecycle costing approach endorsed by multiple, credible resources, e.g., CEE, NEMA, EASA (Electrical Apparatus Service Association—www.easa.com, the DOE and many more). So MDM provides a platform for that.

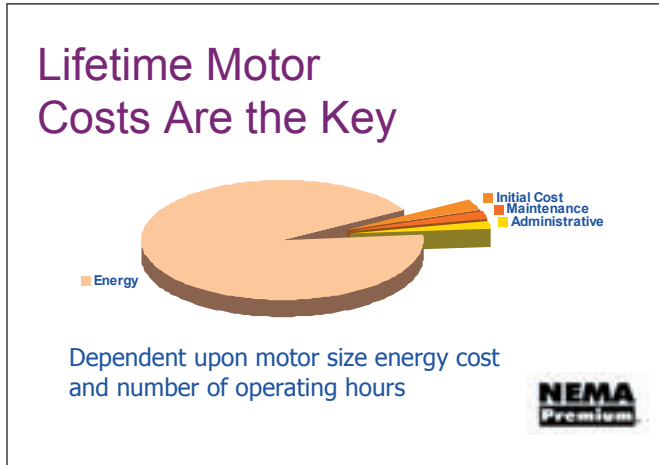
"And when you talk about when your motor fails and you know what you're going to do, that is a matter of panic and planning. If you planned and if you tagged that motor, you know what you're going to do because you've run the numbers. That makes a big difference. If you're going to replace it, are you going to replace it with an EPAct motor or a NEMA Premium motor? If you're going to repair it, are you getting a "best practice" repair as defined by EISA or EASA? That assures that you're going to maintain the efficiency rather than degrade it during the process."

The EPAct motor referred to above derives from the Energy Policy Act of 1992, the last time motor efficiency standards were established prior to the 2007 EISA. At the time, manufacturers and end-users were allowed five years to reengineer their products or upgrade their facility with the then higher-efficiency EPAct motor or to upgrade their existing motor population with best-practice repair.

Placing a premium on high-efficiency motors. But now, as mandated by last year's EISA legislation, it is the NEMA



Charts courtesy of Emerson Motor Co.



Premium motor that sets the gold standard for motor efficiency. William Hoyt, industry director for NEMA, explains how that came to be.

“NEMA was very much involved back in 1992 when they put in the EPAAct regulations that were based on our MG1 standard for motor efficiency tables. We have continued throughout the years to cooperate with the DOE and some other interested environmental groups such as ACEEE (Washington, DC-based American Council for an Energy-Efficient Economy—www.aceee.org) to raise the level of motor efficiency as it comes into play.”

But after some back-and-forth with the ACEEE over implementing individual, state-by-state standards that proved unworkable, says Hoyt, the question arose, “Should we attempt to raise the efficiency levels on a broader scale nationally in the Energy Security Act? And they pretty much agreed that was a better way to go. It just so happened that (in 2003) we (NEMA) already had the NEMA Premium tables in place for premium-efficiency motors that were over and above what EPAAct required. So we just translated the efficiency tables from the NEMA Premium on the 1 to 200 hp and a couple of different types and designs of motors and said, ‘Let’s make that the new national minimum efficiency level standard for that class of motor.’ And we also took an additional class of motor—the 201 to 500 hp motor and proposed that to be the minimum efficiency level for that type of motor.” As with the last-iteration EPAAct motor and standards, the new benchmarks also have a grace period, ending in 2010.

The tables Hoyt refers to are important to understanding the benefits of higher-efficiency motors. “There is a direct correlation between the efficiency of industrial motors to reducing the carbon footprint, taking cars off the road, reducing gigawatts off the grid. Whatever analogy you want to use for being able to understand why this is a value to the society as a whole.

“Our technical committees have come up with realistic tables for what can be achieved from an engineering standpoint, from a cost-effective standpoint and from a practical standpoint, as well as for being able to produce and sell something on a reasonably profitable basis.” Hoyt also points out that a correct motor and correct sizing for a given application is of equal importance if best-practice methods are to be adhered to. “Choosing the correct motor and size for the application is critical to the efficiency aspect of it. You can manufacture the most efficient motor in the world, but if you don’t size it right for the application, you’re not going to get the efficiency you should.”

If this sounds at all confusing, relax. There are plenty of motor manufacturers out there ready to give you a hand in auditing your facility’s motor inventory. Siemens Energy and Automation Inc. is one of them.

“Yes, we work with customers,” says Tony Giamba, product marketing consultant/NEMA motors for Siemens. “In fact, we have an energy efficiency calculator that’s available to our customers online (siemens.com/energysaving). It allows them to

compare a NEMA Premium efficiency motor with whatever they may have in their factory. You can put in quantities, hours of operation, whatever their energy costs are, and it will actually give you a payback time; it will tell you your power saved in a year’s time.”

And is the MDM campaign good for a company like Siemens?

“Absolutely,” says Giamba. “Because what their campaign is about is exactly what we’re doing. We’ve made a more efficient motor, so we want our customers to understand why having an energy-efficient motor is better. And that’s exactly what the MDM campaign is doing.”

Motor makers in high-gear mode. As a result, Siemens, like many other motor makers, is gearing up for when the EISA standards go into effect in 2010. Giamba says the company is developing a “new product road map” that will highlight the new efficiency levels. That’s because some of Siemens’ product line is not yet up to the impending new standards, although they do in fact meet the 1992 energy act standards. Giamba says the company is now redesigning all its products to meet the 2010 standards.

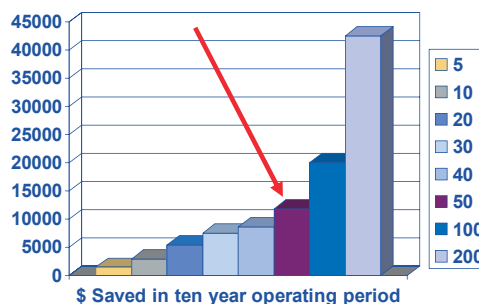
Boteler says the same holds true at Emerson. “One of the things it (the new standards) does of course is it forces redesigns, and in some cases, major changes at the factory level because we’re switching from maybe 20 percent of our products being NEMA Premium today, and tomorrow it’s going to be 80–85 percent. That’s why we needed the three years (prior to 2010), so that we could get all of our laborers and our machinery and everything aligned as we move into a different mix.”

Another reason Boteler is a big fan of MDM is that it provides sales representatives an opportunity to change the collective mindset of facility maintenance managers; that MDM, the new standards and NEMA Premium are indeed a good thing.

“You know, you can go in and talk to the maintenance people all day long, and they’re like, ‘Yeah, I know we should

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Premium Savings Over Ten Years



A 50hp motor can save the equivalent of a significant labor cost reduction over ten years

Courtesy Emerson Motor Co.

All the Tools You Need for Motor Management

Following is a listing of MDM tools and resources available online (www.cee.org) to interested parties. They serve to further explain the MDM campaign and how adhering to it can help you realize significant savings in energy usage, energy cost and downtime:

Motor Planning Kit

A booklet providing a comprehensive overview of motor management, including available opportunities and how best to implement a number of plans ranging from generic purchasing policies to total motor inventory. Available online and in print.

The 1-2-3 Approach to Motor Management—Users' Manual

Developed by Emerson's Boteler, this step-by-step guide explains how to use the 1-2-3 spreadsheet. It also suggests a process for applying the results to convey the financial benefits of sound motor management to your customers.

The 1-2-3 Approach to Motor Management Spreadsheet

A simple how-to guide for getting started in motor management for your facility. It is intended to benefit motor service centers, vendors, utilities, energy-efficient organizations and others in relating the financial benefits of sound motor management to their customers.

Simple Savings Chart

Just log in the number of hours of operation and electricity cost in this spreadsheet and it will provide a side-by-side comparison of annual energy costs and annual energy savings for pre-EPA 1992, EPA 1992 and NEMA Premium motors. Includes calculations for TEFC and ODP motors.

MotorSlide Calculator

This slide rule calculates annual energy costs and annual energy savings based on electricity costs, motor size, motor efficiency and hours of operation.

CEE Motor & Drive Program Summary

Explains the value of energy efficiency programs in bringing financial, technical and educational resources to commercial and industrial markets. It supplies an overview of programs that support the use of NEMA Premium motors, ASDs (adjustable speed drives), motor management services, system optimization and other energy management strategies.

Trifold Brochure

Provides a thumbnail sketch of motor management. It is intended for C-level managers to learn more about motor management. Available online and in print.

How-To Guide to Bringing Motor Management to Your Customers

Online guide offers tips on helping your customers implement motor management plans.

be using more efficient motors, but we just have an expense budget and if I repair an old motor for \$100 instead of replacing it with a brand new premium efficiency motor for \$150, I get good marks.'

"So what we have to do is to try and explain at the financial level the benefits of the \$150 motor versus the \$100 repair. And of course when we do that we have to switch from upfront cost to lifecycle cost, and that's really where the whole initiative for MDM applies in trying to explain lifecycle cost and why that's important at the end-user level."

So what is a NEMA Premium motor? The CEE's Jones defines it as a "branded product that meets a predefined specification level. NEMA Premium is two things—it's a spec and it's a brand, endorsed by CEE and NEMA. So when utility programs talk to a customer and when motor marketing people talk to a customer, they're talking about the exact same motor in terms of efficiency. It's not Baldor or GE; it's a performance level."

To repair or replace looms large in 2010. NEMA's Hoyt points out that the MDM campaign will soon be updated regarding the new regulations slated to come online in 2010. He says by that time marketing of NEMA Premium will wind down because they're going to be required in any event. He adds that repair versus replace will be the next marketing platform. And while motor repair shops will always have a place in the market, Hoyt says that there are factors to be considered.

"The repair shops will tell you that they can repair (a motor) to the efficiency level that's on the nameplate of the motor, but if it's 15 or 20 years old, what's the efficiency of that 20-year-old motor?"

Siemens' Giamba sheds further light on the repair versus replace dilemma.

"EPA's only went into effect in 1997, so there's probably a lot of motors out there that don't even meet the EPA's efficiency level."

And believe it, those new efficiency levels matter. Just ask Boteler.

"We can argue that, depending upon the load of the motor and a lot of other variables, you may or may not get that (savings) benefit, depending on your individual application. But overall, if we can take a motor in an existing application and make it two or three points more efficient, we are reducing the overall energy usage and the overall greenhouse gases that we're producing as a country.

"I think to us at Emerson, that's something we're aware of."

(Editor's Note—For further proof that good motor management can save you significant savings and improved downtime, simply go to the CEE's website (www.cee.org) and review the many real-world case studies there documenting how various companies in a variety of industries made it happen. See also a story on motor replacement on page 15.)

For more information:

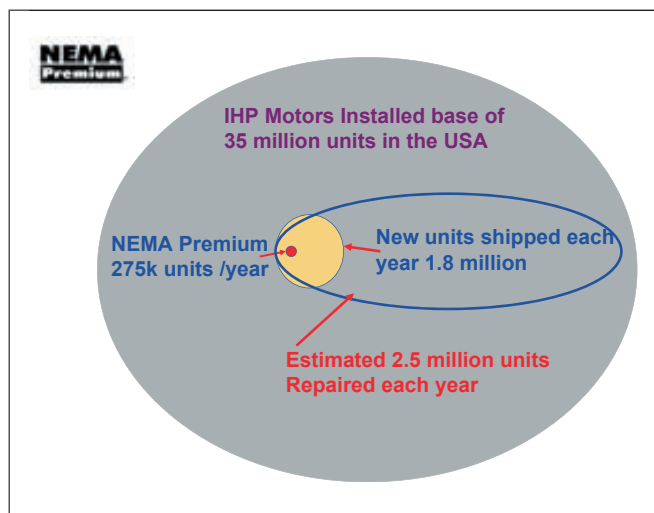
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Courtesy Emerson Motor Co.