OKUMA

OPEN POSSIBILITIES

ENERGY-EFFICIENT MACHINE TOOL TECHNOLOGIES, FOR ANY SIZE SHOP

MACHINE SHOPS CAN CONTROL THEIR OWN DESTINY BY ADOPTING ENERGY-EFFICIENT MACHINE TOOL TECHNOLOGIES.

EXECUTIVE SUMMARY

In January of 2015 the government advocacy program One Voice surveyed metalworking companies to quantify trends in energy costs. Based on the numbers, each of these shops could see an energy cost increase of $21,541 in just one year. With increases of this magnitude one has to ask: what can the individual shop owner do to keep energy costs down?

Globally, this issue is being addressed. Both Canada and Japan currently offer rebates for the purchase of equipment that includes energy saving features. Large manufacturers are also implementing cost-saving features such as changing lighting systems from older “yellow” fixtures to more efficient and brighter white lights. But machine shops of any size can control their own destiny by adopting the energy-efficient machine tool technologies described here.

RISING ENERGY COSTS ARE CHIPPING AWAY AT PROFITS AND CAUSING GREAT CONCERN.

ALARMING NUMBERS

In individual shops across the Americas, rising energy costs are chipping away at profits and causing great concern. If you look at recent numbers, there's even more cause for alarm. In January of 2015, One Voice, the government advocacy program for the National Tooling and Machining Association (NTMA) and the Precision Metalforming Association (PMA), polled metalworking companies, with respondents averaging 67 employees. These companies reported average annual energy costs of $184,588, and 66% of the respondents projected that in 2015 they'd experience an average increase of 11.67%. Based on these numbers, each of these shops could see an energy cost increase of $21,541 in that one year. With increases of this magnitude one has to ask: what can the individual shop owner do to keep energy costs down?

CONTROL YOUR ENERGY DESTINY

Globally, this issue is being addressed. Both Canada and Japan currently offer rebates for the purchase of equipment that includes energy saving features. This is great for users, who benefit from both the rebate and the ongoing savings on energy expenditures. One Voice reports that large manufacturers are also implementing cost-saving features such as changing lighting systems from older "yellow" fixtures to more efficient and brighter white lights. Many have also invested in new HVAC systems with the help of state tax credits. But machine shops of any size can control their own destiny by adopting new energy-efficient machine tool technologies.

MANAGING THE MACHINE TOOL'S "ENERGY GUZZLERS" CAN PROVIDE SIGNIFICANT SAVINGS.

BEWARE THE "HIDDEN COSTS"

CNC machining processes contain hidden costs that often go unnoticed. Machine tool idling, unnecessary pump rotation and continuous running of peripheral equipment are all energy guzzlers that, when managed, can provide significant savings. Recognizing that advanced machine tool technology can be used as a highly effective energy-saving tactic, in 2015 Okuma released its ECO suite technology as a part of OSP suite.

ECO suite

ECO SUITE: NEXT-GENERATION ENERGY-SAVING SYSTEM

ECO suite is a next-generation system that saves energy by reducing the power consumption during both machine operating and waiting times. Okuma's ECO suite won the Excellence Award/Minister of Economy, Trade and Industry Award at the 45th Machine Design Awards, sponsored by the Nikkan Kogyo Business & Technology Daily News.

ECO SUITE REDUCES POWER CONSUMPTION, AND THE RESULTS CAN BE QUITE DRAMATIC.

ECO suite includes four new intelligent control applications that save on unnecessary energy expenditures, and the results can be quite dramatic. Following are the features you can benefit from with this system.

ECO IDLING STOP

ECO Idling Stop is the world's first application that stops machine tool idling. This energy-saving system uses Okuma's Thermo-Friendly Concept to monitor the cooling status of the milling spindle and the turning spindle, and automatically turns off the coolers for these spindles when cooling is complete (See Figure 1).

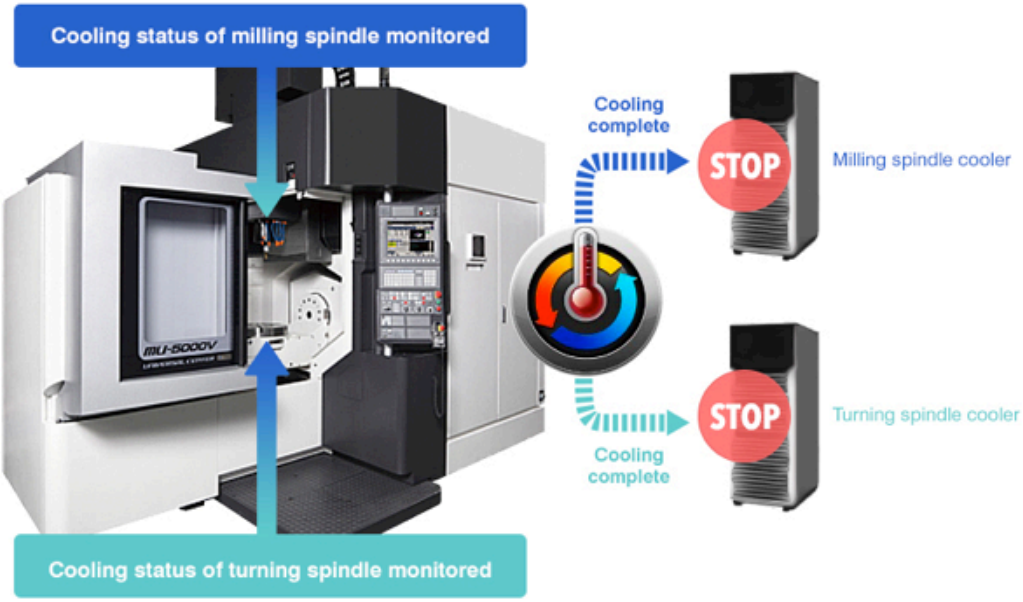

Figure 1: ECO Idling Stop turns off spindle coolers when cooling is complete. *(Note: On MU-V-L 5-axis machining centers, cooling is stopped on respective milling and turning spindles.)*

ECO Idling Stop carefully stops peripheral equipment, and the benefits increase with longer machining preparation times. The result is dramatically decreased power consumption when the machine tool is not cutting, and power can even be reduced while cutting with the optional ECO Hydraulics. See Figure 2 for an example showing a 74% decrease in non-cutting power consumption that can be achieved in just one month.

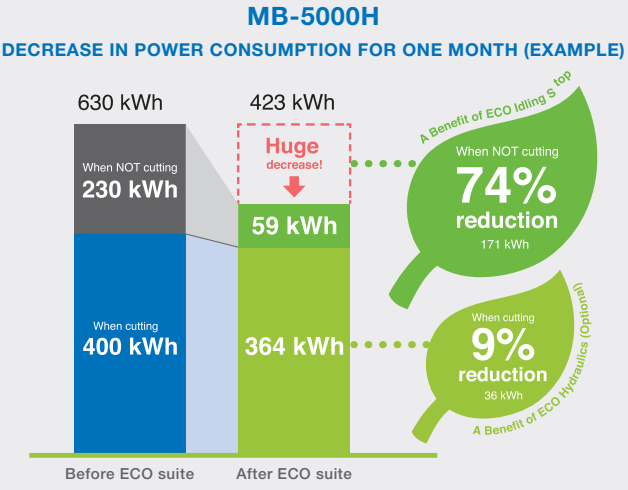

Figure 2: Example of the decreased power consumption that ECO Idling Stop can achieve in just one month. *(Calculated from actual power consumption measurements. Power consumption will differ depending on machine specifications and usage conditions.)*

Figure 3: The ECO Power Monitor's operation screen, shown here on a 19-inch display.

ECO POWER MONITOR

The ECO Power Monitor allows you to see how much energy is being saved – right on the machine tool's display (See Figure 3). Power consumption is shown for spindles, feed axes and peripheral equipment.

You can also view the energy savings achieved by using ECO Idling Stop to manage peripheral equipment. (See Figure 4)

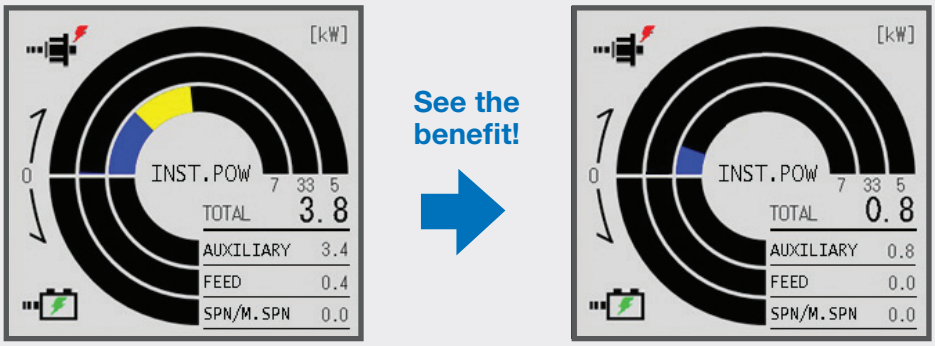

Figure 4: The ECO Power Monitor shows energy saved by ECO Idling Stop. (Power consumption is estimated).

ECO HYDRAULICS

This optional feature gives you the best of both worlds: accurate control, at a very low rotation speed. ECO Hydraulics minimizes unnecessary pump rotation during dwell pressure applications. Pump rotation is optimized to match operating status by combining the servo control technology on the machine tool with high-efficiency hydraulic pumps. The result is a significant reduction in power consumption. In the following example we see a savings of 63% (See Figure 5).

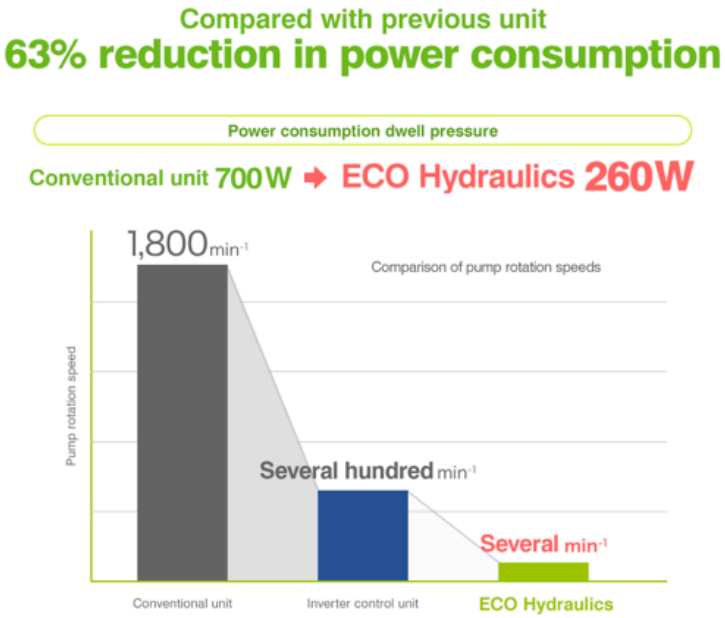

Figure 5: An example of 63% reduction in power consumption achieved by using ECO Hydraulics.

ECO OPERATION

When using the optional ECO Operation feature, peripheral equipment will only run when needed, and only for the duration required. This means that equipment such as chip conveyors and mist collectors are automatically stopped after cutting is finished.

ECO SUITE: ALLOWS YOU TO INVEST MORE WISELY

By totaling the energy savings from the features shown above, it's clear that significant savings can be achieved. Think of what you could do with the extra money you're saving: add to your profitability, invest in new equipment or technology, add to your staff – there are many things that make more sense to invest in than paying unnecessarily high energy bills.

Beyond the control functionalities discussed above, there is also an energy saving feature built into the Okuma machine itself.

Figure 6: Okuma's PREX motor is a permanent interpolation reluctance motor with multilayer slit structure.

OKUMA'S PREX MOTOR: "SUPERIOR ENERGY-SAVING MACHINE"

Many of Okuma's CNC machines are equipped with the company's PREX motor, which in 2009 won the Superior Energy-Saving Machine Award sponsored by the Japan Machinery Federation.

PREX motors are built-in reluctance motors incorporated in many of the spindles used in Okuma machine tools. Numerous slits in the rotor make generation of reluctance power more efficient (See Figure 6). This unique rotor structure has a small amount of interpolated permanent magnets to increase performance. The PREX motor is more efficient than induction motors, which were the main power source of spindles in the past, and high torque in typical turning ranges raises the system efficiency by 4-9%.

PREX motors are also compact, with low mass in the rotating section that reduces inertial mass by 47%. This makes acceleration and deceleration highly responsive. The combination of all these features reduces energy consumption by 5-13%.

Okuma machines equipped with the PREX motor are: CNC lathes, the LB EX series of horizontal lathes, and the MULTUS series of multitasking machines.

INVEST MORE WISELY IN YOUR BUSINESS

TODAY, SHOPS OF ANY SIZE CAN BENEFIT FROM ENERGY-EFFICIENT MACHINE TOOL TECHNOLOGIES.

As you can see, Okuma has been working on energy-efficient machine tool technologies for many years. We offer tested and proven innovations you can utilize to achieve significant savings. Today, shops of any size can benefit from energy-efficiency, enabling you to stop paying increasingly high energy bills and invest more wisely in your business.

For a demonstration of Okuma's energy-efficient machine tool technologies, visit www.okuma.com, contact your local Okuma distributor or schedule an appointment to visit us at one of the following locations:

Okuma America Corporation
11900 Westhall Drive
Charlotte, NC 28278
P 704.588.7000 | **F** 704.588.6503

Partners in THINC
12428 Sam Neely Road
Charlotte, NC 28278
P 704.587.6789 | **F** 704.587.7669

The Okuma Technical Center
4727 S. Pinemont, Suite 200
Houston, TX 77041
P 704.504.6104 | **F** 704.504.6105

The Okuma Technical Center at Morris Midwest
68 Congress Circle W.
Roselle, IL 60172
P 630.351.1901 | **F** 630.351.1912

TECH-WHP-Energy-Efficient-1-0116-0