

## Shop Modernizes With Cutting Tools

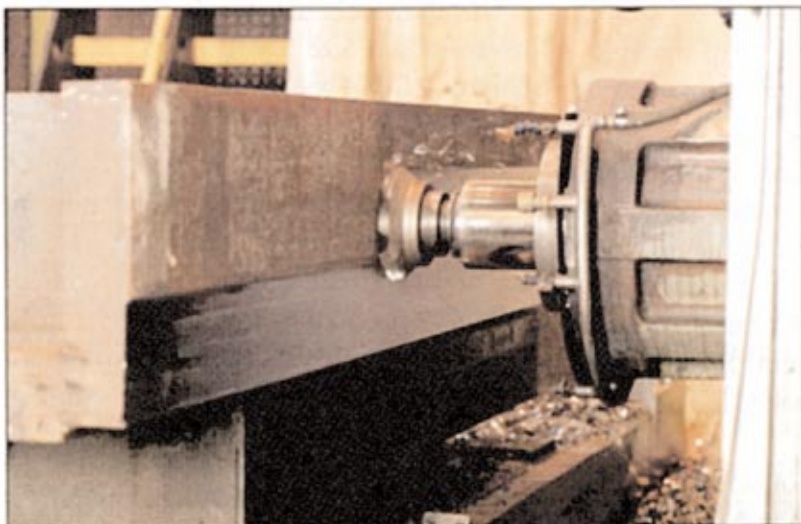
Shop owners dealing with offshore competition might gain some assurance—and a few ideas—from Duane Gushee of D&G Machine Products, Inc. (Westbrook, Maine). The company performs fabrication and machining of large parts for turbines, chemical equipment and aerospace structures.

Incorporating what it refers to as “smart modernization” has allowed D&G to recapture work that had started moving to China and Romania.

“Investing to modernize equipment and practices can offset lower offshore labor and raw-material rates,” explains Mr. Gushee.

“With expanding economies in those developing regions, workers will inevitably demand higher wages and a better

The PowerQuad+ face mill increased throughput, saving 4 hours and \$600 per piece. The free-cutting geometry keeps the part cool enough to eliminate a 45-minute unclamping/reclamping step to relieve machining-induced stress distortion.



standard of living, thus closing the competitive gap.”

Recently, the company retooled a face milling job that would’ve otherwise been sent overseas because of lower steel prices. The job—consisting of volumes of about 450 pieces annually—involves milling all surfaces of welded steel mounts for stationary gas turbines. Replacing the older types of face mills with PowerQuad+ face mills from Ingersoll Cutting Tools (Rockford, Illinois) reduced face

milling cycle time from 8 hours per part to 4 hours per part, which translated to substantial savings per part. These savings offset the lower material costs overseas, enabling the company to reduce its price and recapture the contract.

The company’s programmers then began converting face milling on 14 other machines

The large angle plate undergoes final inspection. A uniform finish is achieved, and there is an absence of marks because of insert changes in mid-operation.



to the new tools. Many of the jobs performed on those machines could also have gone overseas. "So far, the change-over has saved us \$150,000 on an annual basis, and it has preserved other key jobs," says programmer/engineer Randy Wakefield. "Upgrading face milling plant-wide should save us more than \$250,000 a year, which gives us competitive leverage."

Embracing Mr. Gushee's "constantly modernize" philosophy, the company updates

its machining practices one operation at a time. The shop performs milling, drilling, turning, boring and tapping. "We strive to keep pushing machining rates and invest in better tooling as soon as it's proven," says Mr. Wakefield. "Every throughput improvement magnifies the bottom-line benefit. We've found the fastest route to those improvements is through retooling, which accounts for about 3 percent of total machining costs."

Retooling the face milling operation on the turbine-mount job was an ad hoc addition to the company's ongoing effort to reduce costs. The turbine mount is essentially a 1-ton welded angle plate measuring 6 feet by 2 1/2 feet by 3 1/2 inches. The machining, performed on a Toshiba horizontal CNC mill, includes

milling approximately 3/4 inch off the entire surface and then creating a bolt circle in each face.

Previously, D&G milled the part with

a 6-inch, 45-degree shear, with face mill running at 45 ipm with 0.190 depth of cut and 4 1/2-inch width of cut. The cycle time was 8 hours, part of which

included a 45-minute mid-cycle unclamping and reclamping to relieve residual welding-induced stresses.

Using the Power Quad+ cutter of the same size, a feed rate of 72 ipm was achieved (all other settings were the same). This reduced cycle time to 4 hours, while keeping the part cool enough to omit the mid cycle stress-reliever stoppage. Edge life was said to be doubled as well.

After consulting Ingersoll's Mike Brown, Mr. Wakefield put those settings into practice. "With the new face mill, we offset the material cost differential," says Mr. Gushee.

Mr. Wakefield also began applying the tool to face milling operations on 14 horizontals. "We gave the operator the new cutter and told him to accelerate the feed rate 30 percent immediately and not to worry about optimizing it later," explains Mr. Wakefield. "Now

we're at that optimizing stage, picking up another 10 to 20 percent on average."

Mr. Wakefield goes on to say that face milling rates have improved between 30 percent and 60 percent

D&G also doubled throughput of the side milling operation on the same angle plate by switching to an Ingersoll high-shear finishing end mill. The new cutter feeds at 36 ipm, compared to the previous feed rate of 18 ipm.



plant-wide, averaging around 35 percent.

According to the manufacturer, high throughput is made possible because of the free cutting geometry of the Power Quad+ cutter. "It's the combination of cutter seat design and insert geometry that creates more of a cleaving than a scraping action," explains Mr. Brown. "It reduces cutting forces, thus protecting the machine, tool and workpiece. Cutting forces are lower even at higher cutting rates, and the heat goes into

the chips instead of the part."

"Workers can see and feel a difference on the plant floor," adds Mr. Wakefield. "Even at 35 percent faster cutting, the operation is quiet, spindle loads are down from 95 percent to 75 percent and the workpieces are cooler to the touch."

Mr. Gushee also appreciates the free cutting, but from a different standpoint. "It's gentle on our big-ticket machines, which lowers our equipment ownership costs and helps us stay competitive," he says.

D&G also benefited from the free-cutting geometry on a drilling job involving chrome-moly steel rails as thick as 6 inches. The previous penetration rate for 2-inch holes was 4.5 ipm, and the edges lasted for six holes. Using a Quad Drill+, the company was able to increase the penetration rate to 9 ipm, while extending edge life and reducing costs. The company is now standardizing on that drill for other work. ■

*For more information from Ingersoll Cutting Tools, call (815) 387-6600 or enter **MMS Direct** code **714VF** at [www.mmsonline.com](http://www.mmsonline.com).*