

Drag way cutting

Drag racing appeals to nearly everyone with an interest in engineering innovations. The dragsters represent a pinnacle in aerodynamic design, powered by engines that propel the vehicles to speeds topping 300 mph. With each race a mere seconds in duration, dragster owners constantly search for new technologies and techniques to provide the slightest edge.

For more than 30 years, Bill Miller Engineering Ltd., Carson City, Nev., has introduced innovations that help racing teams smoke the competition. Founded in 1975, the com-



Bill Miller Engineering

Craig Whitener, foreman, and Russell Findley, supercharger shop lead, constantly search for innovative techniques and technologies.

pany's workspace has grown from a 1,200-sq.-ft. factory to a 20,000-sq.-ft. state-of-the-art facility where it produces connecting rods, pistons and wrist pins for the world's top drag racing and NASCAR teams.

In 2006, the firm was running multiple products on Okuma 5-axis machining centers. Larry Schwartz, president of Okuma America Corp., Charlotte, N.C., suggested that the company could get more out of its machining centers with new tooling from Sandvik Coromant Co., Fair Lawn, N. J.

"When we first invited Sandvik Coromant in, they showed up with a team of five guys," said Craig Whitener, foreman at Bill Miller Engineering. "They went through and looked at all of our machines and tooling. From there, we started doing some test cuts and implementing new solutions."

The first process to be updated was a drilling operation for wrist pins. These components transfer the force generated

by the pistons to the connecting rod, subjecting them to incredible levels of stress. In a typical NASCAR engine, the wrist pins are exposed to 6 tons of force 77 times per second. Bill Miller Engineering produces the parts from 9310 vacuum-arc-remelt steel to provide the necessary strength. For dragster engines, the wrist pins can be exposed to forces of up to 50 tons, and must be machined from an exotic nickel-cobalt-titanium-steel superalloy.

The company traditionally made holes in the wrist pins with a carbide-tipped drill running at 112 sfm, 808 rpm and a feed rate of 0.006 ipr. It took two operations to drill the hole to the required depth of 3.35". The total machining time stood at 2 minutes, 4 seconds, and the part also required time to be unloaded and reloaded between operations.

To improve efficiency, the company purchased a Sandvik Coromant CoroDrill Delta-C 840 solid-carbide drill. The new tool runs at 129 sfm and 928 rpm, all the while maintaining the previous feed rate. Unlike the previous tool, the CoroDrill Delta-C 840 drilled to the full depth of 3.35" in one operation, reducing machining time to 1 minute, 10 seconds and eliminating the operator handling required with two operations. Because the company produces thousands of the wrist pins every year, it reaped significant savings in both time and cost. Also, the new drill extended tool life 40 percent.

Another tooling change also achieved notable results, leading to the redesign of a vital component in the Gibson/Miller supercharger the company produced.

"The inside of the blower casing for our superchargers is an extreme manufacturing challenge," Whitener said. "Because of the intricate work needed inside the case, we originally had to machine an insert, cut a hole in the case and then bolt the insert in."

After reviewing the job, Sandvik Coromant representatives recommended using a Coromant Capto toolholder in combination with several of the company's CoroMill ballnose endmills. The holder provided both the reach and stability needed to machine the complex geome-



Bill Miller Engineering uses a variety of Sandvik Coromant milling tools when producing high-performance engine parts.

tries inside of the blower case.

"We saved quite a bit of time with the new process, but that wasn't even the important part," Whitener said. "The stability of the Coromant Capto system let us machine the entire component from a solid block, which simply wasn't possible before. The resulting increase in quality was huge. In the past, over-revving the

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engine could result in ruining a blower casing. Now the product has much more strength and integrity. The revamped design also increased airflow through the supercharger, allowing for higher levels of performance." **CTE**