

### Company Optimizes Rail Impeller Milling with MAX-PAC™

Californian company uses specialized CAM software to improve process, quality, and delivery.

Over the course of the past five decades, California-based precision machining specialist, Chipco Manufacturing, has created a successful niche for itself machining turbomachinery parts for the locomotive industry. However, in the last four years, a major technical challenge has been overcome — the creation of optimized toolpaths for complex turbocharger impellers is now simplified and expedited using MAX-PAC™ CAM software from Concepts NREC.

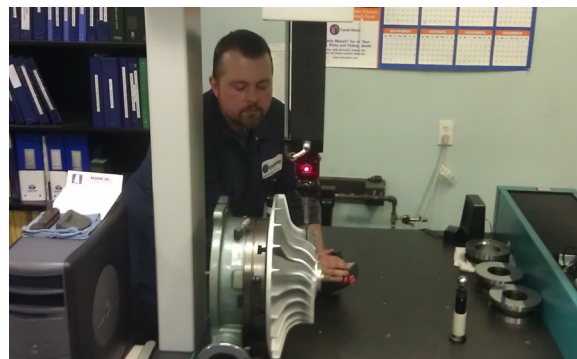
Located in Yuba City some 35 miles (50 km) north of Sacramento, Chipco Manufacturing has, since its formation in 1960, become a respected resource for five-axis prismatic machining, Concepts NREC turning, and multi-axis, multi-task machining services. The business has remained family-owned and operated throughout its history, with an unerring commitment to continuous investment, in both hardware and software. A case in point is the company's implementation of MAX-5™ CAM software.

"The most difficult geometries can be produced by utilizing a combination of CAD/CAM technology, Concepts NREC equipment, and our staff's extensive knowledge of close tolerance machining," says Jeff Fredieu, Chipco's Manufacturing and Operations Manager. "However, until four years ago, we were contracting out our CAM programming requirements either to Concepts NREC or other suppliers of this service."

With orders and new business mounting, the lack of project control caused by the outsourcing of CAM programming prompted Chipco to review its

strategy and bring this important function in-house.

"We noticed that the impellers created using toolpaths generated by Concepts NREC were always superior to those made by other CAM



*Corey Halloran, Chipco's QA/CMM specialist, takes points on an impeller to create a new program in MAX-PAC.*

programmers," says Mr. Fredieu. "It was this that made us consider MAX-PAC as the preferred in-house software for our business moving forward."

Most of the machining operations at Chipco's 22,000 sq. ft. facility involve flank milling. Using MAX-5's patented algorithm, significant cost savings can be realized deploying ruled-surface designs and production with a flank milling process in which the entire blade surface can be finished with one pass using the side of the cutter. Compared with other CAM systems, MAX-PAC is often capable of generating flank milling toolpaths with 80% to 90% error reduction. The alternative of point milling requires many finish passes to

## Company Optimizes Rail Impeller Milling with MAX-PAC™, continued

leave a suitably small cusp height between consecutive passes.

"A typical impeller for a diesel electric locomotive turbocharger measures 15 inches (38 cm) in diameter and around 10 inches in length (25 cm); however, our machinery allows us to accurately produce impellers of up to 28 inches (71 cm) overall diameter to the strictest tolerance and surface finish specifications. This level of quality would not be possible without MAX-PAC," says Fredieu.

All of Chipco's locomotive turbocharger impellers are machined using a Mitsui Seiki HU40A-T five-axis, four-pallet horizontal machining center. The four-pallet facility allows them to load the machine and leave it running unattended overnight and on weekends. However, achieving the necessary confidence in lights-out operations of course requires reliable toolpaths. "We can control everything a whole lot better now that we have MAX-PAC in-house," says Fredieu. "In particular, high levels of quality are

Every 1-2 months, on average, a new impeller design arrives, but these days, knowing the capabilities of MAX-5, little seems to faze Fredieu.

"I'm pretty experienced now," he says. "I know what cutting techniques and routines I like to use; whether I'm going to use a longer hub or shroud, and what offsets I need — I've already got a template down. If all else fails, I can always contact Concepts NREC for applications support — they always get me on the right track in no time."

For Chipco, however, it's not about eliminating every second from the cycle times of these high value complex components. Quality is a far higher priority.

"If it takes a little longer to cut but we have fewer problems with issues such as tool life or push-off, then it's far more cost effective in the long run, for both ourselves and our customers," explains Fredieu. "We have a lot of competitors, particularly overseas, and it's always a challenge to match the prices offered. At Chipco, we sell on quality and personal service. We will jump through hoops to meet the requirements of our customers, and we believe this is the reason we have relationships with some customers that date back over 30 years."



*Running a part on the Mitsui.*

invaluable to our business, as is change control. If the customer requires a modification or we see a good way to improve the machining operation, we simply edit the program, re-post, and start cutting without any compromise to lead times."

"Aside from impellers, the software is also great for machining diffusers, as well as reverse engineering from castings, for example. We simply take points and create our own lines — it's so easy."



### CORPORATE HEADQUARTERS

217 Billings Farm Road  
White River Junction, VT 05001-9486 USA  
Phone (802) 296-2321 • Fax (802) 296-2325  
E-mail: [sales@ConceptsNREC.com](mailto:sales@ConceptsNREC.com)  
Web: [www.ConceptsNREC.com](http://www.ConceptsNREC.com)

Agile Engineering Design System, AxCent, AXIAL, COMPAL, FAN-PAL, MAX-PAC, PUMPAL, FINE/Agile, Pushbutton FEA, RITAL, and TurboOPT II are registered trademarks or trademarks of Concepts NREC, LLC. Any other company, product or service names may be trademarks of their respective owners.