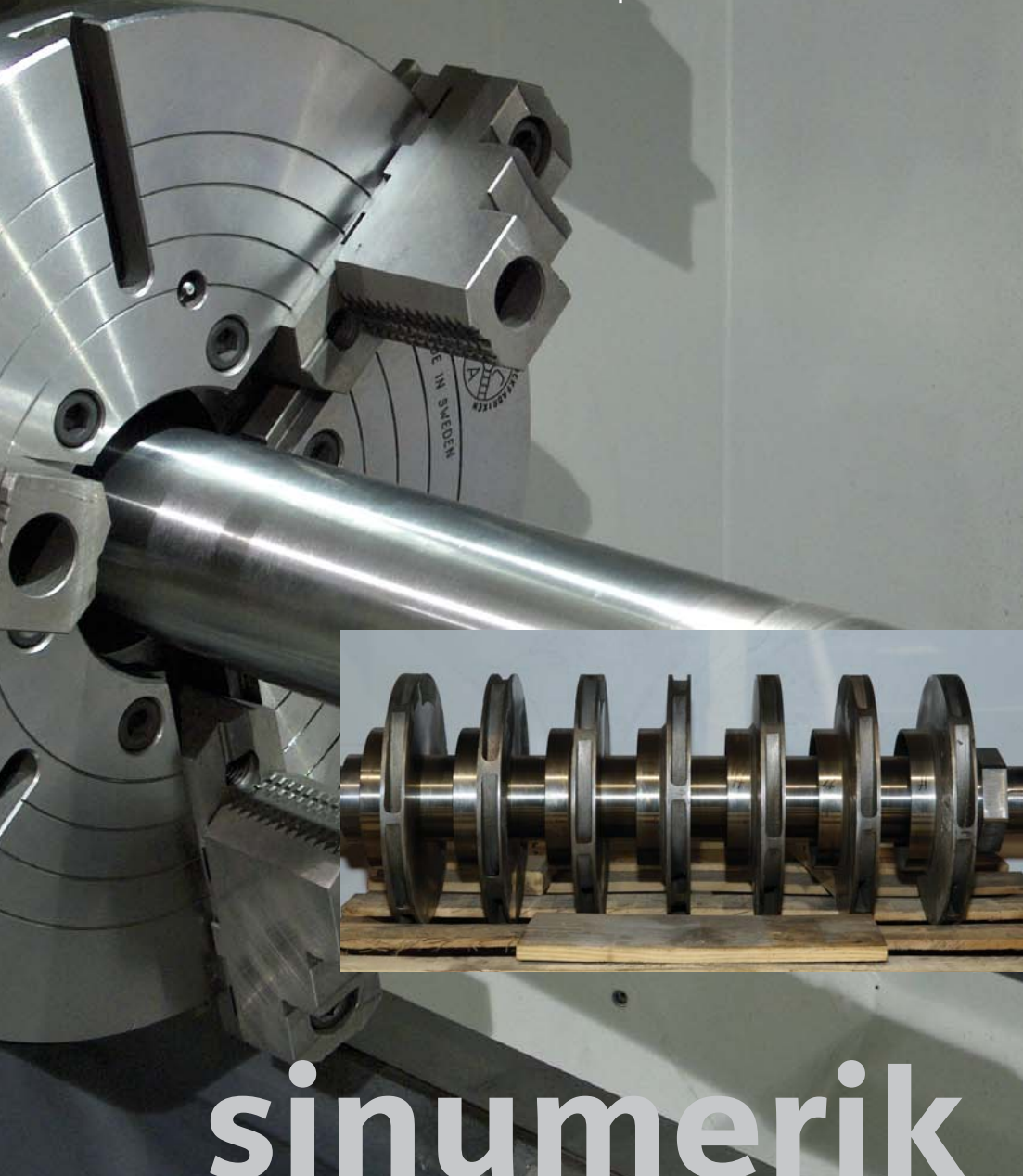


PUMP REPAIR/REBUILD SHOP TAKES BIG STEP FORWARD

33% reduction in time-to-part



Rotating Equipment Repair, Inc., based in Sussex, Wisconsin has taken a major step forward in its machining technology, with the use of a new CNC cycle-controlled lathe. By implementing this equipment for its pump shaft and other long, heavy workpieces, according to plant manager Bob Merriman, RER has realized a 33% overall reduction in time-to-part, with some jobs involving a 50% reduction, based on the tracking done by the company.

Inset: A typical shaft rebuild done by RER (Rotating Equipment Repair) of Sussex, Wisconsin shows a 7-stage water pump assembly, on which the shaft was machined on the Weiler lathe in 33% less time than previous methods used at the company. RER also machined the shaft nuts and impellers, cut keyways and reassembled the unit for a .001"-.003" interference fit. The shaft is CA6NM, a modified 400 Series magnetic stainless steel, with high-corrosion resistance.

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CASE STUDY

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Case Study • Weiler—Rotating Equipment Repair, Inc. (continued)



E70 CNC Lathe with Parat tool post that features thru-tool or over-the-top coolant, Weiler USA

The machine, in this case, is a Weiler E70, a CNC lathe equipped with a dedicated control, designed by Weiler and based on the Siemens SINUMERIK 840D architecture, for the specific needs of the lathe operator. According to Andreas Schulz, Weiler's general manager for the U.S., the machine has been designed so that simple parts can be made in the same way as on a manual machine, only better, while complicated parts can be made in the same way as on a CNC machine, only more easily.

This is the result of three factors, Schulz says. "First, we built the control to run with a very rugged, rigid and high-precision machine. Secondly, the control was designed by machinists, based on the input we gathered through our internal marketing operation. Last, but perhaps most importantly, Weiler engineers wrote the code graphics, emphasizing the simple, fast and informative. An operator doesn't need extensive G-code or CNC knowledge and can

go from a drawing to cutting in far less time. Plus, he can make adjustments on the fly, especially in the running speeds, to compensate for various factors, without interrupting the basic program." For RER, the machine was sold and training was provided by the local Weiler dealer in Wisconsin, Mike Weller of Weller Machinery in Pewaukee.

Bob Merriman of RER echoed this observation. "We installed the Weiler E70 with its 4-1/2 meter (177") bed about six months ago. Since that time, we've cut our production per part by at least one-third and up to one-half on some jobs. The constant speed of the machine, the adjustable feed, the non-stop production rates and especially the programming set-up all contribute to an overall savings for us." A typical job Bob cited involved a part where the previous run took 45 hours and was now being done in 28 hours with superior quality. He noted the straightness of the part, the tight tolerances held to ± 0.0005 " and the finish quality, even on vertically heat-treated 416 S.S. were outstanding. RER typically works on 3"-5" diameter, multi-stage, high-pressure boiler feed pump shafts that need to run at 3600-5000rpm. As a turnkey operation, the shop also repairs and rebuilds impellers, sleeves and nuts for finished assemblies with extremely tight interference fits, in the .001"-.003" range. On its largest job to date, a 55' long pump shaft was machined, for use on a vertical pump with diffusers on the shaft.

Merriman described the workflow on a job at RER, as it involves their Weiler lathe. A pump is delivered, broken down and analyzed for requirements. The engineering department prepares a Pro-E drawing for the shaft work. Material requirements are determined and the particular material is cut to length, usually from RER inventory, on the



RER plant manager Bob Merriman checks the status.

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in-house band saw equipment. The machine operator writes the program on his laptop and the material is loaded. The program is transferred to the machine and the cutting begins. One-off is the standard at RER, with a typical work-piece starting as a 600lb. billet and finishing as a 400lb. machined shaft

With the look-ahead feature of the Siemens CNC architecture, the Weiler control can maintain a constant cutting speed, while adjusting for angle to radius changes and especially on precise internal threading. Another Weiler Machinery customer who purchased a Weiler lathe explained the machine's performance in the latter application.

Allan Hock of H&M Machine in Greendale, Wisconsin needed to put a 2-pitch internal ACME thread in a 14" ID on a 15-3/8" long part. He noted, "For the grooving and threading cycles we needed, this was the perfect machine. The control was clearly made by machinists, not computer guys. It has truly user-friendly cycles and we can even change speeds manually while the cutting is proceeding. The weight and the rigidity of the machine are perfect for our needs, even though we needed to pour a special concrete base for the Weiler. We had another machine under consideration that was \$50,000 cheaper, but we know we made the right decision, based on the performance and the quality of the finished parts we get."

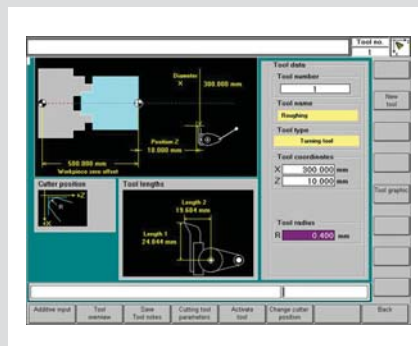
The Weiler designed controller, based on the architecture of the Siemens CNC and its Wizard template, is provided to the customer with customized screens for particular machining functions, tool management, thread cutting cycles, part profiling and cut simulations. A drilling axis in the X or Z axis can also be selected for machining of bore holes and threads. As a demonstration of the company's commitment

to continuously improve the control, four software engineers at Weiler have Siemens 840D CNC's at their workstations to simulate all possible screen variations, based on the input from machinists worldwide. Thus, Weiler R&D receives new or unique application data from the field almost daily, then incorporates the machine motions and tool management schemes into the architecture, to make the control as adaptable onsite as possible. Long used in the oil & gas industry for long, heavy sections of drilling equipment and other rotating devices, Weiler lathes are finding applications in the aircraft, steel and power industries. At one government facility, an E-Series machine makes the hologram for dollar bill printing.

Under the leadership of owner Kurt Weis, RER performs heavy repair and rebuild operations on pumps, primarily for the power generation industry. In addition to in-house machining, welding, final assembly and sophisticated diametrical/runout testing procedures, the company also operates a portable "machine shop on wheels" that can travel onsite for breakdown, repair and rebuild operations at the company's power gen customers. Another facility is currently in planning for the Southeast region to better serve RER customers there.

While machining shafts are the company's primary focus, RER also repairs or rebuilds threaded nuts, sleeves, bearings, balance pieces and forgings for their customers.

Bob Merriman, RER plant manager, sums up the company's experience with the Weiler CNC lathe. "Anything you can do on a conventional engine lathe, you can do on this Weiler machine, only better and faster."



Left: The Weiler designed controller, based on the Siemens SINUMERIK 840D CNC platform, provides the lathe operator all the pertinent data, customizable for the application and staged for fast production on a series of one-off runs.

Right: Individual screens provide machine data, tool management information,