

Cutting-Edge Grinders are Great—

BUT HOW'S YOUR WORKHOLDING?

Jack McGuinn, Senior Editor

Ok—you make big gears and you've gone out and purchased, say, a spiffy Höfler Rapid 900 or 1500, or maybe a Gleason 1600. Nice move. But some owners of such machines are finding them to be almost too much of a good thing. The problem, they say, is that while their new machine is state-of-the-art, they are finding that their workholding tooling is so last-century, particularly for large-gear production. It is somewhat like buying a complex machine and not having anyone on the floor capable of running it. Capacity is key today, and the best way to ensure that you are squeezing every dime out of that new machine is to complement it with innovative workholding.

And that is exactly what Milwaukee-based Rexnord did.

“The big thing was that we purchased a Höfler rapid 900 and we realized we bought the latest and greatest technology to grind the part, yet we were putting 1920-vintage tooling on here,” says Marty Kuklinski, senior manufacturing engineer, Rexnord geared products division. “What we did in the past when we'd finish grinding the gear teeth geometry, we sat them on a thrust plate or thrust ring. We would have hundreds of these different plates because the OD of the plates would have to be less than the root diameter of the part that we're finishing.

“We approached Drewco and said ‘Setup is killing us, because every time we go from one part to another we have to take this plate off, put another plate on; we've got to bolt the plates in place, which is standard throughout the



Top: Drewco's workholding system in action. Bottom: The part is held in place by the activation of three pedestals (Courtesy of Rexnord).



industry.”

Drewco, of Franksville, WI, had the answer.

“They asked us if we had an idea for shortening their setup time, so they gave us a family of 30 different gears—bore ranges of 3 to 12 inches—and we came up with a center pedestal setup. Because

of the large range we came up with three different series of mandrills or extending collets,” says Jeff Moczynski, Drewco engineer/engineering manager. “They initially wanted a big ring that the gear would rest on way out towards the root diameter of the gear. Some of these gears were six feet across and larger—

for all these gears you’d have to have a bicycle rack for storing all those plates. I suggested that we use these pedestals that would be precision-ground and move them in and out on the keyways of the table. They weren’t real comfortable with it at first, and the other thing they were concerned about was that with the weight of these gears, would our collet be able to center the gear to overcome the weight of it—one gear was 1,700 lbs. But manually, with just a wrench and a flange nut, we were able to turn the gears within a half-thousandth every time.”

Moczynski goes on to explain that “The activation of the collet was done by means of a custom-built hydraulic nut. This was done for two reasons—one, it provided direct axial force to expand the collet as opposed to the rotating/axial force a standard nut would provide; two, due to the depth or hub width on some of the larger gears, the activating nut was deep inside the bore, thus not allowing the use of a standard wrench. Operators activate the nut by use of a T-handle allen wrench—no big wrenches or extensions required.”

Rexnord was thrilled with the results—and the system’s simplicity.

“These uprights (pedestals) are in key slots, and what they did was make little spacer blocks for us that located off of a central pilot,” says Kuklinski. “And we just put these blocks in and slide these three uprights in place, and that positions the part like the thrust plate would under the root diameter. So now we’re not changing any of these plates. We have these uprights on a fixture and, based on the root diameter, they gave us gage blocks and we just set them in, and we bump up those three uprights, bolt them down and we’re ready to go.

“So, we’ve cut our setup time by 50 percent, if not more.”

Drewco has been equally effective with other gear makers as well, Milwaukee Gear among them.

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“We were using a lot of traditional manual tooling—solid bushings, clamp plates—and now we use a set of six pedestals with the expanding mandrill from Drewco,” says Mike Pascavis, gear supervisor. “You put the part on, clamp it up, and it holds the part very well. It works very well on our Höfler Rapid 1500 and Gleason 1600. If you make a significant investment in a gear grinding machine or hobber, why limit yourself with your table tooling? You can cut down your cycle and setup time by investing in efficient tooling. Our old way was labor-intensive; now we’ll do a 50-piece run and guys are taking only 10 to 15 minutes for setup. The savings start adding up.”

Drewco’s Moczynski explains that both customers were given a setup sheet for each part, so they knew what mandrill was needed with which collet. He also points out a residual benefit in that the work area is much less cluttered, especially in the number of storage racks. And speaking of capacity, the new workholding system is keeping the pedal to the metal on those new machines.

“These new grinders and hobbbers—they have much higher capacity. So with our short setup times, in conjunction with better grinding equipment—they (Rexnord) gave us a whole raft of parts and they ran this machine ‘out of business,’ ” says Moczynski. “They actually started using the older hobs and grinders, and we put them out of business as well.”

Rexnord’s Kuklinski certainly concurs.

“It gives us a lot more flexibility to go from Part A to Part Z because with the old system we had we would load the work up so we’re not changing all those thrust plates—we’d try to almost batch the work through,” he says. “Now you can run one part at a time regardless of what the next part is. The setup time is so short that we can jump from one

size to another and—presto—the setup is changed and we’re ready to go.”

Prior to taking shipment of the Höfler, Kuklinski explains, the machine builder provided cycle times based on some test parts that Rexnord sent them. And then a light bulb went off.

“Based on (the test cycle times) and based on the machine that we were taking work off of, we saw a percentage increase (in productivity). But then we started looking a bit further when the machine was in transit and we said ‘We’re going to make it up in the grinding time, but we’re still going to lose out in setup.’ So we figured at that time that we better take a hard look at our tooling and say—‘Wait a minute, we need to take another step here and move into the 21st century.’”

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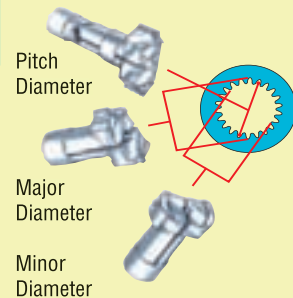
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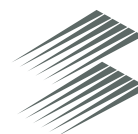


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Stadtfeld spent five years researching this project with the collaboration of four colleagues.

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"The (*Gleason*) *Gear Encyclopedia* is a logical progression of one of my earlier works, the *Gleason Gear Dictionary*," Stadtfeld says. "This time, I wanted to provide the industry with a much more comprehensive and easy-to-use reference book that will be beneficial not only to gear engineers, but to the gear industry as a whole."

Stadtfeld has authored several other gear industry publications, including *Handbook of Bevel Gears* (1993), *Bevel Gear Technology* (1994), the *Gleason Gear Dictionary* (1994) and *Advanced Bevel Gear Technology* (2000).

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