

TOOLING & PRODUCTION

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Strategies for Large Metalworking Plants

ON TARGET
WITH
**AUTOMATED
CENTERLESS
GRINDING**



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TRU TECH

Systems

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On target

For a new generation of parts, automated centerless profile grinding fills the bill — with up to 3-fold increase in production

Two Southern manufacturers are reaping the benefits of automated centerless grinding that range from time and money savings to a 300 percent improvement in production.

Ostrem Tool Co. of Lyman, SC, a manufacturer of customized carbide tooling, experi-

producer of ceramic components, saw a three-fold production increase in one job.

Both give credit to the TT-8500 Centerless Profile Grinder from Tru Tech Systems of Mount Clemens, MI.

In developing a modern automated approach to centerless grinding, Tru Tech augmented existing technology with customer-sensitive features as the basis for a fully automated system for high performance grinding.

Before “unmanned machining” became an industrial byword, high-volume manufacturers in the appliance and electrical motor industry had applied mechanical automation, such as inclined plane loaders, to centerless grinders.

But today's parts have changed in many ways including configuration, material, finish, and quantity produced. Complex shapes in new alloys and non-traditional materials require step grinding, profiling, and more exacting tolerances. Multiple runs demand shorter setup times and ease of programming.

“We knew from the start that flexibility was key,” said Tom Lebel, Tru Tech product manager. “Because of our experience in working with complex high-precision applications, we understood that customers would be running multiple parts and sizes and that ease of setup would be critical.”

The Tru Tech unit selected for full automation was the TT-8500. Capable of accommodating parts of up to 7.5” long, and up to 3” in diameter in conventional applications, the grinder utilizes an 8” standard wheel powered by a 2hp drive (3hp optional).

Input increment is 0.000010” with accuracy



The grinding operation on the Tru Tech TT 8500 saves time and money for Ostrem Tool Co.

enced outstanding savings due to the grinder's automated profiling capability.

CeramTec North America of Laurens, SC, a



A gripper loads the part onto the workstation.

cies of up to ± 0.000010 " and repeatability of ± 0.000050 " due to the patented high-precision grinding unit.

"Because we don't automate to a chuck, the center varies on every part," Lebel explained. "To ensure perfect results, we lay the part on a precision-ground regulating roller to ensure there will be no deflection."

Custom pallets/ SCARA robot

Parts are loaded via a SCARA robot moving between a specially designed part pallet and the grinding area. The part's grippers consist of a fixed finger and moving finger and load in one direction. Auto-offset ensures that the gripper never contacts the rubber roller.

Standard pallet size is 8" x 10" and is available to accommodate diameters ranging from 1/8" to 1" (3mm to 25mm). For specialty applications, custom pallets can be provided.

Parts at the grind stage typically have significant value, so efforts have been made to ensure integrity and protect the part. Pallets are constructed of engineered plastic to minimize the possibility of chipping or other disfigurement in the event of misalignment during loading or unloading. Further, parts are loaded from one pallet and, after grinding, unloaded onto a second "finish" pallet.

For extended automation capability, a variety of pallet storage systems equipped with recognition and load/unload capability can be designed.

In surveying current and possible customers for auto-

'WE DISCOVERED THAT we could use profile grinding for everything but the final sharpening. Also, we're doing longer runs with tighter tolerances.'
— Heath Bolts

mated centerless operation, ease in programming was a major consideration.

"With or without automation, parts runs demand faster, more flexible programming, and improved user friendliness when it comes to operator instruction," Lebel said.

"To meet this need, we developed a control featuring interactive voice tutorial incorporating simple, precise instructions in sequential format," he explained. "The operator is guided through a series of operations that make for both ease of programming and in-process training."

The software permits the entry of basic values rather than G codes. Lebel said when the values are entered, simulated part views appear on-screen in highly readable graphics. Other helpful features include trig help and radius help.

Because automated systems frequently involve other machines or ancillary equipment, controls are compliant with MT Connect, the new

Continued on page 12



Another gripper unloads the part into a pallet.

standard protocol for connectivity between controls, devices, and software applications. This permits G code recognition and eases networking. The system can also interface with MRP software and facilitate remote reporting.

Features facilitating automation capability include:

- An Ebbco filtration system which eliminates swarf above 1 micron while maintaining a constant temperature to prevent thermal part expansion.
- An automatic lubrication system that provides real-time lubrication and will stop the machine in the event of pump failure or lubricant shortage.
- On-site diagnostic capability.
- In-process wheel dressing with automatic compensation at the control.



The grinder is equipped with a probe to measure the length of the parts

polybond formulation.

Another order, which formerly took one month, is now accomplished in a week.

“The ease of programming got our operators up to speed quickly, and the only problem we have had to do with

something, we’ll do it,” he said. “When we heard that automated centerless grinding was available, our team reviewed all the manual processes that we were doing on our 3-axis machines to determine how well the technology would fit.

300 percent improvement

CeramTec North America, a division of a German-based firm producing a range of ceramic components, expected to see better results with automated centerless grinding, but was surprised with the outcome.

“When we introduced the automated machine, the result exceeded even our expectations,” said Mark Payne, team leader, grinding. “On one piece of work, we saw a 300 percent improvement in production.

“One of our primary jobs is the production of pump seals for a sister company,” he said “The material is 96 percent alumina which is pressed and machined in a green state.”

After firing, the final profiles are ground in. Sizes are in the range of 0.020" OD and 3" in length. There is a finish requirement of 32RA or better.

The pump seals are typically manufactured in medium- to large-batch lots. Standard diamond wheels are used for routine grinding, and profiling is achieved with the aid of a

PARTS ARE LOADED via a SCARA robot moving between a specially designed part pallet and the grinding area. Auto-offset ensures that the gripper never contacts the rubber roller.



Health Bolds, co-owner of Ostrem Tool, believes manufacturers need to embrace newer, better methods.

was swarf control early on,” Payne added.

“In fact, we plan to add a second installation in the near future.”

Resharpener up to five times

Ostrem Tool Co. has employed automated centerless grinding for over a year. Co-owner Heath Bolds is an avid believer in the need for manufacturers to embrace newer, better methods.

“If there’s an automatic way to do some-

"One of our jobs involves drills and reamers," Bolds explained. "We discovered that we could use profile grinding for everything but the final sharpening. Also, we're doing longer runs with tighter tolerances."

"We typically run 50 to 100 parts at a time, and our pallets are designed to hold from 50 to 200 tools," he said. "Sizes range from 1/8" to 3/4", and the material is solid carbide."

The grinder is equipped with a probe to define the length of the parts, as well as automatic wheel dressing and corresponding wheel diameter compensation at the control.

"One of the advantages with this machine involves tools with specially shaped heads that are rounded or contoured," Bolds noted. "It would be impossible to grind and profile these tools on most grinders because you would encounter the front stop. On this machine, you don't."

Bold said that although most of Ostrem's work involves new tooling, there is a considerable amount of resharping done.

"It's extremely easy on a Tru Tech because we can reference the original part program and enter in the compensation," he said.

"Given the expense and complexity of some of the specials we produce, resharping is a big money-saver for our customers," Bolds noted. "In fact, we typically can sharpen up to five times."

The automated profiling capability has resulted in exceptional savings in both time and money for Ostrem.

"Profiling solid carbide was extremely time-consuming for us," Bolds said. "Parts that used to take all day now run on a second shift unmanned."

Future growth

Tru Tech's Lebel foresees rapid growth for automated grinding applications:

"Global competition has forced many manufacturers and shops to re-evaluate the entire manufacturing process," he said.

"While grinding used to be regarded

as primarily a finishing process, people today are using profiling capability to generate shapes and create a desired finish in the same step.

"That adds up to a tremendous savings in terms of time, setup, fixturing, and quality control and eliminates the need for a second operation on another machine."

Prior to this time, the only element missing was on-board automation.

"Now that we've made that leap, I think we can look forward to a whole new generation of automated grinding applications," Lebel said.

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