

# Retrofitting puts machines in gear

*New CNCs elevate old gear machines to today's standards.*

**By Charles Bates, senior editor**

**G**ear cutters and hobbers tend to outlast typical machine tools because of the parts they produce and their high production levels. But keeping these machines around does have one significant drawback — mechanically, gear-manufacturing machines usually outlive their controls. In this situation, gear-manufacturing shops have few choices. They can hobble along with outdated controls or scrounge around for used parts to repair them. Or they can opt for a complete in-field CNC retrofit and get a “new” machine in the process.

The most important benefit of in-field CNC-retrofit packages is that they bring machines up to current standards. Putting today's controls on yesterday's machines provides more options, improves accuracy, and makes for faster changeovers. And because the retrofit is done at the customer's facility, there is less production time lost.

“When a machine goes to a vendor's plant for a retrofit, the customer loses about six months of production. On the other hand, an





For its in-the-field gear-cutter or hobber retrofit, Drake quickly installs new, updated CNCs to get equipment back in production faster.

in-field retrofit has the machine back in production after a week,” says Dave Bartholomew, a mechanical engineering technician at Drake Manufacturing. The company, in Warren, Ohio, retrofits hobbers, gear-cutting machines, and grinders.

The process starts, explains Bartholomew, with a mechanically sound machine because the retrofit is not a band-aid that covers up sloppy ways and worn bearings. For first-time customers, Drake sends in an engineer who notes servomotor dimensions and gathers other engineering data. With this information, Drake designs a retrofit package — complete with all necessary components — ready to install.

During installation, a crew of Drake engineers replaces servomotors and servo-feedback cables, adds new or updates existing machine scales, and puts in a CNC package housed in either a roll-around cabinet or a framework attached to the machine’s existing control panel.

Depending on the condition of the machine’s electrical, non-CNC hardware, Drake may fully upgrade starter motors, fuse packages, and other related components. With the upgraded electrical system tied into the new CNC, the machine is ready for initial startup.

According to Bartholomew, gear machines are more complex to retrofit than other systems. For instance, they typically have six axes as opposed to two or three, and there is usually some type of automation — either a carousel or pick-and-place system — to contend with.

For one of Drake’s customers, John Deere in Waterloo, Iowa, retrofitted controls let it add future options, such as automation. The first couple of machines Drake retrofitted for Deere began as manual-load. But later Drake easily converted them to

robot loading using a selection switch within the new, updated controls.

In all, Drake’s retrofitted nine machines for Deere — mostly Gleason and Pfauter hobbers — with three more on the schedule. Depending on the machine, Drake uses either Fanuc 16i or 18i controls in its retrofit packages.

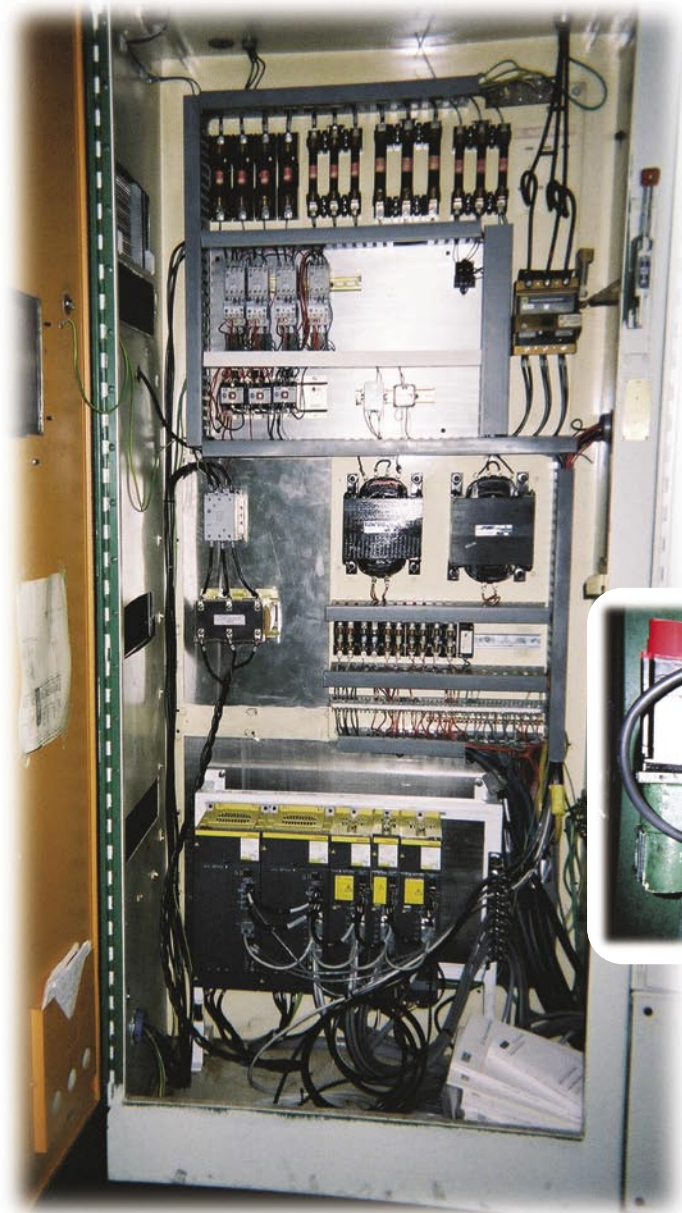
For Deere and other customers, Drake’s retrofit does improve some aspects of machine accuracy, says Mike Hughes, manager of information systems and a systems engineer at Drake. While the retrofit doesn’t fix mechanical issues, the new motors have higher encoder counts, so machines run tighter control loops for more accurate positioning.

Drake further improves part accuracy by eliminating the machine’s electronic gearbox. In its place, an option, called Flexible Synchronous Control, in the Fanuc CNCs maintains the timing between the cutter and workpiece/gear.

“Before Drake comes in, we clean up any machine-maintenance problems, so the project doesn’t involve major mechanical overhauls. But the machines aren’t usually that bad, so with the new controls and motors, accuracy does improve,” says Steve DeGraeve, facilities engineer and lead man on equipment overhauls at John Deere.

“Basically, our operators program out machine slop due to wear,” continues DeGraeve. “They are quite familiar with the machines and know how to get around any shortcomings.”

With the old controls, it was hit-or-miss as to whether or not machines would return to operating conditions after a power outage or a weekend shutdown. “When anything unusual happened, we weren’t sure what the old controls would do, or if they would be damaged,” adds DeGraeve. The new controls power up and return the machine to its accurate settings.

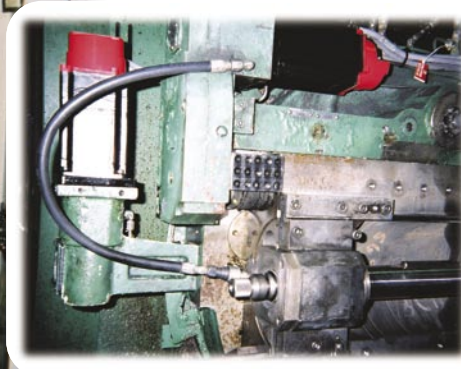


**If needed during a retrofit, Drake upgrades a machine's electrical, non-CNC hardware and ties it into the new CNC.**

changes because Deere runs such high volumes.

**Why the retrofit at Deere**

Deere could no longer find support or replacement parts for the Allen-Bradley controls on its gear-manufacturing machines. "The controls were outdated technology," comments DeGraeve. "We needed more flexibility and had to upgrade to today's standards." The company did consider less-expensive control panels for retrofitting, but it went with the Fanuc because they handle the complexity of a gear-hobbing machine.



**New servomotors installed during a Drake retrofit deliver a high encoder count, so machines run tight-positioning control loops for improved accuracy.**

"Drake is well-versed in retrofitting such controls," says DeGraeve. "Four guys come in and know exactly what they are doing. Once their work is done, our operators are trained, and we are back in production." ■

Part changeovers/setup are also faster and easier on operators at Deere as a result of the retrofits. Prior to the new controls, the process involved a list of numbers generated in the front office. Now, operators set up the machines for parts, programming-wise,

by themselves without the level of engineering previously required.

Control-menu entries tie into prints/drawings and naming converters, so operators simply read a print and set up the machine. Once programs are in, there aren't a lot of

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