

You've Gotta Know How to Hold 'Em

Magnetic workholding is a winning strategy at TMF Center (Williamsport, IN)



Finished engine gaskets are laser cut, then 58 holes are drilled and tapped.



Jeff Martin and Andy VanMeter

The TMF Center has been dealt a lot of winning hands lately in the high-stakes game called *Reducing Cycle Time*. Like all manufacturers, TMF is always looking for ways to improve its manufacturing processes. Optimized CAD/CAM systems, manufacturing robots, and the most advanced cutter technologies, can all be easily found at TMF. But until recently, their workholding was strictly traditional; vises, toe clamps, and manual fixtures were the norm.

While walking the FABTEC show, Andy VanMeter (General Manager) and Jeff Martin (Plant Manager) recognized the familiar faces of John Swann (Product Manager) at the Techniks booth. Andy and Jeff had been buying toolholders from Techniks for years, but were unfamiliar with their Earth Chain line of magnetic workholding products.

After viewing a demonstration of the ECB magnetic vise, Jeff and Andy thought that magnetic workholding may have the potential to improve setups and part change-over times on some of the production lines at TMF. They left the show intent on finding out if they had an application to use as a test case for magnetic workholding at TMF.

TMF's manufacturing processes includes: machining (74 CNC machines), robotic loading and welding (7 machines), painting, grinding, heat treatment, sawing and forming. They produce components made from steel bar, steel plate, and iron castings. These components are used in the manufacture of heavy-duty trucks and earth-moving equipment.



Workstops are used for fast and easy part alignment. (circled) The soft jaws of the magnets have been machined to create clearance for drilling and tapping operations.



For machining the engine gaskets, a custom table was made to house the magnetic vises level with the table face. Built-in workstops provide accurate alignment, and the table supports the thin areas of the engine gasket during drilling and tapping.

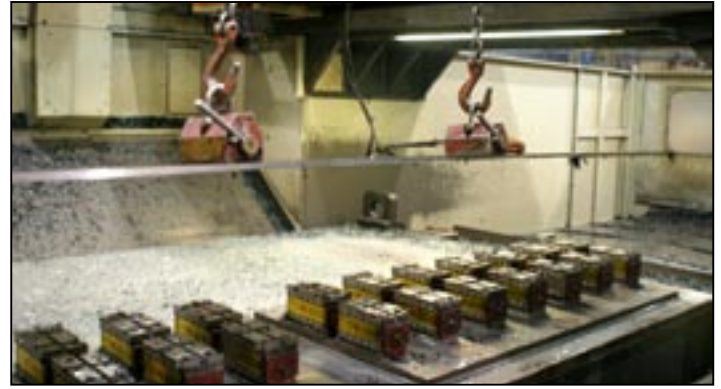
Many of these components are laser cut to shape with secondary mill, drill and tap operations. Traditional fixturing using vises and toe clamps worked fine, but initial setup times ran up to 2 hours per piece, and part changeover required time-consuming changes to the setups.

With the help of their programmer, Andy and Jeff reviewed the drawings used to produce “side plate” components for an asphalt roller. Stacking the part drawings in their CAD program, they could see where magnets could be placed to handle all the different sizes they produce (7) and still hold both sides of each size. In effect, 14 setups were combined into 1. John and Greg of Techniks/Earth Chain provided the magnets needed and testing began.

This part had previously been held using 12 toe clamps. Setup times averaged about 2 hours and part changeover required the operator to release all 12 clamps, switch parts, and then retighten by hand with final tightening using an air ratchet. Using the ECB magnetic vises changeover time is about 5 minutes, most of that spent transporting the stock.

Next, Jeff and Andy looked at using magnets to hold a component called a screed, that is used to control asphalt flow on road construction equipment. Screeds are manufactured to various lengths and widths, and are drilled and tapped. This component was traditionally held by vises to allow drilling and tapping, and setup time took about 2 hours. Part changeover took 30 minutes because it required manual release of each vise, plus the jaws and insides of each vise had to be cleaned of all chips so the new part would sit flat in each vise.

For this application the ECB vises were laid out in 2 large banks on the bed of the machine, large enough to hold all the different size screeds. Workstops were mounted on the back and left side of the bank of mag-



Two large banks of ECB magnets are used to hold plate stock for the screed. According to Jeff, chip evacuation is easier than with vises because all you have to clean off is the tops of the magnets.



Plate stock for a screed aligned to the workstops.



Earth Chain lifting magnets make short work of positioning the part against workstops on 2 sides.



Ready to begin machining operations.

nets. The soft induction block tops were machined with slots to provide clearance for the drilling and tapping operations required. According to Jeff Initial set-up time was reduced by 65%, but the bigger savings was in part change-overs because the magnets clean up much faster and parts can be locked down and released much quicker than using toe clamps or other fixtures. Part changeover was down to 5 minutes from 12, and considering that TMF manufactures between 80 and 120 screeds a day that meant a savings of between 9 and 14 man hours a day!

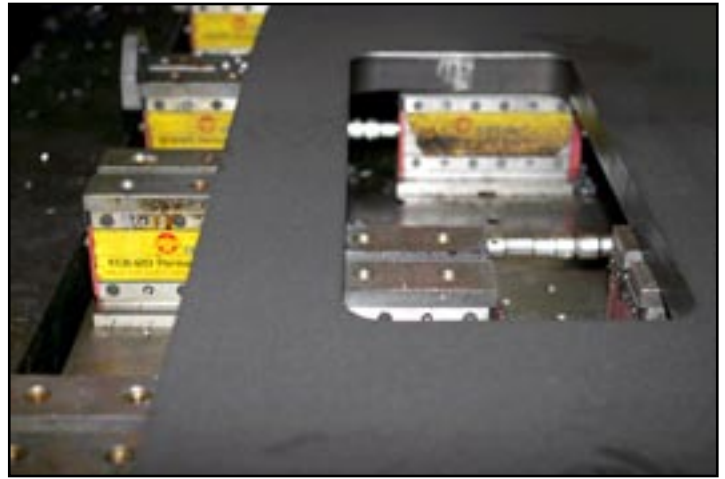
Jeff summarizes the benefits of magnetic workholding this way; “With the old fixturing parts had a tendency to bow up the center, affecting the machining operation. Magnets hold the stock more evenly, so we get the same depth of cut all over the workpiece.”

Regarding time savings he says: “Magnets clean up much faster and parts can be locked down and released quicker than using toe clamps or other fixtures. With vises or fixtures you have to clean everything out totally before you can load the next part. Part change-over now takes only a couple of minutes, and on a process we perform dozens of times a day that adds up.”

Earth Chain’s ECB magnetic vises use powerful “rare earth” magnets that don’t require electricity for operation. They are easily switched ON or OFF with the turn of a wrench. ECBs are used to create modular setups, or to gang many parts together. They allow machining on all 5 sides, and thru-hole drilling too. They are available in 4 different sizes with holding power up to 4,620 lbs.

TMF Center, Inc.
300 Washington Street
Williamsport, IN 47993
765-762-1000

Techniks / Earth Chain
9930 East 56th St.
Indianapolis, IN 46236
(877) 354-3837



ECB magnets can be linked together to turn ON and OFF



TMF uses Earth Chain lifting magnets for stock transport.