Fives Giddings & Lewis
Application Report 3203

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Fabricated Metals

Check Valves

VTC 1250 Vertical Turning Center

The Challenge
Producing check valves for the chemical processing industry poses many challenges. The materials tend to be difficult to machine, the precision and surface finish requirements are high and the components can range widely in size. Hygrade Valve of Point Clear, Alabama produces large valves from hard and abrasive material. They needed a vertical lathe that would handle the diffcult material and improve their cycle times and accuracy.

Part Specifications
Hygrade has a patented design for their check valves. They require very close tolerances and an extremely smooth surface finish in order to maintain seal integrity, reduce turbulence and maintain maximum flow through the valve. The finish is like a ground or lapped finish. The larger valves begin as forgings, typically made of materials such as 4340 carbon steel, 316 stainless steel, inconel and the most difficult to machine material, Hastalloy. Stock removal rates for Hastelloy are 45 surface feet per minute with high speed tools and 125 sfm with carbide tools. Hastalloy requires a machine that is extremely rigid.

The Solution
Hygrade Valve chose a Giddings & Lewis VTC 1250 mm vertical turning center. The VTC 1250 met their requirements for rigidity, accuracy and speed. The hydrostatic ram, roller guideway system, infinitely variable cross slide and heavy-duty table bearing design of the VTC 1250 are just a few of the features that contribute to the machine's rigidity and accuracy.

"High accuracy, repeatability and speed were the reasons we purchased the Giddings & Lewis VTC 1250. We can take heavier cuts for roughing and use faster speeds for finishing. This has improved accuracy and repeatability as well as reduced cycle times and secondary operations."
Henry Teumor
President, Hygrade Valves

Giddings & Lewis VTC 1250 Specifications
- 1250 mm (49 in) table
- 100 hp table drive
- WedgeLock tooling system which handles standard modular tooling. Tools as long as 27.6 inches may be used.
- 20 m/min (787 ipm) rapid traverse.
- Large 250 mm (9.8 in) ram
- Standard linear scales
- Fanuc 160i control with remote pendent and Manual iGuide software.
- Tool probe

The Results
- The VTC 1250 helped Hygrade simplify its manufacturing process and reduce cycle times by as much as 85 percent. Before the VTC 1250, Hygrade had to fixture the same part twice. This has been eliminated. A part that used to take 2 to 3 hours is done in 30 minutes or less.
- The surface finish is like a ground or lapped finish which Hygrade is able to do it in the primary operation on the VTC 1250.
- Hastelloy, a difficult to machine material, requires low cutting speeds and plenty of coolant flow. This is provided by the standard coolant through-the-ram feature of the VTC.

- The rigidity of the VTC prevents work hardening and surface glazing on the check valve.
- The availability of 23 tools in the tool magazine reduces set up time.
- The standard linear scales and infinite number of rail positions on the hydraulic rail elevation and clamping system help improve accuracy.
- Hygrade included the large chiller option to cool the oil and table bearings thereby controlling thermal growth and improving precision.
- The Fanuc Manual iGuide software makes programming easier. Operators can take the dimensions off the drawing, load them into the control and the programming becomes automatic. Graphics for proving the part are provided.

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