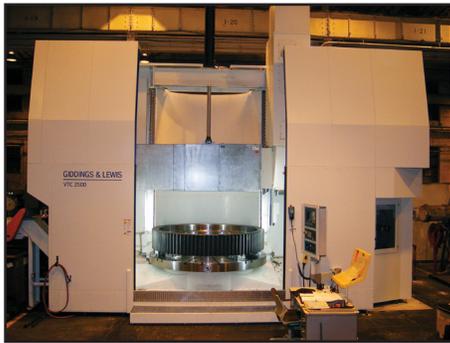


### Mining Equipment

#### The Challenge

With skyrocketing demand for mining equipment, P&H Mining Equipment Inc. sought ways to improve their delivery time. The company chose to implement a manufacturing philosophy called QRM (Quick Response Manufacturing) whose overriding principle is lead time reduction. In a many pronged approach, P&H implemented QRM, selected vendors and equipment, negotiated an agreement with their union, reorganized their factory into cells, installed the equipment and trained employees all within an 18 month period.



#### Parts Produced on Giddings & Lewis VTCs

**Gears.** P&H produces all their own gears. Ring gears have especially tight tolerances.

**Planetary Carriers.** Considered by P&H to be an area of core competency, special tooling and the added reach of the VTC live spindle lend accuracy and machining versatility to the production of these parts.

**Frames.** Two of the VTCs purchased have extended columns to accommodate large parts such as the frames.

**Tumblers.** Weighing more than 20,000 pounds, with diameters slightly larger than the VTC table, tumbler production illustrates the large capacity of Giddings & Lewis VTCs.

#### Fives Giddings & Lewis

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### Gears, Frames, Tumblers and Planetary Carriers

#### The Solution

P&H selected the Fives Giddings & Lewis facility in Fond du Lac, WI as their partner for vertical turning equipment. Among the vertical turning centers purchased were two 1600 mm VTCs, one with a pallet shuttle, and a VTC 2500. For a number of critical parts, Fives Giddings & Lewis programmed, tooled, fixtured and ran off the parts, supplying P&H with a proven process. QRM requires the use of cells and limiting the movement of parts out of the cells. To accomplish this, P&H completely reorganized their rotating factory. Ultimately, nine cells will be in operation. Three now include Giddings & Lewis vertical turning centers. Redundant capacity is a significant concept in the QRM system. Prior to the project, one VTC handled critical components such as ring gears and planetary carriers, often causing a bottleneck. The additional capacity supplied by the VTCs is reducing lead times.

*"We didn't want a typical vendor/customer relationship. We narrowed the field to those companies that could work with us every step of the way, from part processing through service support. We chose Giddings & Lewis as our partner for vertical turning."* Walt Wiedman, Facilities Manager and Capacity Expansion Project Leader, P&H Mining Equipment



#### VTC 1600 and 2500 Specifications

- Three vertical turning centers, two VTC 1600 and one VTC 2500, all include the following:
  - Live spindle and C-axis
  - 75 kW (100 hp drive motors)
  - SIEMENS SINUMERIK 840 D control
  - Automatic tool changer with 26 positions
  - Tool and Part probes
  - Adjustable rail
- One Giddings & Lewis VTC 1600 includes a pallet shuttle system with rotary pallet changer, park stand and rotating setup station with power assist.
- To accommodate taller parts the customer chose added rail height for two of the VTCs.

### VTC 1600 and VTC 2500 Vertical Turning Centers

#### The Results

- A 40 to 50 percent lead time reduction was achieved due to implementation of the QRM manufacturing method and acquisition of new machine tools.
- Use of the VTC live spindle adds machining-center capabilities such as drilling, tapping and milling. The live spindle used with the Kennametal Tuneable Bar adds reach for machining two bores inline, 19 inches apart to extremely tight bore diameters and clocking tolerances.



- The Giddings & Lewis WedgeLock system is a rigid tooling system that provides a stiff connection between the spindle and tool with the 6.3 inch diameter gauge line and 33,000 pounds of clamping force. This is especially important for long tools such as the tuneable bar. "We're pleased with the accuracies WedgeLock is a rigid system and holds close tolerances well." Wiedmann said.
- The C-axis provides full contouring with the 360,000 position table facilitating the drilling and tapping of bolt hole patterns requiring extreme accuracy.
- The pallet pool selected for one of the VTC 1600s is well-suited for cellular production, allowing the loading and unloading of parts during the machining process.