

Modular Fixturing Tames Welding Jobs

Northern Manufacturing Co. (Oak Harbor, OH) is a 75-person fabrication shop offering cutting, punching, forming, welding, finishing, and assembly of metal parts to customers in power generation, furnace and oven, paper pulp processing, waste water treatment, glass tooling, and farm machinery, among other demanding industries.

Since its founding 55 years ago, the company has built a reputation for know-how that goes beyond that typically expected of a fab shop. In 1992, for example, Northern developed the patented Versagage metrology tool that is widely used in metal fabrication. As a fabricator, the company has become known as a go-to source for fabrication of complex shapes and sizes, mostly in difficult stainless alloys—a capability that wins Northern jobs for everything from free-form sculptures to components requiring tight tolerances over very large dimensions. For welding workpieces in relatively low quantities, the majority of Northern's jobs, the company has adopted Demmeler modular welding fixturing systems from Bluco Corp. (Aurora, IL).

Quintin Smith, Northern's CEO and sales manager, first saw the Demmeler system at a trade show while exhibiting the Versagage product. He could see that adding a modular fixturing system for welding in his facility was a natural next step. The first purchase was a D16 system for a new robot welder purchased in 1997. Today, Northern has a total of six D28 systems and tables operating in all areas of the plant.

The Demmeler system is based on a five-sided high-tensile-strength steel table with a grid of accurately located 28-mm bores on 100-mm centers, a pattern of grid lines across the top, and a scale etched on all four edges to aid setups. Flatness of the table is 0.10 mm overall and the bores are located ± 0.03 -mm hole-to-hole and ± 0.05 mm overall. System angles and blocks can be attached to the sides of the table to act as outriggers for parts that are larger than the table surface.

Fixture elements are precision-engineered to match to the table's hole and grid pattern for quick setup, repeatable

ing bolts provide up to 3 tons (27 kN) of clamping force, and withstand up to 25 tons (222 kN) of shear.

Northern is using the Demmeler modular fixturing in an application involving the large-scale laser welding of a "box assembly," a large component critical to the operation of paper-processing machines. The nozzle-like part is 20' (6.1-m) long and made of stainless. Its large area and complex surfaces make it difficult, if not impossible, to form from a single sheet of stainless, so several pieces need to be joined.

Northern utilizes one of its two Prima Rapido CNC five-axis laser



Northern replaced the laser's table with a 5 × 10' Demmeler table to handle the longer part, which is indexed after one section is welded to complete the welding operation.

performance, and easy removal. Structural pieces have slots to locate around irregular assemblies that are between the hole grid pattern. Positioning and clamping bolts attach the fixture angles, workpiece positioners, and other elements to the worktables or to each other. The hardened clamp-

cutters/welders to weld the long joints. The Rapido laser is of a moving bridge type on which the workpiece remains stationary while the bridge-plus-laser head moves to generate all five axis motions.

The laser is well-suited to welding a joint this long. Chad Geretz, process

engineer, explains: "Northern obtains high strength joints with minimal distortion due to heating, a small heat affected zone (HAZ), a narrow weld profile with good appearance, and considerably faster weld rates than traditional welding, but all of this would not be obtainable without precision fixturing." The various subcomponents making up the finished box assembly are assembled prior to reaching the Rapido laser machine, which performs final welding operations.

To accommodate the overall length of the part, Northern has replaced the table that came with the laser with a 5 × 10' (1.5 × 3-m) Demmeler table. The part is longer than the travel on the laser, so one section is welded, and then the part is indexed to a new position to complete the welding operation.

The laser operator uses the Demmeler horizontal clamps to ensure

that all joints are properly aligned and secured. Angles mounted to the sides of the table extend the surface to support and locate larger parts. "When you're CNC laser welding, it's absolutely critical to precisely locate the joint. The laser welding head moves to an absolute position, and the parts better be exactly there," Geretz says. "Tackling this job would not have been as fast and precise without the Demmeler system."

Another job requiring special setup that benefits from Demmeler modular fixturing is fabrication of a stainless steel frame for an egg packaging machine. Northern found it could improve assembly efficiency through use of a "slots and tabs" method to speed positioning of loose frame pieces prior to welding. The same operation that laser cuts the frame pieces also cuts the slots and tabs. While this method speeds initial positioning of parts, the entire assem-

bly still needs to be precisely aligned prior to welding. This is accomplished on Northern's 1000 × 2000-mm Demmeler table with a D28 modular fixturing system.

Because the egg machine frame is used in a food service application, Northern does everything it can to eliminate the possibility of carbon transfer during fabrication. This can occur if the stainless steel parts are scratched by the carbon steel of the fixturing, which can cause rust to form on the scratched stainless during its service life. And, of course, rusting is unacceptable in food-grade applications.

To prevent the stainless parts from coming into contact with the mild steel modular fixturing components, Northern carefully covers the Demmeler table with paper, and all clamping surfaces and angle faces are fully taped or covered with paper. ■