



*Application Story: MJC Engineering*

## WORLD'S LARGEST METAL SPINNING MACHINE

### FOR PRESSURE VESSELS NOW AT FIBA TECHNOLOGIES

Capable of spinning up to 24" diameter x 1-1/2" wall x 40' long steel tubes into pressure vessels for the industrial gas and chemical market, the OSC-24300 from MJC Engineering & Technology (Huntington Beach, CA) has been installed and is producing product at FIBA Technologies (Westboro, MA).

Driven by a 300 HP motor and weighing over 125,000 lbs., this giant machine incorporates a tube handling system as well as an automated induction heating system. Each tube is spun with a necking-in and/or bottom forming operation performed at each end.

At the heart of this enormous machine system, which measures over 80' in overall length, are MJC's proprietary Spin CAD™ software and a Siemens SINUMERIK 840D CNC with HMI software. Spin CAD is a Windows-based operator interface software that allows the machine programmer to generate spin passes on a computer, using "point and click" technology. All machine functions and editing are controlled and saved through Spin CAD. When the program is complete, Spin CAD generates a G-code program that the Siemens 840D CNC utilizes to form the part.

MJC Vice President Dave Grupenhagen explains, "FIBA contacted us in late 2002 about building a machine to spin large diameter steel tubes into DOT-approved pressure vessels used in the compressed gas, chemical and other industries. The high-pressure tubes are typically used on tube trailers and containers to transport CNG, hydrogen, helium and other industrial gases. FIBA told us there was no spinning machine manufacturer willing to build a machine to their desired size. One company manager even told FIBA it wasn't possible to build a machine on such a scale that would work. That was all

the motivation we needed at MJC. Within three months, a preliminary design meeting was held and we were awarded the contract."

"The next six months were spent completing design engineering, which included the tube handling system and automated induction heating system. All fabrication of major components was done at our Los Angeles facility and, within eight months of the release on our engineering drawings, we tested the machine, using the heaviest steel tube, 24" diameter x 1.5" wall x 40' long."

Onboard this massive machine, a Siemens SINUMERIK 840D CNC was configured for two-axis control, Z and rotation. The rotation axis used a standard hydraulic cylinder with feedback converted from inches to degrees of rotation to simplify the programming. Both axes are powered by a Siemens HLA Module, while PROFIBUS communications handle the data interchange between the CNC system, operator panel and PLC.

FIBA Technologies, founded in 1958, serves major industrial and specialty gas and chemical suppliers worldwide, as well as the U.S. government and industrial gas distributors throughout the U.S. The company specializes in pressure vessels, tubes and other industrial equipment for storing and transporting high-pressure and liquefied gases and chemicals.

The machine for this particular application was one that could spin the ends of a large steel pipe to fabricate an unfired, seamless, integrally forged pressure vessel. FIBA proprietary software is used to generate the G-code program, which is then loaded into the Siemens control package. Once the part is in position, the program is initiated. The CNC is manipulating machining rotation, Z- and X-

**Above left:** Siemens SINUMERIK 840D CNC and PROFIBUS communications control all functions of the machine plus a material handling system and automated induction heating

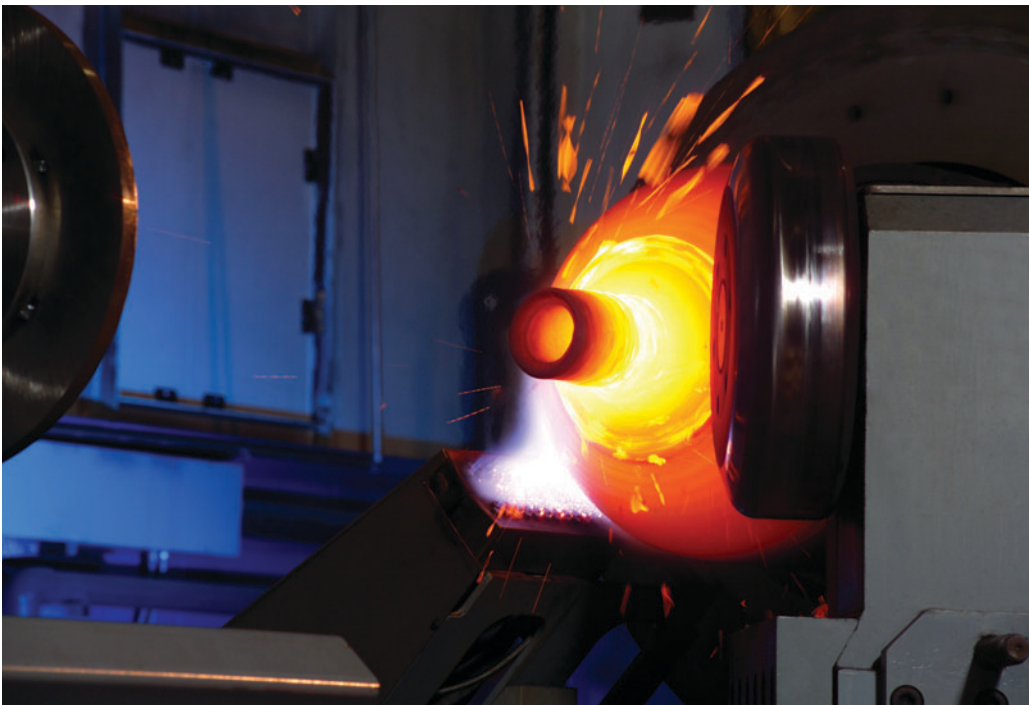
**Above right:** MJC's Model OSC-24300 installed at FIBA Technologies spins and forms tubes into pressure vessels over 40' long

axes, as well as the stop/start functions of supporting devices, including the automated tube handling system.

The set-up of a typical job involves the following steps:

1. The programmer writes the program from a desktop PC or directly into the machine's CNC.
2. The spin program is accessed from Spin CAD and the onboard FIBA software generates the G-code file.
3. The operator sets the home position on the machine.
4. The operator activates the part handling device, loads the part to be spun and starts the cycle.

The MJC machine (OSC-24300) running at FIBA is fed by 1000A of 480V power and 250 hp of hydraulics overall. It is currently the world's largest metal spinning machine for this type of pressure vessel production. ■



An induction heating system and shaping tools close the end of the steel tube for seamless integrity, a substantial improvement over welded end caps

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