

TUBE FABRICATOR, MACHINE TOOL BUILDER AUTOMATES TO ACCELERATE

Hole punching, material handling, cutting operations run stealthily

By Dan Davis, Executive Editor

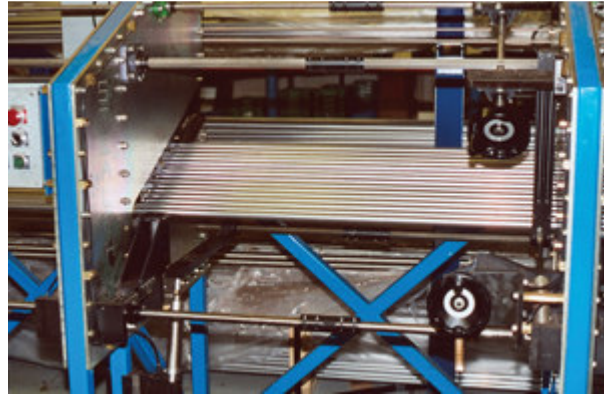
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Stealth Manufacturing Inc., Savage, Minn., is a tube fabricator, and machine tool builder that automated its tube punching, laser cutting, and material handling to improve the efficiency of manufacturing its gas heater tubes and other tubular products.

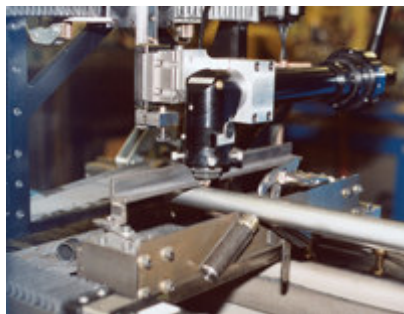
Editor's Note: This feature about Stealth Manufacturing Inc. does not contain quotes because the company president asked that names be withheld from the final story so that the entire company can share the spotlight, not just a few. We have acknowledged this request.

MOST fabricators like to tinker. They fabricate their own racks and fixtures, and they might have hobbies, such as metal sculpture or customizing old automobiles, which allow them to use their skills in and out of the shop.

Stealth Manufacturing Inc., Savage, Minn., takes tinkering to the next level. The tube fabricating shop is customizing automated machine tools and production aids that are helping it to become the dominant player in a segment of the gas tube industry.



Stealth Manufacturing Inc. fabricated its own tube unloader for its cutoff line. Instead of relying on special Allen wrenches to adjust the unloader each time a different-sized tube is switched out, the operator just turns the hand cranks for quicker changeovers.



Stealth built its own laser cutting machine with capabilities to make very fine 3-D cuts and standard 3-D cuts. It purchased a 240-W Synrad laser resonator for cutting tube for medical applications and a 2,000-W Rofin-Sinar resonator for industrial cutting and then mounted them on the same machine. The laser cutting heads are designed for quick changeout when switching between the resonators. An operator only has to turn a bolt, take out the laser head, set it aside, insert the new laser head with articulated arm, and turn on the corresponding resonator.

MANUFACTURING A MARKET

Stealth Manufacturing began life as North Star Machine Co. back in 1978. The shop mostly did screw machine work for clients in the Minneapolis area, but that changed in the late 1980s.

After some market research, North Star decided concentrating on the heater tube business for gas fireplaces and appliances made sense. The market wasn't directly served by dedicated metal fabricating shops, and the OEMs basically were designing products originally designed for the HVAC industry.

On the technology side, the North Star brain trust developed its first CNC machine to punch holes in tubing. On the marketing side, the brain trust sent a promotional flier to about a dozen gas fireplace manufacturers. The two-pronged plan worked unbelievably well.

The phone was ringing off the hook, and North Star Machine began its growth spurt. By 1990 North Star Machine was only a name on the outside of the building and on some invoices from longtime material suppliers. Stealth Manufacturing had stolen the spotlight.

MANUFACTURING TUBE FABRICATING EQUIPMENT

Stealth Manufacturing's ability to make its own equipment is at the heart of its success. It can deliver almost anything because it has the means to create the equipment that can do it.

Such expertise has helped the company take a commodity item—gas heater tubes—and turn it into a fabrication unique to each gas fireplace design. The tube fabricator learned over the years that different tube shapes—round or flat pan—and hole configurations on the tube can create different fire shapes and colors behind ceramic logs. The company also works with a variety of sizes—1¼- to about 4-inch-diameter tube—and materials, the most popular being aluminized and stainless steel. Stealth Manufacturing management estimates it now has about 4,000 gas heater designs in its database, dating back to 1988.

Thirty of its 40 fabricating machines used to produce those designs have been engineered and manufactured based on in-house designs. Here are some automation examples:

- Many of the stamping presses have been removed from the Stealth Manufacturing shop. Hydraulic-powered punching equipment has replaced them because of convenience and safety. One punching station used to fabricate shutter caps, through which the main gas tube is fed into the heater tube, actually relies on standard turret punch press tooling. The machine, which can accommodate six different tools, is used to produce 20 different part numbers and has produced more than 15 million parts since 2000.
- When it came time to buy a new laser to take some of the work load off of its Mazak SpaceGear 48 MK II, management decided to build a laser tube cutter that could accommodate two types of lasers—one for very specialized medical work and another for general industrial cutting—instead of buying two laser tube cutting machines. Stealth Manufacturing bought a 2,000-W Rofin-Sinar and a 240-W Synrad laser resonator, articulated arms, and laser torches and assembled those parts to the machine base and material feeding system it fabricated. This two-resonator laser tube cutting machine is the new and improved version of a tube laser Stealth Manufacturing built almost 10 years ago. The eventual goal is to add a robot to the cell to automate material handling.
- Stealth Manufacturing's newest tube punching machine is equipped with a servomotor to control the depth of the punch. Operators now can change the punch depth on-the-fly if an operator discovers that the original specs detailed on a job order aren't resulting in the correct-sized hole.

The tube fabricator also designs and fabricates its own quick-change tooling. All 16 of the company's bending machines feature tooling that is interchangeable, even though equipment ages are from just 4 to 50 years old.

ELIMINATING DOWNTIME

By the late 1990s, Stealth Manufacturing had 36 employees, and manufacturing was booming. Unfortunately, shop floor activity was becoming unmanageable.

One day managers spent a morning looking out the window of a second-floor office and watching shop floor activity. Management witnessed a large amount of time dedicated to support activities, such as mopping floors, moving material around, boxing parts, chasing tools, and setting up jobs, rather than time dedicated to fabricating metal parts.

Management wanted to draw employees' attention to the amount of time spent not making parts. Stealth Manufacturing contracted with an electrical engineer to write a software program to help track downtime. The software was then put into a processor that was connected to a 'scoreboard' made by a local sign manufacturer. The first Industrial Scoreboard™ was born in 1999.



Stealth has 16 tube benders from Pines Manufacturing Inc., including one from 1946, and all of the machines have the same custom quick-change tooling designed and built by in-house staff.



Tube fabricating machines are kept on tables that can be moved easily with a pallet jack. Operators may construct and deconstruct a workcell a couple of times per day, depending on the job size.



The Scoreboard keeps track of a workstation's total quantity of parts produced over the shift, parts produced per hour, and total downtime—measured in seconds—during the shift. The Scoreboard's software uses information gathered early in the shift to determine the optimal time needed to complete each fabrication assignment.

The Scoreboard tracks quantity of parts produced over a shift, parts produced per hour, and total downtime resulting from stoppages related to nonfabricating activities. The software figures out the appropriate time based on early-shift fabricating activities; after an operator completes several fabrications, the software has an idea as to how much time it should take to fabricate one metal part completely.

When the first signs went up over fabricating cells, workers were unnerved. Some never got over the feeling that Big Brother was watching, and they left. Others embraced the idea and actually used the tool to justify their pay increases during annual job reviews.

Today all workcells are attached to the Industrial Scoreboards at Stealth Manufacturing. In fact, some other companies have actually adopted the tool as well.

ATTENDING TO SHOP FLOOR NEEDS

So Stealth Manufacturing employees have bought into the idea of minimizing downtime, but what happens when downtime occurs because an employee is unable to tend to a machine because of other shop floor obligations?

Company management began to explore that issue when it was looking for ways to have employees work more efficiently and keep machines running as much as possible. Sometimes machines needed quicker attention because material changeover was needed at the end of a production cycle. Other times a manufacturing glitch, such as a tip-up on the laser cutting machine, would cause the equipment to end the fabricating process, and the operator wouldn't know about the problem until he walked over at the time he expected the production cycle to be concluded, which could be many minutes later in some instances.

Stealth Manufacturing developed The Attendant™, a paging system connected to equipment that lets an operator know his attention is needed. A microswitch is attached to the shutter light on a machine, and when the machine stops running, because material changeout is needed or a production error occurs, the shutter light goes off, tripping the switch that sends a message to pagers carried around by machine operators. The pager vibrates and delivers a text message, such as 'Mazak needs attention.'

FACING THE FUTURE

Stealth Manufacturing likes to describe itself as a machine development company that produces parts for customers. It believes such an approach keeps them ahead of competitors—both in North America and abroad—and forces competitors to play catch-up while Stealth is already on to next-generation manufacturing practices.

Faced with a more competitive manufacturing environment, the company thinks its investments and employees' collective talent have put it in a good position to succeed.

Reference Links:

Stealth Manufacturing Inc., 12511 Boone Ave. S., Savage, MN 55378, 952-890-1303, www.stealthmanufacturing.com

Mazak Optonics Corp., 140 E. State Pkwy., Schaumburg, IL 60173, 847-252-4500, www.mazakoptonics.com

Pines Manufacturing Inc., 30505 Clemens Road, Westlake, OH 44145, 440-835-5553, www.pines-mfg.com

Rofin-Sinar Inc., 40984 Concept Drive, Plymouth, MI 48170, 734-455-5400, www.rofin-inc.com

Synrad Inc., 4600 Campus Place, Mukilteo, WA 98275, 425-349-3500, www.synrad.com

This article can be found at:

http://www.thefabricator.com/TubePipeFabrication/TubePipeFabrication_Article.cfm?ID=1649