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**Millwork move
pays off** p. 32

**Aiming for better
workflow** p. 38

**Display maker
cuts lead time** p. 44

**Small changes mean
greater profit** p. 54

Small changes equal greater profit

Meridian Yacht uses a number of processes and equipment to improve efficiencies.

by Linda Ohm, Managing Editor
loh@chartcomm.com



The inside salon of this finished model 490 motor yacht manufactured by Meridian Yachts has a solid cherry interior with a glossy finish.



When all the sub-assemblies are finished, the parts come together to become the finished product.

Definitions of manufacturing processes

plant facts

Meridian Yachts, a division of
Brunswick Boat Group
Arlington, Wash.

Product: motor yachts

Employees: 700 total, 74 in the
woodworking part of the plant

Annual sales: \$85 to \$90 million

Plant size: 40 acres

Web site: www.meridian-yachts.com

- ▶ The Kaizen method of continuous incremental improvements is a Japanese management concept for continuous improvement.
- ▶ Six Sigma is a management philosophy developed by Motorola that emphasizes setting extremely high objectives, collecting data and analyzing results to a fine degree as a way to reduce defects in products and services.
- ▶ Takt Time is the rate at which parts have to be produced to match customer requirements. Lean

Production uses Takt Time as the rate or time that a completed product is finished. If you have a Takt Time of two minutes, that means every two minutes a complete product, assembly or machine is produced off the line.

- ▶ Lean Manufacturing is a business initiative to reduce waste in manufactured products. The idea is to reduce the cost systematically, throughout the product and production process.
- ▶ Cellular manufacturing is an approach that helps build a variety

Sometimes the smallest change can make the biggest difference, like taking some steps out of an employee's movements through the plant. At other times the changes are bigger and more complex.

The goal of the changes being made at Meridian Yachts, a division of Brunswick Boat Group, is to make employees work better, not harder. "It's not about beating up people to get them to work faster. It's helping them improve their processes so they can work faster, giving them more tools," says Howard Gearheart, plant manager.

Meridian builds motor yachts in a 40-acre plant in Arlington, Wash. The



The new Accu-Router CNC router has an onload/offload system that makes loading of panels for jobs safer. Wood panels are put in a stack with a forklift and require no handling until the parts are cut and ready to be placed in a cart for further processing.

company employs 700, including 74 in the woodworking operation.

In its efforts to rebuild itself into a more efficient and productive company, Meridian has taken to heart the Kaizen method, a process of continuous improvement, along with principles from the Toyota production process and lean and cell manufacturing methods. And the company believes the only way to change and grow is with the full participation of its employees. Meridian's ultimate goal is to provide hassle-free customer satisfaction through quality, safety and productivity, says Gearheart.

Meridian is constantly upgrading and evaluating its equipment, but Gearheart says that is only part of its ongoing effort. "We're changing our people processes and helping our people manage their work, as opposed to us managing them." Gearheart also says that it's not about always buying bigger and bigger machinery. Instead it's about buying what he refers to as right-sized machines.

The evaluation process

Gearheart compares the Toyota process to building a house, which requires a strong foundation and walls before putting on a roof. The roof represents the company's goals. All elements of the process are critical to reaching the company's goals.

"We're doing some pull

systems, some Takt Time customer-based production, a little bit of lean and Six Sigma. We're doing a bit of everything and it's going to be a little while before it all comes together," says Gearheart. "The book, *The New Shop Floor Management*, by Kiyoshi Suzuki, is our bible right now. We're taking some classes. We have many consultants on board who are teaching us the Toyota production system."

Recently, the company finished doing a current-value stream map to determine how long a product takes to produce. A large team goes around the plant and evaluates and documents every step involved in getting a boat built from start to finish. After the map is done, another team comes in and puts together an ideal state, which would be how fast a boat could be done if money and time were no object.

"We come back and build off our ideal state and our current state and come up somewhere in between with a target state," says Gearheart. "In order to make that happen, every one of those processes needs to be improved upon. So you'll have a Kaizen burst."

used:

of products without wasting time or movement by setting up cells or clearly defined work areas.

- ▶ Nesting is a production method in which a variety of parts are grouped, or nested, on a sheet of plywood, particleboard or MDF. These parts are then cut and machined using a CNC router or machining center. Visually, a nested sheet appears much like a jigsaw puzzle with the parts of the project laid out in close proximity to minimize material waste and increase yield.



All programming information is sent directly to the machine after being approved by the supervisor. On the bottom is a Video Jet printer that prints part and machining information directly onto the panel before it is cut. This allows jobs to be mixed for maximum optimization.



The first step in building the boat is the creation of the fiberglass hull. The entire boat, including the fiberglass, wood components and upholstery, is made at the plant.



Howard Gearheart, plant manager of Meridian Yachts, stands in front of a model that illustrates the company's commitment to improving processes and making all aspects of the company work well for everyone.



The Superfici flat-line finishing system scans parts so that spray heads only spray parts. The finish is a UV-cured waterbased product. Excess material is recycled and reused on the first three coats of the products.

The spaghetti map

To improve one sub-assembly area in the shop, one Kaizen event performed what is referred to as a spaghetti map. A piece of paper is assigned to an employee along with a map of the building. Then the employee is followed everywhere he goes and tracked on the paper. When the exercise is finished, the marks on the paper look like spaghetti. Then, the distance the employee walks is measured.

"We had Joe walking 10,000 steps in a week. When we got done, we had him down to 1,000 steps," says Gearheart. "Movement is big in this plant. You see people walking everywhere. If you can take out

10 percent of the movement in this plant, that's huge."

The plant is set up with a cell system to keep movement to a minimum. There is a pick cell, where parts are put directly after being cut, where nothing further is required. There is a cherry prep cell, upholstery cell, laminating cell, solid surface cell, finishing cell and assembly cell.

Machines behind the people

All the wood, laminate and solid surface parts are cut on a three-axis, single-head Accu-Router CNC router with an onload/offload system. This machine was purchased a year ago and replaced two older CNC routers the company had used for 10 years. Accu-Router worked with a third

party to build the loading system.

The router is set up with a Video Jet printer that prints information directly onto the wood when it is processed. The printing system allows the company to optimize, nest and cut multiple boats with the one machine. The router operates for two shifts and still has capacity available, says Gearheart.

All the nesting programming for the router is done in SigmaNest by the plant engineering staff, while the design is done in corporate engineering. The information is posted directly to the machine and checked by the supervisor for accuracy before the operator does a job.

Meridian added a conveyor belt where scrap pieces are placed as

FDM

small changes

finished cut parts are unloaded, separated into jobs and stacked in carts. After parts are sorted by job, and since parts stay together until the boat is finished, the ink labels are then removed with denatured alcohol. The conveyor system, built by Meridian, takes wood scrap directly into the dumpster, which is emptied a couple of times a day. All wood scrap is recycled.

Another recent addition to the woodworking section of the plant is a Superfici flat-line finishing system.

The system has a scanner that scans the part and sends a signal to the spray head, which only sprays where there's a part. Parts go through warm-air drying, a forced-air jet and a UV curing system. The finishing system, purchased in April 2005, uses a Sherwin-Williams waterbased UV curable finish.

Parts are not sanded before the first coat but are sanded between each coat. All the finish is recycled and reused whenever possible on the first three coats. The final topcoat is always new finish. "The Superfici is absolutely wonderful," says Gearheart.

Right-sizing machines

The finishing system is working

well right now. But Gearheart says that could change in the future. "You have to right-size what you do," he says. "Instead of having one router and one spray system, I might have three different routers and three smaller spray systems and then only build what I need to build."


The company is working with every tool at its disposal to make employees more productive and happier. Using the different processes as tools for improvement has made the company more profitable than ever. "We're just barely into our journey," says Gearheart. "Right now the most important thing is employee involvement." ▲


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