

Shipyard upgrades manufacturing for GoM market return

A systematic approach changes the process

Marine fabricators and shipyards along the US Gulf of Mexico are dealing with the recent slowing of activity in different ways. With the goal of establishing world-class status in all aspects of its business, Signal International has taken some significant steps. A complete make-over of the work flow through Signal's Orange, Texas, yard has established a completely new way of executing work for the company. The company has been so successful that the new process is also being incorporated into its Pascagoula, Mississippi, site.

"Diversification has been the watchword at Signal International since it began operation in 2003," says Dick Marler, CEO and president. Three years ago Signal linked the future of its Orange Shipyard with a commitment to modular marine construction using world class manufacturing techniques. This decision resulted in an investment of over \$33.5 million and a complete re-vamping of the Orange yard which has almost 500,000 sq ft (46,452 sq m) of covered building halls and shops.

Today Signal can build a host of heavy manufactured products for the marine and energy markets. For example, Signal has entered the market for super size barges. Currently under construction is a 100 x 300 ft (30.5 x 91.5 m) work barge for Signet Maritime Corp.

The core of Signal's effort is a formal Continuous Improvement Program based on Lean Manufacturing principles. Changing the work flow necessitated a complete re-thinking about how work was being done. There are two main categories of change – the incorporation of Sig-

nal's continuous improvement program by the workforce and complete revamping of the flow of materials through the yard. To achieve these changes, Signal has implemented new engineering, manufacturing, fabricating, and project management methods.

Continuous flow manufacturing

Signal's physical plant layout rearrangement came directly from re-thinking and re-defining how to do projects. That new approach was divided into several phases. Each phase had its own set of targets and benefits aimed to improve productivity.

"The most important thing is non-stop improvement," says Craig Yuill, Signal's director of Industrial Engineering. "Our employees understand that what we do today may be good but we are always finding ways to improve. That mindset is instilled in every worker in the organization. That is the key to success of the system."

Employee involvement has been the foundation of ongoing achievements at Signal. Every employee is encouraged to offer ideas for improving the work place, the methods, and the products. Suggestions for improvement are encouraged and rewarded.

The focus has been on process change. The

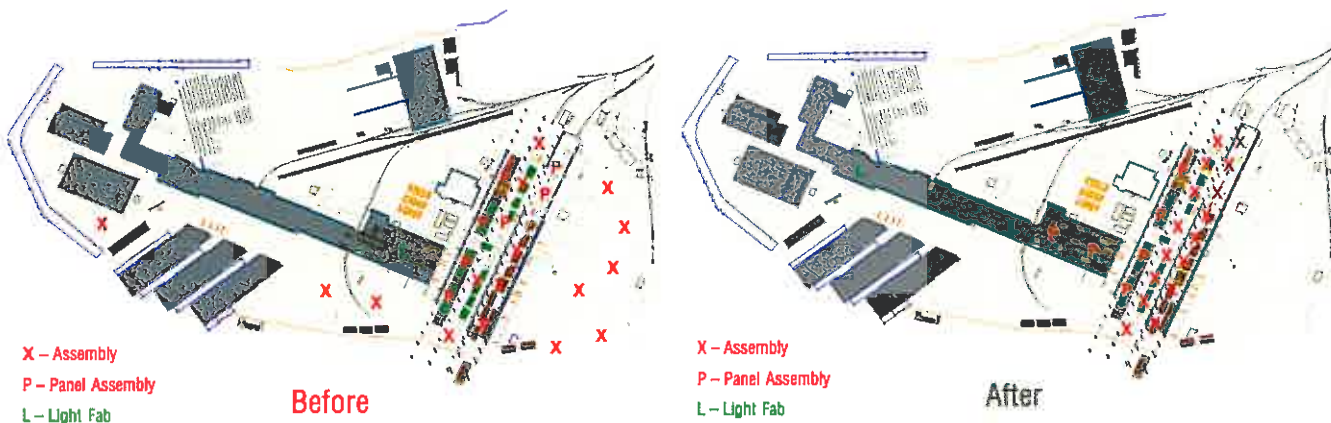
general term used for the new process is Continuous Flow Manufacturing (CFM). The idea behind CFM is driving the material to the workers and keeping tools and in-process work pieces readily available. CFM is a strategy aimed at just-in-time delivery and calls for continuous examination, improvement, and integration of all elements in the production system. The goal is a balanced production line with minimal waste, optimum cost efficiency, and on-time/defect-free products.

As an example, Yuill points to rail systems, transport carts, rollers, and other tools designed to move materials through the shops efficiently while saving cost and time.

"It's essential to post the workers where they need to be, putting the tools in the right place, moving the parts expeditiously, and minimizing the use of overhead cranes and other cumbersome transport," says Yuill. "Less time transporting your work translates to a higher percentage of productive time and shorter lead times. CFM optimally streamlines the process."

Critical elements of CFM processing include items such as how to zone out the work. Another is labor utilization: who's going to do what? When do they need to do it? How are they going to do it? Still another area is raw materials handling: where do they need to be fed into the work stream? What time do they need to be fed in? CFM allows for the flow of components to the worker and assembly unit so that the exact tool and part are at hand as the activity moves down the assembly line. Each worker spends little or no time getting and/or preparing mate-

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(Left) Layout of Signal International's Orange, Texas, facility before the application of Continuous Flow Manufacturing. (Right) Layout after application of the Continuous Flow Manufacturing approach.

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Aerial view of Signal's 500,000-sq ft (46,452-sq m) facility with updated Continuous Flow Manufacturing workflow.

rials and/or tools.

Next is movement of the product. How do you get it to the operation most efficiently?

"Rigging and overhead cranes are very time consuming and very costly," says John Sanders, industrial engineering manager. "We try to keep their use to a minimum."

Constant monitoring and as-needed adjustment of process flow avoids lapsing into non-productive process activities.

Visual Management Aspect

An elementary question is how to communicate information to the manufacturing team in such a way that everyone understands what is happening.

Visual Management Aspect (VMA) addresses this challenge. VMA includes lean manufacturing principles. VMA makes all the processes visual and tangible. It structures the workplace using processes that are clear to everyone.

"An example of VMA in the shop is zone mapping," says Sanders. "Certain work disciplines belong in assigned locations. Designations prevent overlaps such as putting waste on top of good product. The next thing that we've implemented is hard hat color-coding. Each worker's helmet has a particular color code to designate the job function of that worker (welder, fitter, electrician, safety officer, etc.). This also informs the management team about what disciplines are working on what product at

any given time."

The purpose of VMA is to make everything clear and concise to enable correct reading of a project status.

Visual Factory

While VMA refers to what is on the shop floor, Visual Factory (VF) is concerned with conveyance of information. The aim is to make the current status of any work piece immediately apparent. Visual Factory describes how data are conveyed in a Lean Manufacturing environment using visual methods such as signs, charts, and LEDs so that information is readily accessible to all. "Lean Manufacturing" translates to implementation of cost and time saving measures without compromising personnel safety or quality of the product.

"We don't want things misinterpreted," says Yuill. "We want to make sure everybody on the team understands what the information is and has it available in real time to enable making appropriate decisions."

Engineering is integral to the system, as well. When modifying or adapting to a customer's as-built equipment, accurate match-up in the field is critical. Signal uses the 3D laser scanning technology aboard the rig or on the vessel to ensure that dimensional accuracy is maintained while designing replacement or new equipment to be fitted on board. For both new and replacement components and modules, advanced versions of auto-cad software are used by Signal's

engineers to maintain exact fit and to minimize shop floor waste and in-the-field adjustments. In addition to accuracy and efficiency, Signal says it sees further cost and time savings through single-source accountability.

CFM, VMA, and VF integrate with Signal's Quality Management System (QMS). Signal's QMS is in compliance with ISO-9001:2008, and has been audited and verified independently. The verification documents the QMS as an ISO 9001 Registered Quality Management System.

"Our view of world class performance assigns uncompromising dedication to safety," says Dick Marler. "Our commitment to personnel health and safety and to protecting the environment is paramount. Our statistics, recognition, and awards attest to this company-wide dedication."

Over the past six years Signal International has developed an environmental/health/safety management system that consistently achieves OSHA incident frequency rates below 1.0.

Signal has received from the Shipbuilders Council of America (SCA), the "Excellence in Safety" award for the years 2003, 2004, 2005, 2006, and 2008. Additionally, Signal has received from American Equity Underwriters, one of the nation's largest marine workman's compensation insurers, the "Best Large Shipyard" safety award for the years 2007 and 2008. ●

Editor's note: This is the first in a series of articles that examine how fabrication facilities along the Gulf Coast are adapting to oil and gas operational changes