Northrop Grumman Newport News: Reaching Out to Suppliers

Leaning their shipyard supply chain for win-win gains through value stream management.

Lea A.P. Tonkin

When people at the Northrop Grumman Newport News (VA) shipyard targeted improving their supply chain management in 2003, they set ambitious, win-win goals. (See Figure 1.) They realized that, while the elements of supply chain management were in place, a more effective model was necessary if improvements were to be rolled out across the country in all product lines.

Results from this collaborative, value stream management approach with the original 12 supplier participants are dramatic: 62 percent reduction in overall defect rates, leadtimes down an average 35 percent, and on-time increased deliveries up to an average 91 percent from the previous 63 percent level. An added 33 supplier firms have joined this effort, with increasing participation (and projected benefits all around) on the way. "Lessons learned" so far were shared during a recent AME event, "Leaning the Supply Chain Using Value Stream Management," at the Newport News site. The event was co-sponsored by the Virginia Philpott Manufacturing Extension Partnership (VPMEP). Part of the National Institute of Standards and Technology within the U.S. Department of Commerce, MEP organizations are located throughout the United States; they work with small and mid-size U.S. manufacturers to provide training and other performance improvement activities.

VPMEP worked with Northrop Grumman in the development and deployment of supply chain partnership with key suppliers. Companies initially tapped for this effort supplied products such as valves, pipes, and fittings, according to Director of Sourcing John Jordan.

In Brief

Win-win gains through value stream management are a key element of the Northrop Grumman Newport News lean initiatives. They work collaboratively with suppliers to achieve shorter leadtimes, improved quality, and better on-time delivery performance. Also partnering in this successful end-to-end improvement effort is the Manufacturing Extension Partnership (MEP) organization.

About Northrop Grumman Newport News

The employees of Northrop Grumman Newport News have designed, built, overhauled, and repaired a variety of ships for the U.S. Navy and commercial customers for more than a century. Newport News is the sole U.S. designer, builder, and refueler of nuclear-powered aircraft carriers. It is one of the two U.S. companies with the capability to design and build nuclear-powered submarines. The shipyard also provides after-market services for naval and commercial vessels. It became a business sector of Northrop Grumman Corporation, Los Angeles, CA in 2001. Newport News is the largest non-governmental provider of fleet maintenance services to the U.S. Navy.

The operation employs more than 19,000 people (many are fourth and fifth generation shipbuilders) and occupies more than 550 acres in Newport News, VA. It is Virginia's largest industrial employer. More than 4000 engineers, designers, and technicians support Newport News as a leader in new ship technologies. The company website www.nn.northropgrumman.com offers more information on Newport News activities and capabilities.

Win-Win Solutions Targeted by Northrop Grumman and Its Suppliers

For Northrop Grumman:
- *Reduced price premiums*
- *Reduced expediting*
- *Reduced inventory levels*
- *Improved material availability*
- *Greater flexibility*

For Suppliers:
- *Reduced cycle time*
- *Increased capacity (sales potential)*
- *Reduced inventory levels*
- *Improved agility (response to demand)*

Shared:
- *Increased partnering relationship*
- *Improved communication*
- *Agile supply chain*
- *Improved profitability*
- *Perform well on contracts.*

Figure 1.

Looking for End-to-End Process Excellence

"We had begun our lean process improvements in supply chain management, engineering, manufacturing, programs/assembly and test, and other areas in the late 1990s," said Glenn Marshall, process excellence strategy department at the Newport News operation.[1] "Then we began looking for additional tools that would help us to accelerate our progress and reach out across the country to our suppliers with these improvements."

Partnering with VPMEP provided the right combination of understanding, skills, and training that allowed Northrop Grumman to help selected suppliers develop "end-to-end" lean process excellence, he said. MEP's local service delivery encompassed standard methodology, familiarity with smaller and mid-sized companies, affordability, and the willingness to work with suppliers "as is."

The idea was to eliminate unnecessary cost and other wastes in the supply chain in a mutually beneficial teamwork effort. Specific supplier performance improvements sought by Northrop Grumman ranged from shorter leadtimes to higher quality performance, better on-time delivery performance, decreased inventory in the supply chain, and increased supplier agility to meet customer needs.

Basics of Lean

The supplier organizations initially participating in Northrop Grumman's lean supply chain value stream management effort were located in eight different states, coast to coast. They were assisted using a process-oriented approach with costs shared on a 50-50 basis with Northrop Grumman Newport News. Suppliers worked with local MEP organizations in assessments, Value Stream Mapping (VSM), lean basics, 5S tools (Sort, Set in Order, Shine, Standardize, and Sustain). They were trained in VSM (request for quote or RFQ to cash cycle) — mapping the current steps along the way and envisioning a process without non-value-adding (NVA) steps. Kaizen (rapid improvement) events netted improvements in process flow through streamlined work area layouts, cellular production, and other changes. The suppliers also learned how to set the stage for continuing progress in their lean

journey, including the development of a lean management team. The "Training for Lean" curriculum is shown in Figure 2.

The suppliers used a standard assessment tool to evaluate their performance in 13 categories. The categories included: communications and awareness, visual systems (5S) and workplace organization, standard work, continuous improvement (CI), operational flexibility, mistake-proofing (poka-yoke), SMED (single minute exchange of dies)/quick changeover, safety, Total Productive Maintenance (TPM), pull systems, balanced production, supply chain, and quality. These standardized yardsticks worked well, considering the range of products/processes represented among these early supplier participants.

Evolution from Work Centers to a Value Stream Approach

A cultural change - not simply thinking about lean as "rearranging the furniture" — is essential to lean supply chain success, according to Valerie Smith, manager supplier quality at the shipyard. She outlined the value stream qualification process used at Newport News. Evolution from work centers to a value stream approach is a key element in this transformation. Instead of thinking about your process as a series of handoffs between functional areas such as main receiving, software review, hardware inspection, marking and color code, etc., they reach out to insure they involve their suppliers and customers.

The lean qualification process map begins with identification of a value stream. Then lean implementation teams (LITs) are formed and trained. They develop a project plan to meet their value stream requirements and launch their implementation. Feedback, improvements where necessary, and then moving on to the next value stream improvement are shown in Figure 3.

Smith noted that there are two essential levels of value stream requirements: "Beginning Level 1" and "Improving Level 2." Other iterations of various levels (such as 3, 4, and 5) constitute CI, she said. Each level requires the selection of a project approved by a management team. For each project, an implementation team (consisting of a team leader and a group of cross-functional stakeholders within the process) is developed. Current state maps are developed to establish a baseline, followed up with future state maps and kaizen bursts (a kaizen burst is a team-based, three-five day rapid improvement event) to demonstrate plans for improvements. These synchronized action plans using lean and Six Sigma methodology support the development of performance metrics to drive the next level of maturity.

Value stream qualification strategic focus criteria encompass leadership and communication, customer focus, people focus, process management, and performance measurements (cost, schedule and on-time delivery, space and travel distance, and quality). A Lean Qualification Evaluation Team (LQET) consisting of customer and supplier stakeholders must agree on all criteria being met by voting to grant or deny qualification. The LQET comprises various levels of management within the designated value stream. Figure 3 shows the Value Stream Qualification flow and cycles.

Training for Lean

The Lean Curriculum as offered throughout the NIST-MEP nationwide system included the following MEP-developed elements. Lean 101, Lean 202, and Lean 203 should be taken first, advised Bill Donohue of VPMEP.

*Lean 101 - Principles of lean manufacturing
*Lean 202 - Value Stream Mapping (VSM)
*Lean 203 - 5S/visual workplace
*Lean 204 - Setup reduction
*Lean 205 - Cellular/flow manufacturing
*Lean 206 - Pull/Kanban
*Lean 207 - Total Productive Maintenance (TPM)
*Lean 208 - Lean metrics
*Lean 302 - VSM "beyond the shop floor"

The goal for each supplier participant is lean practice certification (three core and two elective units). Participants are certified by taking the courses.

Figure 2.

Value Stream Qualification Process

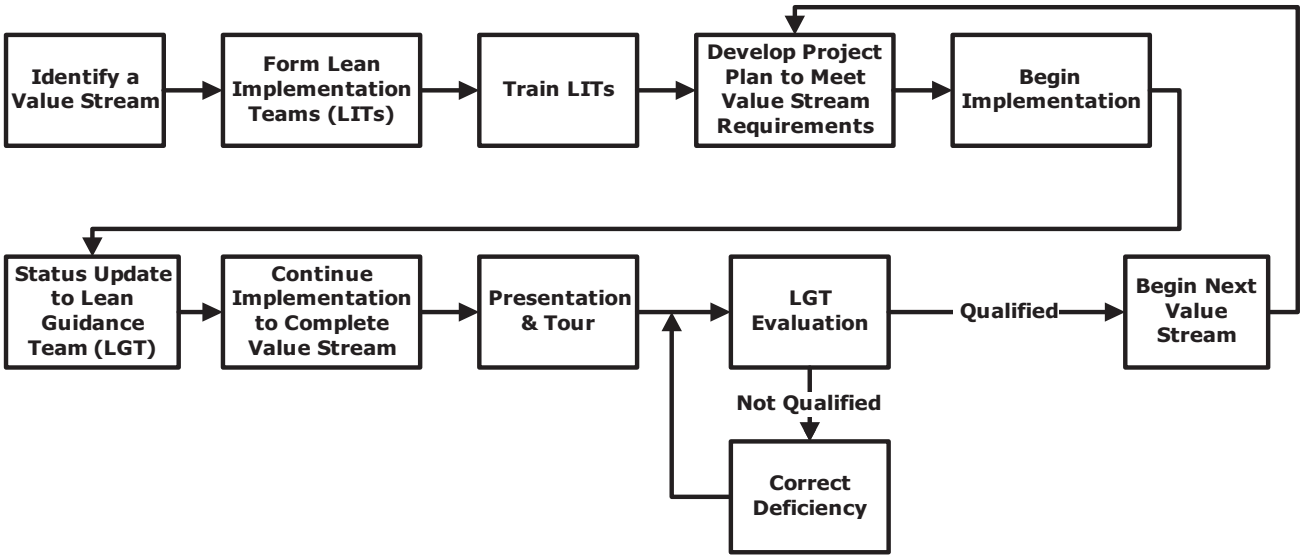

Figure 3.

Results from the main receiving and inspection value stream are significant. They include dock-to-stock process improvements such as overall cycle time decreased by 30 percent, labor productivity increased by 13 percent, travel distance reduced by 70 percent, and defects decreased by 37 percent.

Learning to be a Better Customer, and Related Supplier Improvements

Improved teamwork with suppliers and shared improvement activities stem from a cultural shift. "Instead of having the mindset that suppliers simply will need to do what we want them to do, we have tried to create a collaborative framework for exchanging ideas with our business partners," said Jordan. "We are genuine in soliciting their feedback about how we can be a better customer. In turn, we can help them to be better suppliers." For example, Newport News has implemented improved up-front documentation (based on focus groups and discussions with suppliers) resulting in better coding and appendices that are more understandable to suppliers. "We are also looking at ways to improve our forecasting and how we share that information with suppliers," the executive said.

"We are learning how to tackle business issues in a constructive, not adversarial, way with our suppliers," he continued. "For example, we communicate with them about not only ambitious improvement goals, but about sharing related resources and savings with them. We think of ourselves as an integrated team, instead of each party representing only their own self-interest. While we are stimulating value stream and lean thinking within our supplier base, we recognize that some of our suppliers are more mature in their lean commitment, and we also benefit from their experience."

Added Veasey Wilson, vice president of supply chain management, "We have also invested more time in communicating the 'state of the union' — our challenges and our customer's expectations, and how we believe that improvements in delivery, agility, and other areas will help us to meet these expectations." He also noted the value of sharing and celebrating "wins" with suppliers — engaging their hearts and minds in the improvement processes.

Clear communications about expectations and results extend across the shipyard's range of supplier development/involvement initiatives, said Valerie Smith. Among their CI activities is a supplier-delegated inspection process for high-volume suppliers. She added that "52 percent of our receipts get supplier-delegated inspection." Newport News uses a weighting system to evaluate and track supplier quality performance, Smith said. Rapid supplier follow-up on defects can reduce defects for suppliers. They've also implemented a real-time, computerized transmission process to enable the shipyard and its suppliers to trim the time

needed for approval and return.

Suppliers learned how they could improve on their performance and expand their capabilities. One example reflecting schedule and other capability improvements involved the requirement of approximately 60 component-type devices per week, to meet the shipyard's contract obligations. The West Coast supplier struggled to deliver one or two on a weekly basis. Working with a MEP organization near the supplier, Northrop Grumman encouraged the supplier to conduct value stream and capacity analyses and invested in training the production workforce as well as senior management. The supplier found a bottleneck in the machining area and outsourced part of this work to a local supplier. After implementing lean basics such as 5S, cellular flow, and Kanban improvement activities, they brought production up to the 40-50/week level within one month. "For some supplier senior management, you almost need to create a 'burning platform,'" said Wilson. "It comes down to the need to make substantial changes in a short period of time. In this case, we said, 'Why don't you let us try it this way and see if it works?' When the supplier began to see significant changes in cash flow, they began to be convinced.

"In another supplier operation, we worked with a supplier who needed to meet the production ramp (increase capacity)," he continued. "The owner of the company was going to add more NC (numerically-controlled) machines and expanded their facility footprint to augment capacity. We suggested to him that he did not need to spend money on these things, and set up benchmarking with another company similar to themselves. Now, after learning to expand their capacity without adding to their footprint or investment in equipment, they are one of our biggest cheerleaders. We have locked in a long-term agreement with them. This teamwork paid big dividends for them, including benefits with their other customers." Such gains made through individual supplier partnerships bring significant returns for the overall business.

Lessons Learned, Continuing Improvement Initiatives

Among the "lessons learned" about their lean VSM collaboration with suppliers, shared by John Jordan and Veasey Wilson, are: 1) Strategic and standard criteria for supplier selection are essential, 2) communicate "What's in it for me?" to suppliers, 3) suppliers have a broad spectrum of lean knowledge, and 4) the measure of success is agility (see Figure 4). Agility, as defined at Northrop Grumman Newport News, is the positive impact of reducing leadtime and inventories while improving on-time delivery and quality. It is an enterprise-wide measure of how the relationship of these factors contributes to overall supply chain performance.

They've also learned more about engaging the shipyard workforce in lean improvement as time goes on. The physical transformation at Main Receiving and Receipt Inspection are remarkable, said Valerie Smith. An employee said, "I was very apprehensive at first about lean. People are realizing that lean/value stream really works, I know and I believe in it." Added other associates in that process, "Management let us make the changes. They took advice from us, the ones closest to the work," and, "With the employees taking control, it gave us a unique perspective." Enthusiastic employees looking for lean improvements are among the shipyard's best "sales people" when they're encouraging suppliers to adopt lean ways.

The executives also suggested: Train everyone to use common tools and language integrating lean and Six Sigma tools and methods, so they become part of the culture from top to bottom of the organization; foster and implement employee suggestions, building employee-management trust; evolve from work centers to value stream "thinking;" use VSM/qualification to sustain CI; and the workforce will become engaged when they "own" the process.

Various revisions/updates in

Measuring Success by Improved Agility

For the 12 Northrop Grumman suppliers active in its initial lean supply chain VSM initiative, results to date are significant:

- Average leadtimes decreased from 98 to 63 days
- Average on-time delivery increased from 63 percent to 91 percent
- Average inventory turns rose from 1.7 to 2.3
- Overall quality scores increased from 98.02 to 99.25 (62 percent reduction in defects, for example).

Figure 4.

the lean supplier teamwork continue to evolve. Increased supplier participation in a kickoff event is now planned for suppliers coming on board. The shipyard builds supplier commitment to lean improvements through tours of the Newport News operations, a lean supply chain workshop, testimonials from existing "lean" participants, presentations by Northrop Grumman's president/CEO and top operations executive, and other activities. "Hands-on demonstrations and Lego exercises demonstrating the benefits from cellular manufacturing bring understanding and commitment," said Smith. Also, suppliers now are asked to sign a letter of understanding about their participation and goals.

Northrop Grumman has honed its supplier assessment capabilities and in turn more effectively works with suppliers on lean awareness and planning, VSM, and rapid improvement events. Ongoing metrics are requested monthly from participating suppliers. These metrics cover the supplier's entire business (the total business must improve if the Newport News portion is to be sustained).

Extending the Value Stream Focus

Additional suppliers have joined the shipyard lean supply chain initiative, bringing the total to 52 participating suppliers. This supplier group represents approximately 40 percent of the shipyard's materials transactions. Newport News has approximately 2000 suppliers. "We are intending to grow the supplier base involved in best value, where we see the greatest opportunity based on transactional volume," said Wilson.

Mutual benefits continue to accumulate, helping all parties concerned to improve their customer service. One of the second group's participants is a fasteners distributor, whose management was initially skeptical of the related changes. After agreeing to "go lean" and establish a vendor-managed inventory (VMI) parts supermarket at Newport News, they've learned how to use a pull Kanban system for easy onsite parts access. Next on the agenda, thanks to shipyard/supplier VSM process information, will be bringing several hundred part numbers to the shop for point-of-use availability. Sharing this information about flow gives suppliers the visibility they need to buy at better prices and provide parts when and where they are needed, for long-term, win-win service.

"Extending the value stream focus not only within the shipyard engineering, planning, and other functions, but also to our supplier base is not only logical but necessary," said John Jordan. "Our initial efforts involve components such as pipes, valves, and fittings that are critical to the running of a ship. As we have worked with our suppliers to develop greater shared understanding of our customers' challenges — as well as our own — we are expanding our capabilities for service in current markets and creating potential opportunities in additional markets." As the shipyard adds to its black belt population, the integration of Six Sigma activities in the supplier base will expand, said Valerie Smith.

"We see this as a CI journey," added Veasey Wilson. "Exporting several of the improvement tools to our suppliers reflects the process of building our framework of excellence within our own operation. Although we have made substantial investments and improvements in these initiatives, we frankly don't see an end to this journey."

Editor's note: The assistance of Glenn Marshall of Northrop Grumman Newport News in the development of this article is appreciated.

Lea A.P. Tonkin, Woodstock, IL is the editor of Target Magazine.

Footnote

1.Glenn Marshall is also the AME Southeastern Region president.

Resources Available Through the Manufacturing Extension Partnership (MEP)

Although small- and mid-sized U.S. manufacturers are the primary customers for the Virginia Philpott Manufacturing Extension Partnership (VPMEP) resources, larger firms such as Northrop Grumman also collaborate with the organization. Evaluation, planning and implementation of improvement strategies, training, and other services are offered by MEP groups (such as VPMEP) located throughout the United States and in Puerto Rico. MEP is part of the National Institute of Standards and Technology in the U.S. Department of Commerce.

For further information, please visit the NIST-MEP website at www.mep.nist.gov or call 301/975-5020. To reach a representative of the NIST-MEP center nearest you, call 800/MEP-4MFG. The VPMEP website is www.vpmep.org.