



LEAN CASE STUDY:

MACRO VALUE STREAM MAPPING AT NORTHROP GRUMMAN AND LOCKHEED MARTIN

There have been six Value Stream Mapping events with 19 improvement opportunities which will reduce lead times by over 40%.

Lockheed Martin Aeronautics (Ft. Worth, TX), and Northrop Grumman Electronic Systems (Baltimore, MD) are partnered on many extremely important and valuable defense-related contracts. Lockheed Martin Aeronautics builds state-of-the-art military fighter aircraft. Northrop Grumman Electronic Systems provides highly sophisticated radars and electronics for the Lockheed Martin airplanes. Both companies continually search for innovative approaches to reduce costs and add value to their products. There are also many smaller companies contributing to the overall product.

In the 1990's both companies were actively but independently pursuing Lean Manufacturing initiatives. Both were also aware of the importance of the Value-Stream Mapping process. This process involves a simple visual tool, which identifies the Current and Future State of how a product or service is produced. Value-Stream Mapping helps companies see waste and eliminate non-value added activities. Use of this tool allows for development of specific action plans as a roadmap to realizing the Future State.

In July 2001, a series of meetings was held between teams from each company to look at ways to collectively add value to programs they shared. Lockheed Martin and Northrop Grumman 'Lean advocates' began to discuss the potential value of a cross-

company or Macro level Value Stream project. The resulting map would show the linkage between information and material flows from Lockheed Martin right back to the second tier supplier. It would help the companies visualize inter-company information and material flows for activities on their respective shop floors as well as for white-collar office activities. At this point, and still today, no major defence aerospace companies have attempted to develop such an inter-organization set of Value Stream Maps. The companies started developing plans and agreed to collaborate in defining the Current and Future State Value Streams for the F-16 Falcon radar system. The desired end result was a Future State Value Stream solution throughout the entire extended enterprise that would create additional value to both current and future programs on which the companies and their suppliers work.

As you might imagine, there are an endless number of sensitivities, legacy relationships, and interactions that must be addressed when several organizations, one of which is the customer for the other two, began to work on a Lean Manufacturing Value Stream map that crosses the walls of the three companies.

The companies realized up front that cultural change would be required to ensure success. They also agreed it was extremely important that a knowledgeable team of facilitator-educators be brought on board to help resolve differences in approaches to Lean Manufacturing, as well as establish common vocabularies and processes. Lean Advisors Inc. was thought to have the best people for such a challenging set of activities. They were asked to be part of the effort and played a significant role in helping the team make effective progress.

The team, comprised 'Lean' practitioners from both companies and Lean Advisors Inc., began to share a common vocabulary and common understanding of Lean Manufacturing practices.

Here are some of the keys to their success

- » Team members had to leave respective company badges at the door and focus on aircraft program needs, rather than on benefits to a particular company.
- » The companies adopted an "open kimono" and no-blame information exchange approach to ensure openness and sharing.
- » Corporate egos had to be dropped and agreements made to develop implementation plans, implement them, and project results to multiple aircraft programs.
- » This often involved dealing with people in departments quite distanced from engineering and manufacturing.
- » The process also required negotiation and executive involvement. The companies agreed to apply the lessons learned to future engagements, which will allow a number of programs to benefit from the increased efficiencies between the companies.

The companies asked Lean Advisors Inc. to give a One-Day Lean Overview to suppliers on both the East and West coasts. Over 150 suppliers attended and were briefed on Value-Stream Mapping. Lean advocates from Northrop Grumman and Lockheed Martin attended these sessions to demonstrate their commitment to this project.

The cross-company Value-Stream Mapping exercise began with a legacy F-16 radar rack. It started at the point where Lockheed Martin engineering ordered a rack and

continued until installation on the production line by union-represented people. As a result of the cross-company Value-Stream Mapping, the second-tier contractor was included and incorporated process changes. Lockheed Martin streamlined their release policy. Northrop Grumman activities were streamlined from order receipt to placement with the second-tier subcontractor.

Lockheed Martin and Northrop Grumman are now beginning to set synchronized, inter-organizational goals using a non-dictatorial approach. Instead of a totally internal focus, with only internal implementation plans, the companies and their suppliers are taking an inter-organizational perspective with coordinated implementation plans. This has resulted in extra efficiencies between the organizations, and delivery of greater value to the aircraft customers.

Some of the lessons learned by the team include

- » Executive leadership, support and buy-in are crucial.
- » Clear, open, honest communications are required.
- » Careful coordination is required with organizations outside the project team to bring about change. » It is easier to set up a strategy for a new product than to change strategy for a product that is already in production.
- » 'Drawing' ownership is a factor.
- » Cultural changes are slow to take place.
- » Knowledgeable outside facilitator-educators not consultants are essential.

To date, there have been six Value Stream Mapping events with 19 improvement opportunities identified and closed. These identified opportunities, which, when

implemented, will reduce lead times by over 40%.

Currently, these activities have resulted in documented savings for 89 production radars. The effort continues and proves that with the proper support and facilitation, cross-company or Macro Value Stream Mapping can be achieved and is extremely valuable. In fact, the process established by this combined effort is now considered the model to be followed by Lockheed Martin on the F/A-22 Program and for Value Stream engagements in that program's "Journey to Excellence."

George Reynolds is a 30-year veteran of Westinghouse Electric/Northrop Grumman. His responsibilities include establishing key strategic relationships with universities for long-term research, business and recruitment partnerships. He is also responsible for introducing new initiatives such as factory modeling, simulation and into the Engineering and Manufacturing organization.

He has served as industry liaison for the Lean Aerospace Initiative at MIT since its inception in 1992. He is the Lean point of contact for Northrop Grumman Corporation. A BSc in Engineering from Howard University, he also holds an MSc in Engineering Administration from George Washington University and is a graduate from the Program for Management Development at Harvard University. George is a Johns Hopkins Fellow in the Management of Change.

He is chair or member of industry advisory boards for numerous universities and is an active supporter of the Meyerhoff Foundation Scholarship Program. He is also vice chairman of the Aerospace Industries Association Engineering Management

Committee. In 1991 he was awarded the National Black Engineer of the Year for Outstanding Achievement in the Industry.

George has recently been elected to become the Chairman of the Engineering Management Committee of the Aerospace Industries Association. George also holds a commercial pilot's license with multi-engine and jet ratings