



59th Advanced Manufacturing Forum

Held March 30-31, 2006 at The Penn Stater Conference Center

Sponsored by

The Center for the Management of Technological and Organizational Change

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Best Practices = Best Plant

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Leadership, teamwork, communication, and clear goals must all be in alignment in order for lean to become a way of life in a manufacturing environment. This was Paul Gomez's message to current and future leaders attending Spring 2006 Advanced Manufacturing Forum. When Gomez came on board at Dana's Owensboro plant in 2001, the plant was operating one 12-hour shift per day, six to seven days a week, barely keeping up with demand. The plant was originally designed to run two eight-hour shifts, five days a week. How was this going to be fixed? In Owensboro's case, the fix started at the top, with the plant's leadership. Truly great leadership is an absolute necessity when deploying lean systems; the top leadership understands what lean is, what it looks like, and what the finished picture looks like. The leader has to get that picture communicated all the way to the shop floor. Every manager, supervisor, coordinator, team leader, team member must be in alignment with the goal.

Dana and the Toyota Production System (TPS) began their lean journey together in 1995, when for the first time, Toyota outsourced a critical component for their vehicles: full-perimeter truck frames. There was much debate within Toyota as to whether an American company could produce such a key component. Lean manufacturing is not a production process, but an entire system of many, many processes, doing everything related to your business with lean in mind. When Dana's lean implementation began and words such as poka yoke and kaizen were introduced, workers questioned the use of Japanese terms. People wanted to know "why". This initial resistance was overcome through communication; first and foremost was the link with Toyota, a tremendous help. Second, the company's leadership provided an historical look at how the Japanese developed lean techniques, how Toyota came to the US in the 1950s and studied the Ford system, and how Toyota picked up the kanban system from US supermarkets. Dana got buy-in right away.

Dana Owensboro builds two products, the Toyota Tundra full-perimeter frame and the Toyota Sequoia full perimeter frame, with just-in-time production. Both platforms are on one assembly line. Dana's customer is Toyota Motor Manufacturing Indiana (TMMI), located 73 miles from the Owensboro plant. Annual expectations from TMMI are 15 ppm quality, 100 per cent on-time delivery, and a 3 per cent annual cost reduction. Dana has a customer that expects continuous product improvement at reduced cost, year after year. Dana also has a workforce that would like a raise every year. How was Dana going to make this happen?

Dana developed a process for everything, and stayed focused on doing the right thing, on the value-added activities, every day. Gomez cautioned against focusing on the money, on what a process costs and whether the money is there. Chase the process, not the money. Taking a cue from Toyota, managers and engineers alike spend much of their time on the shop floor, looking for ways to improve.

There were tough decisions to be made in the beginning. Gomez started with 12 supervisors and within the first year, had to let half go because they did not share the vision and did not want to participate. Putting the right

structure in place, with people who believed in the system allowed Dana to establish owners and accountability, and to build a culture with no fear of change.

The production process in Owensboro starts with an electronic signal received every hour from TMMI. Dana assembles the frame, the frame is painted, and put on a truck and shipped to TMMI. Owensboro has 52 robotic welders, 45 manual stations for riveting, bolting and spot welding. The paint system is fully automated. They do vertical frame shipments, five frames per pallet, 25 frames per shipment, 30 shipments per day to TMMI. The production line was built from the start for flexibility, with real-time communication in the plant. There are andon boards throughout the plant, to show team members the down time, efficiency and takt times. In smaller areas, there are team andon boards that show cycle time, line wait time, overall cycle time, quantity built and buffer status. There are station andon boards that show the operators exactly what model they are building, and what the next model will be.

TMMI operates with about one hour of Dana's product. Dana's trigger board is operated electronically through telephone lines connected to TMMI. Every time a light is lit, another truck is coming off TMMI's assembly line. When all 25 lights are lit, another shipment of 25 frames leaves Dana for TMMI. The truck driver has a button to push so that TMMI knows the truck frames are on their way. If that button is not hit, Toyota calls to ask when their frames are leaving. During the winter months, Dana carries about 100 frames in case of snow. The product has to keep moving.

Lean operation in a welding environment can be quite a challenge. Dana's equipment takes a lot of abuse. Typically, normal equipment availability in this kind of environment is about 85 per cent. Dana had reached a level of about 90 per cent, but then started getting the operators involved, teaching them about their equipment and the parts they needed to keep clean. The operators developed the autonomous maintenance program themselves, and Dana's equipment availability jumped to 95-96 per cent.

Dana's largest supplier is a sister plant in Hopkinsville, Kentucky. When Dana first started with Toyota, almost all of their components came from Japan. Toyota did not trust Dana to work with suppliers until Dana had built the product. Over time, Dana has been able to localize many of the stamped components that go into the truck frames. The parts that come from Japan today are typically small fasteners and bolts. The Hopkinsville plant operates on a complete kanban system – a very simple system that did not cost millions of dollars.

Quality is built into Dana's culture. The production equipment was developed up front with quality in mind, using the Jidoka concept – if a defect is built, the equipment stops. Dana tracks and logs all poka yokes in their facility. The frequency of checks is of paramount importance. Without a verification system in place, how can it be assured that the poka yoke is working properly? Production processes have standardized work instructions, and every 30 days, the work instruction sheets are re-posted. On the back of every instruction sheet is an area where the operator signs and validates that they know and understand these particular instructions. If there is a change in the process, the work instruction sheet comes down and a new one goes up. Everybody has to re-qualify. The results of Dana's quality inspections systems are impressive. In 1999, there were 2,906 ppm defects. In 2006, year-to-date, there are 50.

Throughout the presentation, Gomez returned to the themes of communication and alignment. Once team members and supervisory staff understand the why, the how is simple. It is the leader's job to communicate the vision. Dana has about 3,000 communication meetings annually, just to keep people informed of plant happenings.

When employees are aligned with the vision, and they understand the why, they are not afraid that they are going to lose their jobs. They want to be part of the improvement. Gomez related a story of team members who re-configured a rotation process, a process that had been stared at for five years. The operators on the shop floor figured out that the frame was flipped back and forth seven times; on a three-day shutdown, the stations were rearranged with only one rotation, no back and forth movement. A wasteful process identified by the shop floor, and improved by the shop floor. The moral of the story: train in what to look for, and your team will bring it to you.