Lean at NUMMI

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Here's how lean manufacturing improved this Toyota-GM joint venture's automotive manufacturing efficiency

To remain competitive in the fiercely contested North American automotive industry, the New United Motor Manufacturing Inc. (NUMMI, Fremont, CA) assembly plant, a joint venture between Toyota Motor Corp. (Aichi Prefecture, Japan) and General Motors Corp. (Detroit), has rededicated its efforts in lean manufacturing during the past few years by applying key tenets of the Toyota Production System (TPS).

At NUMMI, the historic joint venture opened by Toyota and GM in 1984, lean manufacturing techniques and TPS have been used since the plant's opening, but in recent years the Toyota management which runs the plant sought to re-emphasize the workforce's employment of TPS to combat the high cost of manufacturing automobiles in California. As the last auto manufacturer producing vehicles in California, NUMMI must contend with several economic disadvantages including high wages, insurance, electricity, and fuel costs.

To compete effectively, the lean manufacturing tools of TPS help the 5.3 million ft^2 (492,000 m^2) NUMMI plant manufacture cars for Toyota and GM that include the Toyota Corolla and Pontiac Vibe subcompact cars, which are built on the same manufacturing line, and Toyota's Tacoma pickup trucks. Created 21 years ago, the 50:50 joint venture gave Toyota its first experience operating a North American manufacturing plant, while offering GM managers a chance to see first-hand the famed Toyota Production System upon which most modern lean manufacturing concepts are built. NUMMI's current annual production capacity reaches 245,000 cars and 165,000 trucks, and the facility includes plastics, stamping, body and weld, paint, and assembly operations.

NUMMI has profited both partners, as the award-winning facility ranks with other Toyota plants among the most productive manufacturing operations in North America. GM, which rotates approximately 16 managers every year or two to learn lean techniques at NUMMI, has improved its lean-manufacturing efforts to the point where its products have received higher J.D. Power quality rankings, and its manufacturing plants are earning kudos for improving plant efficiency on the most recent Harbour

Report.

The Harbour Report says the joint venture plant once again led the overall assembly rankings with a labor hours per vehicle measure of 21.78, an improvement of 0.6% from 2003. “NUMMI has been a successful joint venture from which both General Motors and Toyota have learned valuable lessons they have applied throughout their manufacturing systems,” Harbour states.

Toyota recently sought to re-emphasize TPS at the NUMMI plant, hiring Ernesto Gonzalez-Beltran, NUMMI vice president, manufacturing, in 2002 to help the factory’s workers focus on the proper application of TPS. Formerly a manufacturing executive at Ford Motor Co. (Dearborn, MI), Gonzalez-Beltran sees lean manufacturing as essential to NUMMI survival, to help counteract the cost of doing business in the Golden State, where manufacturing autos carries cost burdens similar to auto production in Japan.

NUMMI’s production system is patterned closely after TPS, which is constantly changing and being updated, notes Gonzalez-Beltran. The pillars of TPS are the waste reduction techniques of Just-in-Time production, bringing inventory to where it is needed and at the right time, and also jidoka, which provides machines and operators the ability to detect abnormal conditions and immediately stop work if such conditions occur. Other major lean manufacturing elements being emphasized at NUMMI include standardized work, kaizen events, jishuken (an in depth week-long workshop similar to a kaizen event), and value-stream mapping, which NUMMI has pushed down into its supplier companies. “Lean manufacturing is a necessity for us, in order to stay in business and remain competitive,” Gonzalez-Beltran states. “The application of TPS and lean manufacturing is the only tool that we have to offset the high cost of doing business in California. That’s why we put special emphasis and always try to stay at the leading edge of any new developments or new techniques to make our operation leaner and more efficient.”

Building cars and trucks in California means dealing with higher wage, energy, and workers’ compensation costs, he notes, with total costs approaching 40% higher than other states where NUMMI’s competitors are located. “When I came over, the big challenge that I was given was how do we regain the level of TPS that we had at the beginning, because according to the management, there had been an erosion of knowledge in TPS and knowledge of application over the years,” Gonzalez-Beltran says. “When you start breaking it down, not only in terms of wages, energy’s almost double here, and taxes and insurance are higher here.

“We face a bit of a different challenge. The environmental policy here is very stringent, so we have to find ways to creatively meet all those requirements and still remain competitive.”

Lean learning at NUMMI is an ongoing effort, as the application of TPS itself is constantly changing and evolving. “Most people are under the impression that since NUMMI’s a joint venture there is a very strong involvement from GM on the operation side, but in reality there isn’t,” says Gonzalez-Beltran. “NUMMI is run like any other NAMC [North American Manufacturing Company], as a Toyota plant, basically. All of our direction, all of our policies and long-term plans are basically in line with TMC [Toyota] policies and plans, so–other than the board of directors, which is divided 50:50 between GM and Toyota–we do not see a lot of the GM side. We have maybe 15 – 16 GM coordinators here who spend a year or two and then they go back to plants. They come over to learn about TPS–lean manufacturing. Most of them are managers and assistant managers in the relatively early stages of their careers, and they’re sent over to better grasp lean manufacturing and see the TPS philosophy in practice.”

The Toyota management at NUMMI came to the plant to teach lean and TPS, he adds. “It’s definitely an opportunity for us to stay up-to-date on all the new ways of improving or leveling-up TPS,” Gonzalez-Beltran says. “TPS as a production system is not always on the same stage, there is always something changing, and by having these coordinators coming every three years, we have an opportunity to learn first-hand how to enhance the system on an ongoing basis. I’ve been here for three years–I haven’t been to a GM plant, but I’ve been to many Toyota plants, and every time we go down there, almost every three or four months, there is always something new. There’s always something changing.”

The exchange of ideas on lean manufacturing includes visits to Toyota in Takaoka, Japan, he adds, as well as going every few months to the automaker’s other North American manufacturing facilities. “There is an ongoing exchange of information, best-practice sharing. We meet every fourth month in a different location. As a matter of fact, they are coming over in October, and we call it the NAPJM, it stands for the North American Production Joint Meeting. And the whole concept is to not only share each others’ results, as well as the actual condition of the plant, but also an opportunity to share best practices."

Deploying lean with union workers posed a challenge at the outset of the joint venture, as NUMMI rehired many of the laid-off workers from the shuttered GM plant, and the

venture began with an agreement with the United Auto Workers (UAW) right from the start. “The biggest challenge was they had this workforce that had been just laid off by General Motors, and the values that they had in terms of quality and productivity, management involvement in communications and so on, were very different to what the Toyota Production System preaches,” notes Gonzalez-Beltran. “They had to go through this whole learning curve at the beginning, and I think they were not only able to embrace it, but to apply it and be very, very successful at it. One factor that I think was in favor of the joint venture was that most of these employees had a very high level of appreciation for having a job, after being laid off. All the area assembly plants had been closed. NUMMI was the only one left.”

Instead of resisting lean and TPS, the workers at NUMMI embraced the changes, he adds. “They were desperate for the change,” Gonzalez-Beltran says. “The traditional combative or antagonistic relationship between union and management was something they didn’t want to go through again, so they embraced the new concept of working together, mutual trust and respect, and the level of involvement in the Toyota Production System that was required from them.”

“I’m not going to say that it’s a disadvantage, but it’s always a little bit more challenging to run a plant realizing the Toyota principles with the UAW representation,” he adds, “mostly because of the flexibility that the other nonunion plants have in terms of being able to move the workforce or apply certain strategies that, because of contract obligations, we cannot. So it is a challenge here.”

Building on lean at NUMMI includes the current construction of an all-new training building on the plant site that will house all of the manufacturing facility’s lean training efforts. Scheduled for completion this fall, the building will house training sessions for the plant’s lean activities, which include TPS training annually for every one of the 4800 team members working at the plant.

“The workforce got older and some of those team members who were here at the beginning, eventually they retired,” notes Gonzalez-Beltran. “We have a training program to sustain that level of knowledge and understanding of TPS with new hires.” NUMMI’s TPS program includes basic lean manufacturing training, and the plant will soon be taking aim at standardized work. Currently, NUMMI team members are working on jishuken activities, which emphasize learning a specific skill or project-solving in a short time of a week or less.

“Jishuken is when you give a very challenging project to a person or group of people and they work on it in a very short period of time–four or five days,” Gonzalez-Beltran says, comparing jishuken to a kaizen team event. “You work on improving uptime or quality, reducing scrap, or reducing the number of defects that are coming out of the plant. They work 12 – 15, even 18 hours a day, doing the work. Then they call me, I go in, and they present to us, ‘this is what we are doing, and these are the results.’”

With lean training, NUMMI team members attend classes with classroom presentations, and other sessions with hands-on involvement through a series of simulations, notes Walter Odisho, general manger, truck operations and plastics manufacturing. “By going through that, we try to drive home the point that having an organized and TPS-oriented production system makes sense,” says Odisho, an employee at NUMMI for 17 years. “We try to establish and differentiate between a pull system and a push system. TPS is a pull system where ultimately the customer and the market condition demands are placed onto a production environment to meet the customer needs and customer wants, in terms of quality, quantity, and timing. So producing the right quality, the right quantity, at the right time is ultimately what we strive for.”

The factory also uses a system called Set Parts Supply, or SPS, which helps cut down on waste at an operator’s work cell or position on the assembly line. “Set Parts Supply is where we work on eliminating line-side parts,” Odisho adds. “The idea is to have the right part at the disposal of the operator, at the right time. For example, if I’m building a vehicle with the option of a CD player, when I turn around I would expect to see a CD player that matches the requirement of that vehicle come to me, rather than an operator turning around and selecting one from the host of parts to pick.

“SPS has the potential to simplify the operator’s job, thereby improving the overall quality of the vehicle; also it has the potential to reduce the line-space requirements, because we don’t need to store as many parts line-side, thereby reducing the upstream parts inventory, reducing costs. And ultimately, if it’s done correctly, it reduces the amount of work that an operator does. An operator will not have wasted motion by turning around and selecting, thinking, reaching, picking up–all of that’s automatically done. You add value-added work where non-value-added reaching, pulling and selecting, and perhaps some walking, existed before.”

Learning lean manufacturing basics when he started at NUMMI impressed 15-year NUMMI employee Salvador Sanchez, assistant manager, Toyota Production System,

plant/manufacturing, who now heads up NUMMI's TPS and lean efforts. A business school graduate from the University of California-Berkeley, Sanchez joined NUMMI in 1990 as a team member right when Toyota was installing a new truck assembly at the plant. He was immediately immersed in TPS.

"First coming in with a new truck, there were a lot of TMC regular team leaders, group leaders, from Japan," Sanchez notes, "and they'd work with us closely, ensuring that we understood the basics: how to hold a body, hold our tools and equipment. We didn't call it ergonomics 15 years ago, but really that's what it is. It's just how to hold body and tools in the correct position.

"At the time, nobody explained to us that this is TPS," recalls Sanchez, whose recently-retired father, Salvador Sanchez, was an original NUMMI team member who previously worked for GM at the plant. "They would say, 'Look at this job, if you were going to stay on here the rest of your life, how would you like to set this job up in the most efficient way?'

"For them, it was everyday work, it wasn't anything special," he adds of the visiting TMC personnel who taught TPS. "When I became a team leader, I started understanding that behind everything we did there was a philosophy or some level of thinking that, as a team member, you didn't really understand."

After spending a couple of years at the Toyota Supplier Support Center in Kentucky, Sanchez returned to NUMMI committed to helping the company understand TPS and

standardized work. "I wanted to help improve NUMMI's culture here, and be able to come up with good kaizens and reduce lead times. One of the changes is that we're aligned with every department, meaning that we have a person from our stamping facility, and we have a person from our body shop facility. They're not experts, but their job in our group for a two-year time period is to learn the fundamentals of TPS–the basics of that department."

A recent jishuken focused on the plant's body-shop operation, but team members from assembly and paint were involved in week-long workshops. "These events focus on some business need of that department, and the other important thing is that everybody there can develop and learn something they didn't know about TPS–whether it's the application of tools, a standardized work form, a way to visually tell a story, or maybe problem-solving," Sanchez says. "So you have to walk away with some improvement, some self-improvement."

The training activities also help NUMMI workers understand the needs of others in the manufacturing facility, so workers realize that successfully applying TPS requires understanding needs of internal customers as well as those of the ultimate car-buying customer.

“One of the things that Toyota really talks about is Customer First, and that means understanding not only customers that are buying our vehicles, but the customers that are within our own walls,” Sanchez adds. “If I’m working the paint shop, my life usually focuses on paint, but I have to take myself out of that position and look at what kind of defects, what kind of vehicles, am I sending to my customer? Does the vehicle satisfy them, and how can I make it better? The developing of this TPS group, coming back and aligning them with their department, and also really running the learning, has been a key for us.

“Just like anybody in our group, they have a feeling that they’re always going to be learning and developing. It’s difficult for people here to not buy in, because TPS is a big part of our culture.”

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