

JOB SHOP LEAN

Dr. Shahrukh Irani, Director IE Research, at Hoerbiger Corporation of America

The Idea Factory

If an organization decides to embark on its *lean journey*, its leaders should be prepared to embark on a *never-ending journey*. Toyota Motor Corporation is the unquestionable poster child of companies that have made continuous improvement an effective and self-sustaining business strategy. At Hoerbiger Corporation of America, located in Houston, Texas, we manufacture a wide range of components and systems for reciprocating compressors. Our R&D teams develop technologies that extend component life and improve overall machinery performance. Product manufacturing is strictly controlled—from procurement and testing of raw materials to installation and testing at our customer sites.

In the United States, we have manufacturing facilities in Pompano Beach, Florida, and Houston, Texas. In addition, we have nine other production facilities spread across the globe in cities like Vienna (Austria), Shanghai (China), Pune (India) and Zandov (Czechoslovakia). Here in the United States, our range of metallic and non-metallic products include: capacity control, monitoring systems, compressor valves, piston rings and rider bands, rod packing, pistons and piston rods, and check valves. Accordingly, we serve many markets, e.g.: OEMs, oil and petrochemical refining, natural gas, refrigeration, cryogenic and industrial air and gas markets.

In our Houston facility (which occupies 63,000 square feet and employs about 125 people) we machine both metallic and non-metallic components, and do some final assembly also. We are loosely organized into five machining cells and two molding departments that produce the bushings supplied to the machining cells.

Through the coming months, Job Shop Lean will discuss a range of projects undertaken and experience gained as I and many of my colleagues throw ourselves into learning, failing, trying, succeeding, innovating and celebrating every little success. To every reader of *Gear Technology*, I can sincerely say one thing: What you will read is exactly what happens in our Houston, Texas, facility because it takes considerable efforts from everybody to bring every project to fruition. To gain each

Editor's Note: This is the first article in an eight-part "reality" series on implementing continuous improvement at Hoerbiger Corporation. Throughout 2013, Dr. Shahrukh Irani will report on his progress applying the job shop lean strategies he developed during his time at The Ohio State University. These lean methods focus on high-mix, low-volume, small-to-medium enterprises and can easily be applied to most gear manufacturing operations.

success, there will be many failures, frustrations and setbacks along the way.

If Every Team Could Implement One Idea Every Week

We began our continuous improvement journey simply by asking each employee on the shop floor to come up with an idea that they would like to see implemented, or could just implement themselves. Our previous plant manager Keith Farnham, had initiated a weekly all-hands meeting with the shop employees at 7:00 a.m. every Friday. He organized the employees on both shifts into teams and appointed a leader for each team. These teams are basically the employees who work in the five machining cells (quick response, CNC packings, power rings, piston rings, manual packings), molding cells (cold compression molding, hot compression molding) and support departments (quality, maintenance, shipping, receiving).

Now, I am a former academic and could be forgiven for doing a simple calculation. If every week, each team in each shift implemented one good idea, this would result in 22 improvements being made every week. Assuming approximately 50 working weeks in the year, we could have 1,100 improvements that could impact our core business goals (workplace safety, job satisfaction, speed of customer service, waste reduction and sales).

It helps to have a CEO (Don York) who walks to your office instead of phoning or e-mailing you to come to his. Whenever he walks through the facility, he uses his time on the floor to guide and offer suggestions to employees in the areas that he visits. York did not demand that I develop and administer a cookie-cutter lean assessment tool to kick off our journey.

The very first improvement idea that was offered by a shop employee concerned safety. Ly Nguyen from the quick response cell demonstrated how loading/unloading heavy parts on an

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lean

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engine lathe could lead to an accident. That resulted in immediate attention to bringing in handling equipment for parts loading/unloading.

Our supervisors, such as Charlotte Pett (shipping), Leonel Salinas (molding), Greg Oakley and Ziggy Skora (machining), also deserve much credit. A continuous improvement program often loses steam because it gets mired in housekeeping projects. Rather than lapse into that comfort zone, our supervisors ask their teams to extend themselves and select challenging projects after the initial housekeeping projects get done. Their message could be summed up as follows, "Just give it a shot. Let me handle the fallout if you fail. Okay?"

We Also Leverage The Time And Talent Of Our Engineers

Conventional wisdom says to let all continuous improvement work be thought about and implemented only by the employees themselves. Otherwise, the improvements will not be accepted or the solutions will be implemented in half-hearted fashion at best. That is not the case in our company. Sometimes the project is technically demanding, and involves IT, data mining or other "engineering skills." Take the case of implementing a project to assess if our workforce was ready for the introduction of computer-aided shop scheduling and order tracking. That was right down the alley of Paul Mittendorff, director of manufacturing systems. With the assistance of one of our planners, Russell Irvine, Mittendorff helped to implement the software in one of our cells. Meanwhile, the cell team did its own workplace improvement projects.

Now consider Shalini Gonnabathula, our continuous improvement engineer, who has an M.S. degree in industrial engineering. It helps to have a details-oriented IE like her to do the methods analysis and time studies that have produced accurate time standards for our ERP system. The time studies she has done have helped cost accounting, scheduling and level loading of our production plans.

Finally, I hope that you will take inspiration from the work that was done for us by Thomas Leskowschek, an undergraduate intern from Austria who is studying for his B.S. in industrial management in the Department of Industrial Management at the FH-Joanneum University of Applied Sciences. Together, we assisted several employees with their continuous improvement projects. In addition, during the four months that he was with us, we did a slew of interconnected technical projects that sought to improve the space utilization and workflows in the shipping department. Thomas brought to Hoerbiger a great work ethic and solid, integrated engineering training. Hoerbiger matched that by giving him valuable on-the-job training by involving him in a variety of meaningful projects where he was mentored by experienced senior personnel.

Recognizing The Smallest Efforts

We do our best to recognize initiative while refraining from scoring employee projects. Take the case of Luong Dam, a machinist in the manual packings cell. He took so much pride in doing housekeeping improvements while his milling machines remained in cut. Talk about eliminating the wastes of waiting and operator motion!

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The shipping department contained plenty of dead or slow-moving inventory prior to lean implementation (all photos courtesy of Hoerhiger Corporation).

BEFORE

Then there is our ebullient receptionist, Keri Walker. One day over lunch she got to talking with Charlotte Pett about the projects they were doing in the shipping department. That was reason enough for Walker to clean and spruce up the supplies closet in a couple of days. Now she has posted instructions on the door of that closet to prevent it from becoming a dumping ground for others.

We Seek The Movers And Shakers In Our Workforce

One of the best continuous improvement projects is that of Juan Nunez in shipping. The first half-hour stand-up meeting that we had with that team yielded a popular grouse from the employees, “We do not have space. It is too crowded in here!” The intern and I did a 5-Why’s brainstorming session with them. A color-coded map of the department layout showed that several areas were “locked out” by racks carrying dead or slow-moving inventory. In one case, two steel racks along the wall carried incomplete orders waiting for one or more parts to get done so they could be packaged and shipped. Nunez came in on a Saturday, emptied an outside rack that had dead inventory, then moved these incomplete kits out of the department. He then categorized the kits and labeled every location that carried an incomplete order. What next? He has kicked the ball back into our court. We will log onto our ERP system and document why each kit is incomplete. So this is how our employees work with our industrial/manufacturing engineers whenever the need arises.

We Are Lucky To Have In-House Lean Experts

Leonel Salinas, supervisor of both molding departments, is a prime example of an individual who demonstrates the potential to become our eventual in-house sensei. He has both a B.S. and an M.S. in manufacturing engineering from the University of Texas – Pan American, along with a prior stint at Siemens where he learned to implement lean. In walking past his areas,

you will see considerable evidence that lean has taken root; i.e., they are clean and organized. He does weekly production huddles with his people in both departments to address issues; I have often seen him assisting his employees. He has acknowledged their projects and recommended them for Employee Achievement Awards. In fact, I challenged him to pursue the next level of improvement opportunities since they have already plucked many of the low-hanging fruits in both departments. As the work in this department involves considerable heavy loading/unloading work, he allows rest breaks that outside observers would consider to be slacking off.

A Team Leader Who Puts Team Before Self

James “Rojo” Bowen is the team leader for the hot compression molding (HCM) cell. He “drank the lean Koolaid” when it was “served to him” by his supervisor, Salinas. I got to work closely with Rojo because we were put on the Tiger Team that our

CEO asked to be formed to drive continuous improvement into the ranks of our workforce. You will be inspired to hear Rojo talk about the importance of lean because he has seen the impact in his department! So I decided to cite him for an Employee Achievement Award. At that time, I did not know that he had already won the Employee of the Year Award for 2010. I requested him to swing by my office and provide additional details about his lean projects so I could complete my citation. Okay, so he comes to my office, settles into a chair and then did what we know is core to the Toyota culture: humility and team before self. Rojo asked me to include EVERYBODY in his department in the citation for Employee Achievement Award because “I could not have done what I did without all of them contributing”. Yes sir, the molding departments are where lean is thriving here in HCA-TX and from there it will spread to the rest of our facility. Count on that!

We Also Do the “Big Bang” Improvement Projects

Even as the dozens of small quick-and-easy improvement ideas of our employees are being implemented, we are also doing a

By emptying the dead inventory, the shipping department now boasts one of the best continuous improvement projects in the facility.

AFTER



few “Big Bang” improvement projects. There is no better example than the complete revamping of the receiving department. This was done by Anthony Herrell, materials manager, Andrew Reynolds, warehouse and inventory supervisor, and department personnel, including Willie Christopher, Linh Nguyen and Thomas Tubes. Similarly, a computerized scheduling and order tracking system has been implemented in one of our manufacturing cells. It serves as a pilot to assess the pros and cons to a full-blown implementation of the same system to manage our entire facility. Each of these projects will be described in detail in a future column.

A Humble Start To Our Lean Journey

In their article “Swarm Intelligence: A Whole New Way to Think About Business” (*Harvard Business Review*, May 2001, 106-114), Eric Bonabeau and Christopher Meyer state that even an ant colony collectively executes and completes challenging tasks because of three characteristics:

- Flexibility (the colony can adapt to a changing environment)
- Robustness (even when one or more individuals fail, the group can still perform its tasks)
- Self-Organization (activities are neither centrally controlled nor locally supervised)

In a similar vein, we at Hoerbiger Corporation decided to first and foremost have *all of our shop employees* undertake continuous improvement projects of *their* choice; we have not imposed any constraints or expectations on them. Rather, we have allowed them to choose *what* to improve, *where* to improve, *how much* to improve, etc. Perhaps the only “higher

level” involvement that management had was to have them work in teams that are associated with a manufacturing cell or department. That will ensure that even though we have embarked on just the first leg of our lean journey, future projects will impact clusters of value streams based on part families (or an entire segment of the product mix). ⚙️

Since September 2012, **Dr. Shahrukh Irani** has been the director of industrial engineering research at Hoerbiger Corporation of America (www.hoerbiger.com). Previously, he was an associate professor in the Department of Integrated Systems Engineering at The Ohio State University. His research there focused on the development of new IE methods to adapt and scale lean for use by high-mix, low-volume SME's (small and medium enterprises). His research group created PFAST (Production Flow Analysis and Simplification Toolkit)—a software tool for material flow analysis and facility layout to implement lean in job shops. Irani subsequently received the Outstanding Faculty Award for excellence in teaching from the graduating classes of 2002—2006, and 2009. In 2002, he received the Charles E. MacQuigg Student Award for Outstanding Teaching from the College Of Engineering. He served as the director of the facilities planning and design division of the Institute of Industrial Engineers for 1999-2001 and 2001-2003. He is the editor of the Handbook of Cellular Manufacturing Systems (1999, John Wiley). In 1996, he was voted Young Engineer of the Year by the Minnesota Federation of Engineering Societies and the Minneapolis Chapter of the Institute of Industrial Engineers.



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