



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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Building Tires in a Whole New Way

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Bridgestone Firestone

In 1998, Bridgestone Firestone found itself in the enviable position of too much market demand for its larger (14" and 15") SUV tires and not enough capacity. Several options were considered to meet this demand: expand current facilities, add more equipment, or build a whole new plant. The decision was to build a new plant, and not just because they needed the extra capacity. Bridgestone wanted to build tires in a whole new way – new plant, new tire-making machinery, new equipment and new mindset – exciting happenings for a company that was over 100 years old.

Firestone was formed in 1900 so Harvey Firestone could supply tires to his friend Henry Ford. It was a great partnership for many, many years. In the 1930s, Ischuro Ishibashi, a great admirer of Harvey Firestone, started Bridgestone. Ishibashi's admiration ran deep - he turned the English translation of his name around (stone bridge) so that it even sounded like Firestone. Firestone entered a steady decline in the 1970s, and was purchased by Bridgestone in 1988. Together, the merged companies have become the world's largest tire and rubber company. The company's headquarters are in Tokyo; North American headquarters are in Nashville, Tennessee; the research and development technical center remains in Akron, Ohio.

Tiny Graniteville, in Aiken County, South Carolina won the site search for the plant that would be designed, built, and operated as an ultimate lean machine. Only one year elapsed from the time the first steel girder was laid until the first tire was tested. Production began before the plant's 1.5 million square feet were finished. Bridgestone Firestone had customers with orders to fill.

The plant was designed to remove as many touches as possible from the tire. The more times a tire is touched, the more opportunities there are to introduce abnormalities and inefficiencies. Bridgestone Firestone was able to get it down to one touch – the inspector at the end of the line. The Aiken plant also integrated its tire assembly. The layers and layers of a tire's assembly are now automatically assembled in the correct order and to exact specifications. The use of 'wind-up' and 'lid-off' machines saves manpower time; product components are not off-loaded and re-loaded via cart and crane because the cart has been embedded right into the machine.

The final finishing and conveying system, nicknamed "six flags over Aiken", is an immense system of conveyors that takes the tires where they need to go in the final finish system. This is the main reason for Aiken's 'reduced touches'. In every other plant, tires come down the conveyor in random orders, are hand-sorted and racked. This is all done automatically at Aiken – there is no opportunity for a tire to be placed in

the wrong rack.

At older facilities, there are three-story-high mixers that require materials to go up on elevators. If there is a breakdown in one of these freight elevators, the repair is costly in terms of time and money. The Aiken plant has a ramp instead – no need for an elevator.

Bridgestone Firestone also solved what was thought to be an impossible problem by placing the curing process – a very hot, steam-oriented process – less than 100 feet from the assembly machine. The usual travel distance of 300 or more feet was eliminated, as well as the 12-hour delay between assembly and curing. Environmental controls make the entire process far more pleasant for the employee and better for the tire, a radical change in thinking in the tire business.

The key points in the Bridgestone Firestone philosophy mirror common lean themes, but the Aiken employees do not use the word lean to describe their operation. Doing the right things the right way was indoctrinated from the beginning with a workforce entirely new to the tire making business. Lean aspects at Aiken include visual factory techniques, 5S, an electronic kanban system, rotating 12-hour shifts, only two job classifications (machine technician and service technician) and real-time quality feedback based on bar-codes. How was Bridgestone going to give their new employees these tools to succeed when so many of them were completely new to the tire business? How could employees be given the information to assure them that they were doing the right thing when work procedures could be many, many pages long?

Aiken developed ‘conspicuous standards’ – quick reference tools for employees, not only to hold them accountable, but to help them recover and/or learn more quickly. These guidelines are as word-free as possible, and as conspicuous and visual as possible. The standards are themselves standardized, through the use of color, type of font and font size. Anyone can go anywhere in the plant and know what they are seeing.

The Aiken plant talks more about kaizen than lean. Kaizen is a Japanese term, a Bridgestone term; lean is not one of the main words in the vocabulary. Still, everyone knows what it means: improving all aspects of the job, using the least amount of resources in the quickest amount of time, whether an energy, environmental, safety or quality-related component.

Lean and kaizen are communicated in a number of ways. For starters, the plant’s industrial engineers are out on the floor enabling improvements – a role quite different than what is found in most other plants. IE is not performing time studies or rate checking; instead, the department works with employee teams, on ideas for improvements. Bridgestone Firestone reaps huge benefits as managers and engineers are seen more as enablers than policy makers and enforcers.

There are crew leaders and small group improvement teams who go through a modified Six Sigma process with DMAIC-type style teaching, using simple tools. The small group improvement teams are four to six individuals who come in on overtime and tackle a project of either their or their manager’s choice. For example, the issue may be what to do with their number one scrap item. They will use the tools they have been taught to address the issue, get the data, analyze it, and figure out a way to use that scrap item. It could be a safety issue, too. Five SQN coordinators (safety, quality, non-operating time) are on every crew and coordinate these issues in addition to their regular job. Aiken does not have self-directed teams; the crew leader is responsible for the work of the team. But the SQN coordinators take the burden of these areas off of the crew leader.

Safety is paramount. The Aiken plant has VPP star status, only the second plant in North America to receive this recognition from OSHA. All team members are required to turn in four safety suggestions each quarter – hidden dangers, near misses, audit results or observations. Last year the plant went over 1.5 million hours before the first reportable incident.

As the premier employer in the area, Bridgestone was very selective in hiring people who understood as they were coming through the door that they were being hired for their brains, not just their hands. Every employee went through two weeks of orientation where typical subjects of company culture, safety, quality, vision, and

mission were covered. But Bridgestone also taught new employees how Bridgestone's tire business runs, what the company's financial indicators are, and what 'cost per thousand pounds of rubber' means. Every month employees are told where the plant stands in terms of profit and loss, and how the plant compares to other plants. The Aiken plant just finished an orientation class, and new employees offered that Bridgestone's factory simulation games are far superior to root analysis charts for teaching the plant's financial concepts.

Bridgestone also talks to their employees about their personal time and financial management. Many employees moved to higher hourly pay rates when they came to work at Bridgestone, with more time off.

Making lean a seamless part of doing business has worked very well for Bridgestone Firestone in Aiken. The plant and processes were designed from the ground up to be lean. The plant just made its first 20-inch tire and that accomplishment has reinvigorated the workforce. The goal now is to remain the lean team, while grappling with a future that includes competition from a new plant in Mexico that will pay its workers between \$3 and \$4 an hour. The challenge will be to stay on top.