

Passing the Point of No Return: Accelerated Implementation of a Lean Manufacturing System

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Introduction and Overview

The Riverdale Assembly Plant of the Autoco Company is in the process of passing what can be thought of as the point of new return in the implementation of the Autoco Manufacturing Systems (AMS). For many individuals at all levels of the organization it would be harder to return back to the mass production way of operating than it would be to continue in the implementation of lean manufacturing principles and practices. For example, as one area manager commented, “a year ago I would have fought you tooth and nail if you wanted to take away my safety stock; now, I would fight you just as hard if you tried to put it back in.” Similarly, an hourly team leader commented, “I thought long and hard before deciding to seek the team leader position. I really wasn’t sure if it was consistent with my role as an alternate committeeperson for the union. Now that I am in the role, however, I can’t imagine not having team leaders in the plant.”

This is a pivotal situation in the auto industry. In North America there are some new auto plants that have been established from the outset with new, “lean” manufacturing systems. Commonly termed “greenfield” plants since they are typically built in open green fields, these plants often benefit from having newly hired workforces and management teams all trained to operate the new manufacturing system. Most Japanese “transplants” (Japanese owned facilities established in North America) are greenfield plants. They utilize lean principles and practices, such as, a team-based operation, just-in-time delivery of components, worker-led statistical quality control, preventative maintenance, and material flow. However, most of existing North American auto plants are not like this. They are termed “brownfield” plants, with most having operated for many decades on the basis of a mass production work system. The challenge facing Riverdale and these other plants is to transform their operations in ways that will allow them to achieve the quality, safety, cost, flexibility and other benefits enjoyed by the newer plants – while still maintaining production and attending to historical traditions and practices.

Historical Context

The Riverdale plant dates back more than half a century, with the workforce represented by the Metal Workers Union (MWU). The plant population has fluctuated over the years with a peak of over 7,000 employees and a current payroll of around 3,500 employees.

There is a long history of joint, union-management activities at Riverdale, beginning with the joint skilled trades apprenticeship program and the joint safety program, which have been in place for many decades, it was not until the early 1980s that joint activities expanded to include Worker Participation (WP) and joint training. The Worker Participation Groups (WPGs) were voluntary, with one in each department of a plant. The joint training activities were initially begun to serve displaced workers laid off from the auto industry, but quickly expanded to include training programs for active workers. In the early 1990s a Total Preventative Maintenance (TPM) initiative was also begun on a joint basis. The mid 1990s saw the first program to involve hourly production workers in the design and development of a new car model, which led to notable improvements for some components.

Despite this long history of joint activities, there were many complex tensions in the Riverdale plant. For example, during the mid 1990's there was a world-wide restructuring of Autoco under which many of separate joint activities for safety, worker participation, preventative maintenance, quality and other managers were all centralized. Instead of having separate joint governing committees for each activity this plant and others in this company were urged to combine the activities under the auspices of a single, plant-wide joint steering committee. Though there was a clear logic to support the move, most of the champions of the joint activities experienced the shift as reduction in commitment to their individual initiatives.

Also, the plant is located in an old industrial area, with a highly diverse workforce. In the late 1990s, a series of sexual harassment lawsuits served as a "wake-up call" to union and management leadership alike. The resulting settlements involved extensive training in diversity and respect for the entire plant population as well as the establishment of a plant-wide diversity council.

Initial Launch of a Lean Manufacturing System

It was during the mid to late 1990's that the plant first began implementation of the Autoco Manufacturing System (AMS) – a version of lean production developed by this company. In 1996 a set of union and management AMS coordinators were trained. In 1997 the entire plant was shut-down for a plant-wide "town hall" meeting in which management leaders, projected on large video screens, announce the launch of the Autoco Manufacturing System. The body shop was selected as the initial pilot implementation area, with extensive resources concentrated on the training of newly formed Continuous Improvement Teams (CITs). A central Plant Implementation Team (PIT) was established with union and management representation.

In 1998 the plant sought to expand the effort to other parts of the plant, including the engine line, the paint shop, and the trim/final assembly areas. The central Plant Implementation Team was disbanded – with the members each assigned to separate departments. Unfortunately, there were a series of management personnel moves

around the same time that led to a nearly complete turnover of the Plant Operating Committee, including the Manufacturing Manager, some of the Area Managers responsible for the production departments and Managers responsible for Human Resources, Quality, Maintenance, Finance and Material Handling.

When a new plant manager arrived in 1999, he found newly forming Continuous Improvement Teams around the plant, but without many resources devoted to supporting the teams. For example, weekly team meetings would be held, but there were few mechanisms to handle requests for information, maintenance support and other forms of assistance from the teams. The many former joint activities had been combined into a single forum, but each only had enough time to give a brief status report before some “hot” issue would take over the agenda in the meetings. The members of the Plant Implementation Team were feeling isolated in their respective departments. Front-line supervisors and superintendents were told to become more participative managers, but the pressure to “make the numbers” in production were undiminished. Throughout the plant, people who had built up their hopes for the new initiative were disappointed by the results – a “hope/heartbreak” cycle all too familiar to management and labor alike.

Accelerated Implementation of AMS

Two related, pivotal events took place in the year 2000. First, the plant was awarded a new model to replace its current product – with the launch of the new model scheduled for in 2003. Second, the plant was picked to be one of a select group of plants (spanning all the major product lines of the company) in which implementation resources would be concentrated to accelerate the implementation of the Autoco Manufacturing System. This would be a test as to whether a lean production system could be implemented in an accelerated way in a brownfield plant.

The first responses just involved an intensification of previous activities. A training “bubble” of workers were hired to back-fill for different areas of the plant as the entire workforce was training in group process skills, basic equipment maintenance, and a reinforcement of the sexual harassment and diversity training.

While there were still many of the voluntary Worker Participation (WP) program groups in the plant, the focus shifted to Continuous Improvement Teams (CITs) with a mandatory half-hour meeting per week. The new plant manager was under pressure from some corporate executives to move the plant quickly to an entirely team-based structure. He resisted, however, stating that the maintenance and other support resources could only provide 16 new teams with the level of support needed.

Working together on a joint basis, the union and management leadership reached an agreement to establish Team Leaders for newly established CITs. There were not, however, sufficient resources to hire additional Team Leaders for all the CITs. There were some new hires, but others moved into these roles from existing positions in the factory, such as repair and inspection positions. The need to establish the Team Leader role had long been recognized by union and management leadership, but there were always political pressures associated with this concept (Would the Team Leaders just become a “straw boss?” Would the restructuring the existing positions take away highly preferable jobs?).

The union and management leadership attended a lean “boot camp” run by the central corporate AMS office which included various simulation exercises, briefings and the chance to “shadow” team leaders for a few hours in lean manufacturing settings. As one Area Manager reported, “the boot camp was a real eye opener.”

Understanding the Value Stream

In addition to accelerating previous activity, there were new initiatives. First, the plant conducted a value stream map in the motor line area. This highlighted certain “constraint” operations that were bottlenecks in production. As part of this process, the hourly and salaried workforce conducted a series of “waste walks,” identifying over \$60 million in potential improvement opportunities. As CITs began to address some of these opportunities parts of the production line were changed – with in-process inventory removed and the overall “footprint” of the operation reduced. As the plant’s manufacturing manager observed, “We soon realized that we had to re-do the value stream map. With each improvement, the operation changed and the old map no longer applied. We ended up revisiting the value stream map every two or three weeks in some areas.”

As the value stream method spread to other parts of the plant, a growing number of suggestions emerged to change line-layouts – from hourly and salaried employees. Where the changes had a potential impact on jobs, the local union and management leaders become directly involved. Although a potentially controversial situation, the tensions were somewhat reduced when an early redesign effort ended up creating new positions in the plant in which it was established that the “kitting” of certain parts could be brought into the plant and done by employees on partial disability leave. This represented a net gain of jobs for the union, a constructive employment opportunity for certain employees, and an aid to efficiency for management.

A parallel set of value stream maps were conducted for the plant as a whole – covering external suppliers and delivery systems. The plant-wide value stream map was integrated with the new product development efforts. It quickly became clear that the “lean” requirements of the new product were going to be difficult to achieve given the geographic spread of the supply-chain. This led to a unique plant proposal, which was for the creation of supplier park adjacent to the plant. Constructing the proposal was a delicate process. The corporate Purchasing function initially resisted the idea as cost prohibitive. The plant and the new product engineers had to construct a business case regarding the benefits associated with the additional lean capability. Concurrently they had to meet with city officials to address a range of tax abatement and site improvement issues. Key executive champions at the Director, Executive Director and Vice President levels were all involved in this effort, which culminated in the 2001 joint announcement with the city of the planned supplier park.

Bridging across the value stream were over a dozen design teams, many of which reached out to actively engage production operators and managers. The focus was on ensuring the manufacturability of the new designs. There was some variation across the design teams in the lever of involvement of manufacturing, as well as some variation in the level of understanding of lean production principles. While the level of integration does represent important progress, there is not an enduring set of mechanisms

designed to ensure that this type of upstream manufacturing involvement characterizes all product development efforts.

During 2001, the implementation of new material flow systems was significantly accelerated. This included the establishment of “marketplaces” for large components and commodity items, as well as line-side racks and other storage set-ups to ensure minimal in-process inventory and ergonomic presentation of parts and components. Pressure was also brought to bear on external suppliers to ship smaller batches on more of a “just-in-time” basis, with some even delivering parts using what is termed “in-line vehicle sequencing (ILVS). Unfortunately, there was not a direct correspondence between the suppliers who shifted their operations and the parts of the plant changing its material flow operations. As a result, some suppliers ended up having to sort through the increased cost of delivering many small batches that the relevant area of plant couldn’t fully utilize. As well, other parts of the plant were ready for this sort of support from suppliers, but the suppliers were not ready to provide it. Even where there was a match between the internal plant flow capability and the external supplier flow capability, it did not always match the areas where the new Continuous Improvement Teams (CITs) and Team Leaders had been established.

Despite the many complications in coordinating material flow improvement efforts, the plant has made significant improvements in reducing the number of days of inventory on hand. It has also achieved the highest rating for material flow practices in an assembly plant – based on the internal, annual corporate assessment process.

A key innovation in the plant has been the development of a systematic method for addressing quality concerns prior to making the shift to a full “andon” system, which are a series of buttons by each work station where workers can press a yellow “caution” or a red “stop” button to signal quality concerns. The red button stops the full assembly line – so having a transitional system is essential since the result otherwise could be highly disruptive to production. The key to the transition involves a shift from having inspectors at the end of each production line to having line operators responsible for their own first-time through quality.

Infrastructure, Stability, and Continuous Improvement

Although the focus of “lean” principles emphasizes customer “pull” and material/product “flow,” there is a prior level of stability needed before either flow or pull can occur. The reduced inventory and other lean practices can become significant liabilities if the work system is unstable. Prior to stability, however, the parties identified the need to strengthen what became termed the joint infrastructure.

Addressing infrastructure issues was not easy. Both union and management leadership had to learn to see gaps or “disconnects” in a constructive, non-blaming way. In fact, sustained attention to these social infrastructure issues did not really begin until early in 2001 – when the Plant Manager and the local union Bargaining Committee Chairperson co-led a series of sessions on infrastructure. Participating in these sessions was the Plant Operating Committee, the Plant Bargaining Committee and the Plant Implementation Team.

For example, the parties learned at one of these sessions that there was no existing forum or process to ensure that requests for maintenance support from Continuous Improvement Teams. Both production and maintenance managers could have been blamed for this “disconnect.” Instead, the parties enlisted support from all key stakeholders to form a short-term “Kaizen Shop” to handle CIT requests, with the focus then shifting to the overall alignment of maintenance support operations.

In this context, the plant-wide joint steering committee had to shift away from just being a forum for status reports on various joint activities. Instead, it had to take on responsibility for constructing joint visions, strategic planning and coordination of implementation activities.

With maintenance and leadership support increasingly clear, the plant set about to ensure the placement of Team Leaders with Continuous Improvement Teams throughout the plant. During the year 2001, 88 Team Leaders were appointed, for example, in the final assembly areas (44 on day shift and 44 on afternoon/evening shift) and approximately half to one quarter as many in each of the other production areas – such that most work areas in the plant are now team-based operations, with Team Leaders.

The importance of a re-invigorated joint infrastructure was illustrated by efforts to move from a containment approach to quality to more of an in-station approach. A group of external consultants with experience in a Japanese transplant operations introduced a mechanism to improve the visual presentation of job procedures for quality, safety and other matters. This was done with input from front-line workers, but did not involve the union’s health and safety representative, quality representative, or job security/time study representative. Needless to say, this oversight temporarily halted forward progress on the new visual display mechanism and created a new set of trust issues for the parties to work through.

Another key aspect of the infrastructure and stability involved the capability of front-line supervision and middle managers. All of these individuals has been promoted to their managerial roles based on their hard-driving approach under a mass production system. There were key gaps in their interactive skills, as well as in their substantive knowledge of lean manufacturing principles. In response, the Plant Manager and the Lean Manufacturing Manager began a series of 30-45 minute single-point lessons for each area of the plant. The participants included Superintendents, Supervisors, Union Committeepeople and Team Leaders.

Conducted at the shift-overlap time on a different day of the week for each area of the plant, they prepared these lessons on a range of relevant topics. In each case, there was the expectation that the material would be applied on the job and the participants would be able to return a week later prepared to discuss lessons learned. As the manufacturing manager commented, “these single point lessons were like a lear jet taking off – they really accelerated out efforts.” She further reported that the participants would show up a week later with carefully prepared presentations summarizing their application efforts – motivated by hearing the single point lessons from their bosses rather than a specialized trainer.

Despite the reported value of these sessions, there are still significant challenges facing plant. For example, in the early fall of 2001, the corporate Vice President for Vehicle

Operations conducted a regular visit to the plant and expressed concern about the continuous improvement efforts of a number of the Teams – based on the lack of detail posted on the work area visual display boards and subsequent conversations with operators, supervisors and middle managers. There was particular concern – shared by plant management leadership – around the capability of many of the front-line supervisors and superintendents to reinforce and drive the new work system.

During 2001, plant safety was the focus of a major case-management initiative, as well as other targeted safety improvement efforts. The results were dramatic, with a reduction of 378% in lost time cases and 375% in what is termed the severity rate. Worker Compensation costs were also reduced by approximately 62%.

The J.D. Power quality metric improved by 14% from 2000 to 2001, which is an indicator of initial product quality assessed through customer surveys. Customer satisfaction numbers remained essentially unchanged during this time period, however.

A final, almost intangible aspect of the changes taking place in this plant has involved leadership – at many levels. At the corporate level, the Vice President for North American Vehicle Operations conceived the accelerated implementation strategy and then reinforced the effort with regular visits and coaching support for everyone from the managers to front-line operations. The Director for Manufacturing Operations championed the use of value stream and quality operating principles, as well as the supplier park. The International Union has provided strong support for the efforts to create new jobs in the location, as well as appropriate caution in the need to link improvement efforts with the existing joint infrastructure. The Plant Manager has established the highest ethical standard on issues of integrity and respect, driving performance while valuing knowledge. The Manufacturing Manager has become a coach and mentor for people all across the plant, always reinforcing learning about lean principles and practices while maintaining the discipline needed to run a large automobile assembly plant. The local union leadership has embraced continuous improvement in the work system as central to long-term job security and growth in this location. And a generation of new leaders is emerging across the plant.

Conclusion

The story of the Riverdale Assembly Plant is still unfolding. Substantial gains have been made in the way this work system operates. For many key stakeholders it would be unthinkable to go back to the older, mass production approach. At the same time, there is much to be done before this transformation is complete. A key question remains – will a “brownfield” plant that completes the journey to becoming a lean production system end up stronger than a “Greenfield” plant that has operated this way all along?

Discussion Questions

1. What do you see as the top three challenges in transforming an existing brownfield plant into a lean production system?
2. What are the top three strengths and the top three weaknesses in the transformation process undertaken in Riverside up to this point?
3. Do you think this plant has passed the “point of no return” – where it is harder to revert back to the old approach than it is to continue forward with the transformation?
 - a. What are the biggest vulnerabilities of the change process, i.e., what events or process failures might derail the change effort and start it to revert back to the old approach?
 - b. What would you do to address these vulnerabilities?
4. What systems changes are required in other parts of an enterprise to support a plant that has reached this stage of transformation?
5. Do you believe that a “brownfield” plant can end up just as capable in terms of lean manufacturing – or even more capable – than “Greenfield” plant that was designed to be lean from the outset? Put differently, what should our expectations for performance be for this plant?