# Lean From A to Z: Z Corp's Lean Practices Improve Productivity and Efficiency

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**Z Corp's implementation of lean manufacturing practices has led to greater production flexibility, efficiency and profits.**

Evander Holyfield did it in 1984. Lance Armstrong achieved it in 2000. Lebron James followed in 2004. Mike Vogel experienced it in 2006. What's the common bond between this boxer, biker, baller and Vice President of Operations at Z Corporation? They've all experienced winning a bronze medal. The only difference is that instead of receiving accolades for athletic achievement, this Burlington, MA provider of 3-dimensional printers was recognized for excellence in manufacturing with a bronze medal from the Northeast Shingo Prize program.

Z Corporation, which is located about 35 minutes west of Boston, began operations in 1996. The company's genesis stems from an 18 month research and development program at the Massachusetts Institute of Technology (MIT) that examined the implementation of ink jet printer mechanics in creating product prototypes. As the project wound down, those involved were able to take ownership of the technology, and shortly thereafter began full scale production.

As mentioned, Z Corp.'s product line works similar to an ink jet printer, but instead of ink they rely upon a proprietary liquid binder and ceramic polymer. The printer's carriage, operating at about 1 vertical inch per hour, moves back and forth in carving out product prototypes to the exact dimensions entered via a CAD drawing or other design software application. Those using these machines range from automotive manufacturers to shoe companies, and even those in the medical field who look to replicate results from MRI data to help illustrate problems and prepare surgeons for upcoming operations.

“We feel that our machines are the world’s fastest and only high-definition color 3-D printers capable of producing physical prototypes of real-world objects with the ease and affordability of 2-dimensional desktop printing,” boasts Vogel. And a number of companies seem to appreciate the product’s value. Production in 1996 had to meet the demands of selling 10 units. Currently, Z Corp. is charged with delivery of these $20 - $50,000 machines to 700 customers annually.

While this growth has been exciting, it’s also made the integration of new processes and production approaches a must. The trick was implementing these changes without negatively impacting flow, profits or an ability to keep growing.

**More Output - Less Inventory**

“Our rapid growth and production model made us a great fit for lean manufacturing procedures,” states Vogel. “And after implementing these processes we’ve been able to get more output with the same resources and space. Although our production rate has tripled over the last couple of years, our inventory levels have not changed that dramatically,” he explains.

Because the vast majority of their printer’s components are supplied from outside vendors, in accordance with Z Corp’s design standards, the company’s primary production activities involve assembly, inspection, testing and shipping. This translates to juggling inventory and supplier production to mesh with incoming orders from customers.

Lean manufacturing centers around:
Inventory reduction.
Eliminating downtime.
Reducing floor space requirements.
Eliminating inefficient steps in the production process, a.k.a. improving workflow.
Avoiding overproduction, which adds to the space needed for inventory and product storage, and consumes area that could be used for meaningful production.

What’s interesting to note is that Vogel does more than just talk a good game when it comes to these principles. He and Z Corp. have seen the results, which brings up a key point. Not only did they invest the time and energy into training employees and updating their processes, but the company also tracked their results to ensure a proper fit.

**People Power**

“After implementing these lean principles, the area where we’ve seen the most dynamic improvement has probably been work flow,” continues Vogel. “Whereas before we had a group of people assembling each individual printer whenever an order came through, now we have teams that work in one of four production cells. This allows us to have more than one printer in the pipe line at a time and create a

smoother flow from station to station.

“The end result is having greater control of our inventory and production cycle. We’re able to prepare a month ahead of time in order to have the right quantity of parts and work space. This preparation leads to more personal attention at each work station, which translates to a higher level of overall product quality. Basically, it boils down to storing small amounts in order to produce a higher volume more efficiently and more effectively. So we’re able to give our customers a better printer at a better price.” Vogel states that the implementation of lean manufacturing principles lowered their costs on one printer line by nearly 20 percent.

The improved quality comes from a greater focus on the task being done at each individual work station. This single-piece, standardized approach also utilizes Kanban with a two-bin replenishment system. So when one bin of a component is empty, it’s filled by a team member dedicated to keeping each work station fully stocked, ensuring an uninterrupted workflow. “Kanban has proven to be a great resource in managing the parts and components that come from our outside suppliers,” states Vogel.

Employees have also been empowered to provide their thoughts on these new processes, and offer feedback on how they can be improved. In 2006 Z Corp. paid out over $50,000 in employee bonuses relating to production improvement suggestions. Furthermore, training, while extensive in each individual’s area of assembly, has also been expanded to include overall operations and equipment maintenance. This enables them to address problems on the spot, minimizing production slow-downs.

While the growing sales figures for Z Corporation have already been documented, the results from their implementation of lean manufacturing principles are equally impressive:

A 300 percent output increase since 2003.
Employee productivity is up by more than 45 percent.
Inventory turns or cycle times have improved by more than 50 percent.
An on-time delivery rate of 95 percent.

While current operations continue to flow smoothly, Vogel is forced to keep an eye on continuing developments. With a product category that changes every 3-5 years in keeping pace with new technological advancements, a different set of challenges constantly looms on the horizon. “Just like anybody else, we’re constantly reviewing suppliers to make sure they’re able to keep pace with our systems in providing the right volumes at the right prices and in accordance with how we want to manage our inventory,” he states.

“Plus, we won the bronze last year, so now the goal is to continue improving towards winning the gold.”

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