

Walking Through Lean History

As you probably know, I like to walk through the gemba, along the value stream, to see for myself how value is being created and how waste can be eliminated. However, recently I took a wonderful but dismaying walk through a facility that no longer creates value. The experience set me thinking about the history of the lean movement and how we can preserve it.

The place in question was Highland Park, Michigan, a ghostly town with a ghostly factory -- Henry Ford's extraordinary Highland Park plant where flow production was pioneered. In the older building on the site, I walked the floor along the exact path of the world's first continuous flow assembly line started up in the spring of 1914. It's now empty, dirty, dark, dank, and uncommemorated.

In the six-story "new shops" across the street, I walked the exact path where the assembly line was moved later in 1914. This was just as the many continuous flow fabrication operations on either side of the line and in the upper floors sprung to life to supply the parts needed by the line. Today, the new shops - all six floors and three sky-lit bays of Albert Kahn's glorious concrete structure specifically designed for flow production - also stand empty and uncommemorated, awaiting redevelopment or the wrecker.

It's my belief that this building was the site of the most important industrial and economic leap in human history. Yet Ford's descendents - and I include you and me since we have built much of our current lean knowledge on Ford's shoulders -- seem to have applied one of his favourite aphorisms: "History is bunk." ("Bunk" is a 19th century American term meaning worthless nonsense.)

How can this be? I think the root cause is that most of us don't realize that we are heirs to a remarkably long struggle in human history to see beyond isolated points in order to optimize the entire value creating process. We tend to think instead that lean ideas were mostly created by Toyota a few years ago and that the history of lean thinking has been short and easy.

I was recently reminded of the length of our struggle when my colleague and co-author Dan Jones visited the Arsenal in Venice, established in 1104 to build war ships for the Venetian Navy. Over time the Venetians adopted a standardized design for the hundreds of galleys built each year to campaign in the Mediterranean and also pioneered the use of interchangeable parts. This made it possible to assemble galleys along a narrow channel running through the Arsenal. The hull was completed first and then "flowed" past the assembly point for each item needed to complete the ship. By 1574 the Arsenal's practices were so advanced that King Henry III of France was invited to watch the construction of a complete galley in continuous flow, going from start to finish in less than an hour.

The point I took particular note of from Dan's visit was that the idea of continuous flow - which many in our community probably think was invented by Henry Ford - was being practiced more than 400 years ago, but then largely forgotten!

Once you are sensitized to the depth of lean history, along with its many advances and setbacks, it's easy to begin filling in some of the other milestones:

* By 1765, French general Jean-Baptiste de Gribeauval had grasped the significance of standardized designs and interchangeable parts to facilitate battlefield repairs. (Actually doing this cost-effectively in practice was another matter and required another 125 years.)

* By 1807 Marc Brunel in England had devised equipment for making simple wooden items like rope blocks for the Royal Navy using 22 kinds of machines that produced identical items in process sequence one at a time.

* By 1822 Thomas Blanchard at the Springfield Armoury in the U.S. had devised a set of 14 machines and laid them out in a cellular arrangement that made it possible to make more complex shapes like gunstocks for rifles. A block of wood was placed in the first machine, the lever was thrown, and the water-powered machine automatically removed some of the wood using a profile tracer on a reference piece. What this meant was really quite remarkable: The 14 machines could make a completed item with no human labour for processing and in single piece flow as the items were moved ahead from machine to machine one at a time.

* By the 1850s all of the American armoires were making standardized metal parts for standardized weapons, but only with enormous amounts of handwork to get each part to its correct specification. This was because the machine tools of that era could not work on hardened metal. Instead they machined soft metal and the subsequent hardening process introduced warping of an unpredictable nature that had to be corrected by hand before parts would fit together. The expense was acceptable for military hardware but unacceptable for most consumer goods.

* In 1914 Ford finally got all of these strands of thinking to come together with advances in cutting tools and a leap in gauging technology so that many suppliers could produce hardened metal parts which consistently fit perfectly in Ford's fabrication cells and on his final assembly line. This was the secret to truly continuous flow.

* By the late 1930s, the German aircraft industry had pioneered takt time as a way to synchronize aircraft final assembly in which airplane fuselages were moved ahead in unison throughout final assembly at a precise measure (takt) of time. (Mitsubishi had a technical relationship with the German companies and transferred this method back to Japan where Toyota, located nearby in Aichi Prefecture, heard about it and adopted it.)

* By the early 1950s Toyota had integrated the idea of takt time with Ford's ideas on continuous flow and added the critical dimension of flexibility to make high-quality products in wide variety in small batches with very short lead times.

* In the early 1990s, the business process re-engineering movement tried, but mostly failed, to transfer the concepts of standardized work and continuous flow to office and service processes that now constitute the great bulk of human activities.

Note that this very incomplete rendition of lean history involves contributions from Venice, France, England, the U.S., Germany, and Japan at a minimum. And there may well have been advances pioneered in other societies that are unrecorded. To take two examples that Dan and I hope to explore someday: How did the Chinese build the vast armada of identical Treasure Ships that set out in 1421 to “unite the world in Confucian harmony”? Were they far ahead of Venice in their design and production practices? And what about the Romans, with all those sunken galleys in the Mediterranean with thousands of identical pots for oils and wine? What process was used to make them?

Whatever the final list of contributors, I feel strongly that our lean history isn't bunk. And Ford wouldn't have thought so either. Remember that he was a remarkable conservator of the pre-Ford industrial past at his Greenfield Village museum in Dearborn, Michigan. What he meant by “history is bunk” was that established methods must never be used as an excuse or impediment to trying new methods. And Taiichi Ohno felt the same way in refusing to write down TPS. He believed that if it was strictly codified - put in a museum in his thinking -- it would be frozen and soon go backwards.

None of us wants to embalm lean thinking in a museum. However, as long as we are determined to continue experimenting - with kaikaku and kaizen forever -- then the history of how we got to our current state of lean enlightenment, inadequate as it is, becomes a precious legacy. It can also be an inspiring story that can sustain us through inevitable setbacks along the path to the future.

I hope you now have at least a bit of appreciation for the long struggle to perfect process thinking. But note the practically complete lack of commemoration. There are lots of product museums full of brilliant, breakthrough objects (like the Model T.) And some -- like the Henry Ford Museum in Dearborn, the Toyota Museum in Nagoya, and the Science Museum in London - include some remarkable machines displayed in isolation. But there are no process museums showing how value creation works as a whole. Shouldn't the Lean Community think about creating a place to showcase the long struggle from isolated points to optimized processes? And wouldn't Highland Park be a great place to start?

Best regards,

Jim

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P.S. I believe that one of the missions of the Lean Enterprise Institute in the years ahead must be to help preserve our legacy. If you have knowledge of little known aspects of the advance of lean thinking I would be delighted to hear about them and to share them with the Lean Community. Alternatively, if you would simply like to read more about the lean history that's already been written down, please check the books by David Hounshell, Taiichi Ohno, and Takahiro Fujimoto in the LEI bookstore.