Wednesday's Words of Quality- Henry Ford and the Basis of Lean Thinking (2017 July)

I know this isn't Wednesday but I've been away at meetings so on this last day of July I thought you might enjoy reading a piece about our own founder's history in designing automobile production for efficiency before what we refer to now as lean production began. Described below is the precursor to lean and acknowledgement of who and how this revolution came about employing linear flow, timed continuous assembly on-demand at the takt time. This seminal accomplishment produced a Model T that was initially offered at $950 in 1908. Because of Henry Ford's incessant drive for continuous improvement and elimination of waste, he was able to offer a 70% price reduction to $290 by 1925.

The 'lean' process principles that were invented at that time were continuous production, moving conveyor assembly line to bring the work to the man and setting the work pace, division of labor, simple repetitive standardized tasks, standardized interchangeable parts, integrated supply chain and reduction of waste. Ultimately that made automobile ownership not just a luxury for the wealthy but affordable for the common man, establishing a growing and secure middle class who lived the American dream and drove on newly paved roads. This changed the world forever as most knew it back then.

Please recognize that you are empowered to think creatively here in our work environment as well. We rely on your engagement in your teams to assist us in improving our healthcare related processes by leveraging your knowledge of lean principles, good work design and problem solving in our continuous improvement culture. So think objectively about what and how you are doing things. Don't assume that the status quo is good enough.

As Henry Ford quipped- "If I had asked people what they wanted, they would have said faster horses." Well, horses are a luxury now and cars a necessity, quite unlike when Henry Ford began challenging the status quo. Taking a page from his story, we can make significant improvements in our piece of healthcare by using our lean skills to contribute to process redesign for more efficiency, higher levels of safety and lower cost. Enjoy the story and old photos.

Ford's other right-hand man: P.E. Martin and the development of the assembly line

Authored by Hemmings contributor on Jul 30th, 2017 at 8am

[Editor's Note: In 1922, Henry Ford issued his book, My Life and My Work*, which was largely a book about his philosophy of business and he omitted many details about his work. In 1944, in an interview with* Fortune *magazine, Henry stated clearly and simply that he and P.E. Martin invented the automobile assembly line. So who was P.E. Martin? The new Amazon ebook* P. E.

Martin: The Origins of The Automotive Industry*, Daniel M. Smith seeks to answer that question and many others in great detail.]*

For the first few years, Ford manufactured average-priced cars and a few expensive cars: Models A, B, C, F, K, N, R, and S. In addition, there were experimental models that were not produced. The stockholders wanted to provide high-end cars with high-end margins. The beautiful Model K was the first Ford with a six-cylinder engine and the last one until the 1940s. The largest investor, Malcolmson, departed after the Model K flop. Ford and the finance officer James Couzens believed the key to survival was manufacturing an economic car. People didn't expect Ford to produce luxurious cars like the Model K, and were disinclined to buy a luxury car from Ford.

 Peter Ed (P.E.) Martin

In April 1904, Ford bought land on Piquette Avenue in Detroit, built his first plant, and, by 1906, Peter Ed (P.E.) Martin was put in charge of the Assembly Department for what was to be the Model T car, working under manager Thomas Walburn. Design on the Model T proceeded through 1907, with P.E. working alongside Ford constructing the process for manufacturing the Model T. Henry Ford developed such confidence in P.E. that, in April 1908, six weeks after announcing to the world that the Model T had arrived, P.E. was made plant manager. During this time, P.E. and a team of engineers worked on the flow of manufacturing and methods of simplifying the process and increasing productivity. The result of their efforts was the birth of the Assembly Line concept, breaking down manufacturing into simple solitary components/processes that could be done by unskilled labor as the product proceeded along a moving assembly line. This one accomplishment revolutionized manufacturing and the way all products, from cars to appliances to computers, were made ever after.

In 1910, manufacturing was moved to a factory in Highland Park where P.E. again was put in charge. By 1913, the Assembly Line manufacturing process was implemented fully and the Model T began moving off the line so cheaply, and at such speed, that Henry's dream of a vehicle for the common man became a reality. By 1920, Henry had built the largest factory in the United States and the world, the Rouge Plant. Both the Rouge and the Highland Park plant were now under P.E.'s supervision.

Long before the term lean production was coined, P.E. was mastering the concept with hundreds and hundreds of conveyors throughout the plants. Necessity is the mother of invention. There are many stories about who invented the moving assembly line and

whether or not they used rails and a windlass to pull the cars during testing of the concept, but there was no doubt in P.E. Martin's mind this entire process had to be linear, in one direction, and on one floor, and the pace of assembly in all the sub-departments and from all the vendors had to be tied to the rate of production and movement on the mainline. Years later, Henry insisted that he and P.E. invented the original assembly line at Ford Motor Company.

There is much debate about who and when and how the first concepts for the moving assembly line were tested at Piquette. Some say the test vehicle was dragged by ropes. Others claim they used a windlass. Others say they pulled the vehicles on carts with wheels. But, in all cases the fundamental difference was the line moved somewhat automatically. All of this testing was done late on Saturdays and was demonstrated early on Sundays, so they could dismantle the test and restart production. A few things were apparent: the worker would be limited to a few steps, the line speed needed to be adjustable or different between subassembly lines and the main line, and the fewer steps the worker had the faster the line could run. This last point had been clearly established on the magneto line. The workers stood in place and pushed the assembly "down the line" to the next worker. Although the line wasn't automatic, P.E. could set the desired production rate based on the division of labor, placement of tools, etc. So all the pieces were in place and it was up to Henry, Albert Kahn, and P.E. to layout the inside of Highland Park. In January 1910, Henry started the move to the new plant; P.E. was plant superintendent.

Assembling magnetos for Model Ts in 1913. Photo courtesy Ford Media.

How the final version came to be was open to discussion and working the details. P.E.'s vision was the future Highland Park facility. In 1908, P.E. and a small team tested the final assembly line concept in the Piquette Avenue plant on successive Sundays. William Avery and William Klann recalled years later that Charles Sorensen was not part of the team and did not participate in the testing. The first assembly line for production was started at the Highland Park plant in October 1913. Klann was the supervisor for motor assembly and Avery was a newly graduated industrial engineer. Together with P.E., they designed the first automated final assembly line in Highland Park. The original plans and layouts for Highland Park did not include an automated final assembly line. Henry's plan was to provide more space to build more cars, but he encouraged P.E. to experiment. Contrary to Charles, there was no automated line at Piquette, because P.E. had determined there was inadequate space. Moreover, when Ford moved the plant to Highland Park, Charles was in charge of the foundry and shipping. Charles was a naysayer not a contributor to the vehicle assembly line at Highland Park. After the first line was installed, it was so successful that four more lines were quickly added. The only conveyor lines that were familiar to Charles were the conveyors in the foundry to move sand and castings, and to pour steel. Henry had borrowed this idea from breweries that used conveyors to move grain and other raw materials.

The overall plan was simple. Quality was a given. Price was king. Volume was the goal. The Model T changed significantly over the years. There were thousands of cost reductions, and equal or greater number of corresponding engineering changes to reduce weight and simplify assembly. Gradually, stamped metal parts replaced wood parts, which facilitated assembly. With the automated assembly line in full swing, Highland Park reached peak production at more than 9,000 units per day, an unimaginable figure. Even as sales slowed due to competition and as the market for trade-up cars grew, the volume was strong. Ford was building 50% of the cars in the

world. P.E. helped establish Ford of Canada in 1910 and Henry exported his model around the globe and to additional factories in the USA.

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