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Boeing Commercial Airplanes

Boeing started in the Pacific Northwest during the years 1914-1916. Bill Boeing was in the wood industry and at the time, airplanes were primarily made of wood. Boeing's first factory, the "Red Barn" had design, procurement and manufacturing all co-located so the units could talk to one another. Today, Boeing has 60,000 employees. And while all of the final assembly lines are in the state of Washington, most of the parts come from around the world.

Boeing has a good mix of models in a diversified portfolio. They also have a good mix of customers and are sold out in many of their product lines; in particular, they are sold out of the 787 model until after 2015, a good position to be in, as long as they can make their commitment dates. The challenge now is to deliver, and Boeing has had to push back delivery on a product (the Dreamliner) for the first time in its history.

Boeing had the market fall out from under it after 9/11. From a production low of about 250 planes a year, Boeing is now on the upswing, ramping up to essentially double its rate of production as rapidly as possible without any safety or quality problems or delays. At the same time, it is implementing the 787, an entirely new airplane. The 747-8 will have a new wing design and new engines; a 777 freighter is also being built. This translates to mega-new product development and productivity improvement, which are huge challenges. Boeing also faces fierce cost-focused competition, thanks to Airbus and to smaller companies entering the 737-size market. Product differentiation is getting tougher. For Boeing, the next frontier in competitiveness will be better production systems and better manufacturing for a company that is no stranger to Lean.

Boeing started its Lean journey in 1980, learning concepts and processes, traveling to Japan, having Japan travel to America. During the 1990s, Boeing built its first moving assembly lines, something that supposedly could not be done. In 2000, it implemented the Tailored Business Streams (TBS) program, segmenting items that were on every airplane. However, some product lines (the 747 and 787) have high levels of customization. For these products, a different

management system is needed. Boeing's TBS program looked at how to simplify its standardized systems and still allow for customization.

The Boeing Production System, aka the House of Quality, was built on basic Lean principles (relentless elimination of waste, value stream mapping, standardized work, visual management and controls, kitting, etc). The company is now thinking more broadly, looking to link its pockets of successes around the world. Lean Plus is the Boeing moniker for Lean beyond the factory. How can the entire supply chain be made lean? How can Boeing achieve a continuous flow of products and materials, from the raw materials all the way to a finished airplane, with the product never stopping? How is it that a person can leave the border in Shanghai and arrive at the factory in Seattle in 14 hours, including a 20-minute customs stop, but product takes a month? What is the math equation that describes the most efficient supply chain for the product? Long supply chains add to the complexity of overhead and processing. What is the difference? That is the challenge going forward – figuring out what the differences are, solving them and making the supply chain flow much more easily.

Boeing's commercial airplane business has 1,500 suppliers located in 70 countries. Geiger's job is to figure out how to connect all of those dots more efficiently by working collaboratively with Boeing's suppliers. Transportation is often thought of more in terms of time and cost than distance. Software and ideas can move quickly via satellite, but parts criss-crossing the world require incredibly long lead times - from raw materials in Russia, to processing in the U.S., to sub-assembly in Korea and assembly in Japan. In 1980, about 60 percent of the value-added of a single airplane was built by Boeing. Today, it is about 45 percent Boeing. When the 787 is fully in production, it will be about 15% Boeing content. Waste anywhere in the supply chain ultimately flows to Boeing and its customers, either through lead time, price of parts, or inventory. Because of this, Boeing thinks differently about things like consignment inventory, delayed payments, or supplier property plants.

Airplane designers have the laws of physics to help them with their performance metrics – fuel consumption, noise. Designers will drive themselves insane to achieve a 10 percent improvement in aerodynamics. But there is no consensus on performance metrics for the supply chain. Geiger theorized that one metric could be measuring how long it takes the product to transform, in Boeing's case, this would mean the length of time from mining the bauxite or ore used to create the fuselage into an airplane in service. For the future of all production everywhere, some of the same math and science used in other fields need to be brought to supply chain and production design.