

# THE BOEING COMPANY – 737

## Re-Engineering Quality Inspection Processes via ML-Enabled Toolkit

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**The Boeing Company** (Boeing) is the world's largest aerospace company and leading manufacturer of commercial jetliners, along with other products and services. In 2018, the firm brought in \$101B in revenue. Boeing's iconic 737, the most successful selling commercial jet in aviation history with over 10,000 aircraft produced to date, is currently facing a number of production challenges. After emerging from a 5-month shutdown with a backlog of over 5,000 aircraft, the 737 program has set a production goal of 31 airplanes per month by 2022. It is crucial for the 737 production system to reduce flow time while maintaining or improving product quality to achieve this goal.

Currently, the Quality Assurance process at Boeing requires thousands of quality inspections per airplane, each of which is often delayed. On average, it takes 90 minutes from when a mechanic requests an inspection for that inspection to be completed. Of this 90 minute period, mechanics spend 51 minutes on average waiting for an inspector to acknowledge the inspection call. The Boeing 737 Tauber team saw an opportunity to reduce production delays by creating a scalable, predictive model to forecast and prioritize inspection call arrivals.

After examining the current quality sign-off process, the team identified that creating a tool as opposed to a dashboard was critical to establishing the model into Boeing's production system. This realization gave rise to the Tauber team's development of InspeQT - the Inspection Quality Tool. InspeQT's predictive model uses a Bayes machine learning algorithm to generate a predicted inspection call time for each job based on a variety of indicators. Through the tool's intuitive user interface, quality inspectors can visualize and efficiently plan their daily schedules. Meanwhile, quality managers are empowered to proactively and strategically allocate resources to balance production demand.

To ensure user feedback was incorporated into future iterations of InspeQT, the Tauber team successfully completed a pilot of the tool's Beta Version in the Renton Factory for three weeks of production. In addition to providing the team with insight on how to make InspeQT more usable in its current state, it allowed the team to walk through the tool with quality team members of other Boeing programs to determine its adaptability to programs other than 737 Final Assembly.

InspeQT's potential impact on the 737's production system was quantified through a set of regressions that showed how reducing the average time a mechanic spends waiting for an inspector to acknowledge an inspection call can affect labor hours and flow time hours. A 20% reduction in this average delay can reduce up to 120 mechanic labor hours per plane. At a future rate of 31 planes per month, this labor cost avoidance presents millions of dollars' worth of savings to Boeing. Additionally, this 20% reduction in the average inspection delay can reduce up to 80 hours of overall flow time per plane. These 737 program-specific figures indicate that implementing InspeQT across Boeing will magnify this impact enterprise-wide.