Deloitte.

THE RIPPLE EFFECT

Stories of purpose and lasting impact

Speed up the assembly line. AND slow down errors: An impossible task?

How Deloitte (and AI) helped a manufacturer of aerospace parts push production while reducing defects

THE COST OF *NOT* SCRAPPING ALL OF THAT WORK?

DOWN $150M+.

THE SITUATION

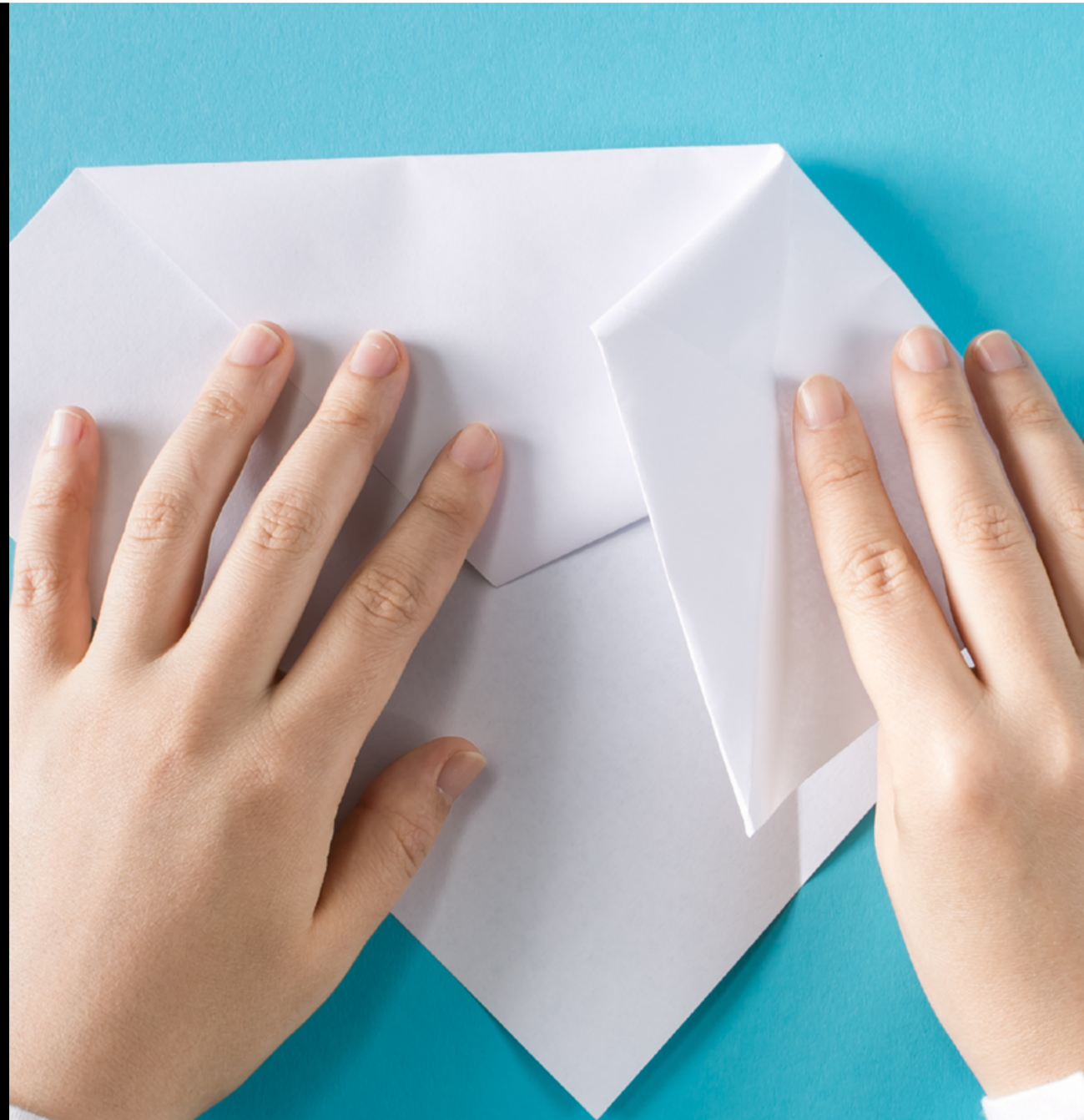
Pete Rose holds the Major League Baseball record for hits. He also won three World Series championships, three batting titles, one Most Valuable Player Award, two Gold Glove awards and the Rookie of the Year Award.

But he also holds the record for the most *outs*. It's simple math—when you do something A LOT, even at very low percentages of failure, that translates to a large *raw number* of failures.

This same basic math was causing headaches for a manufacturer in the business of producing highly complex, high-cost aerospace parts. The good news was that the company had made advances in its manufacturing process and had ramped up and increased the speed with which it could manufacture those complex parts. And while the overall defects rates were still quite low, that still meant that the raw number of defects were adding up. Adding to the challenge was the fact that those defects were often identified downstream in the manufacturing process, after significant time and effort had already been invested in the parts' manufacture. All of this was translating into high scrap rates and production delays driven by needed rework.

But the downstream impact was about more than just cost. All of the required rework and troubleshooting meant that the company's engineers were being pulled into urgent investigations, where identifying root causes could take days—time that was coming at a sacrifice to the day-to-day operations and needed improvement work.

So, the question: Could this manufacturer reduce the defect rate while continuing to scale production? To do so, it knew it needed a way to connect machine behavior to quality outcomes in near real time—so teams could detect risk earlier, accelerate root-cause and corrective action and keep production on track.



THE SOLVE

As is so often the case today, AI proved to be a game-changer. Given Deloitte's extensive experience in and understanding of adoption benefits and challenges, and our IndustryAdvantage™ approach to developing and scaling Smart Factory and AI-enabled solutions in manufacturing environments, the company turned to us for help with its AI-enabled Statistical Process Control (SPC) solution. The solution was built on the client's existing technology platform of choice, a multi-tenant cloud-based platform that includes Microsoft Azure.

The background: AI-enabled models trained on real-time Internet of Things (IoT) sensor data straight from the factory floor, tied to inspection results, can provide users with optimal control limits for machining processes and *predetect* machining settings that have a high likelihood of leading to a downstream defect in the part's value stream. With this capability as the engine, Deloitte helped the manufacturer build an SPC solution that could identify the root cause of defects and provide optimal tolerances for process inputs—which in turn would reduce scrap costs and rework hours and help to improve production and delivery rates. The solution incorporated shop-floor visibility, process analytics and alerts (and on lights and otherwise) already tied into plant workflows and systems, such as SAP.

This work was executed in three phases.

1. Centralizing the data
Deloitte developed the Smart Factory solution to centralize real-time computer numerical control (CNC) machining data from machine sensors, SAP and inspection data; quality outputs; and operational data in the cloud so that the AI tool can collectively and simultaneously analyze the aggregated data to suggest use cases and insights.

2. Developing the model
By tying inspection results to time series machining data, the Smart SPC solution is able to identify the leading process drivers of each quality failure—and, more importantly, simulate outcomes to identify the optimal settings that will avoid those failures.

3. Operationalizing the insights
Taking the insights provided by the model, the company's engineers and manufacturing teams were able to input optimized CNC machine settings and key performance indicator (KPI) tolerance to develop parts that would meet the engineering specs with a lower rate for failure.

TURNING SHOP-FLOOR DATA INTO **PROACTIVE DEFECT DETECTION**

THE IMPACT

The new, AI-fed SPC solution provides the manufacturer with the optimal machine settings for each process in the manufacturing workflow, which has led to a **reduction in scrap-related costs of more than $150 million**.

The new solution has also given engineers something truly precious: time. By streamlining root-cause and corrective action work and reducing the demands of the company's quality note (QN) analysis process by 80%—**equating to up to 20,000 labor hours**—those engineers and their teams can now focus more consistently on daily operations and continuous improvement.

And beyond those quality and efficiency metrics, the solution has also been associated with additional operational performance improvements—including a reported **15% increase in machine uptime** and **approximately $10 million in cost of quality and productivity savings per site** created via the real-time escalation alerts the system flags—along with improved accuracy in demand forecasting and throughput tracking.

Looking ahead, the next phase of the project will include building an enterprise simulation (digital twin), where the AI model can further contribute to end-to-end decision-making at scale.

THE IMPOSSIBLE MADE POSSIBLE: SPEEDIER PRODUCTION WITH FEWER ERRORS

LET'S CONNECT.

Do these challenges sound familiar?

Learn more about Deloitte IndustryAdvantage™

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