Case study

Driving efficiency and saving time by leveraging AI in manufacturing

The client

A world-leading consumer products manufacturer, the client generated revenues of over US$7 billion in 2021. The vast majority of their output comes from five different sites, spread across three continents. Globally, they employ over 24,000 people.

The client's production facilities house around 5,000 machines between them, all of which are running 24/7. In order to keep operations flowing smoothly, they employ a similar number of service technicians worldwide who are responsible for both planned and unplanned maintenance of these machines. Due to the constant operation of plant machinery, service technician coverage is also available 24 hours, seven days a week.

The challenge

The client had already consulted several other providers in search of a solution to a particular issue they had with maintenance of their production facilities, without success.

The large-scale and wide geographical spread of the client's maintenance operations had led to procedures, part-numbering and even part-naming conventions developing independently of each other at each plant over time. This created non-uniformity across their operations, despite the parts required for machines in every location being very similar, and in many cases exactly the same.

As a consequence, and with over 3 million different parts logged in their existing SAP database—around 300,000 of which are considered active, unique spare parts—the client had become aware that finding the correct spare parts for unplanned maintenance tasks was wasting significant amounts of time. They were risking costly and disruptive plant downtime should critical parts be difficult to locate.

The issue was exacerbated by the fact there was just a single text field in the existing database's search function, so finding any specific spare part was laborious and time-consuming for any technician who did not already know exactly how the part they needed had been named at their specific location.

Client-conducted studies that showed it took between 15 to 35 minutes to find each part. In some cases, several technicians would become involved, with anecdotal evidence suggesting extreme examples could cost a technician's entire day searching for a single part.

The client needed to update the spare-part database, create uniformity across global operations, and boost search functionality in order to cut down on the time spent finding the correct part for any given repair job.

NTT DATA was tasked with solving a problem that had been addressed unsuccessfully on several occasions in recent years.
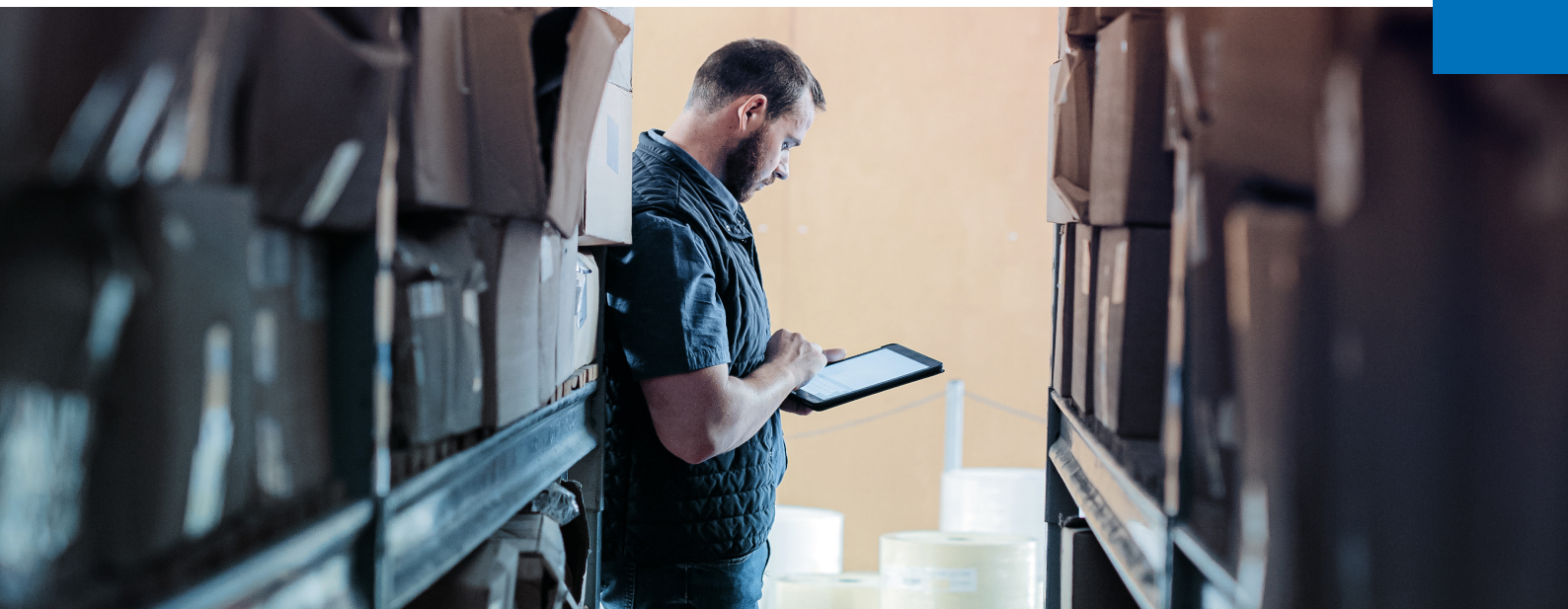
The solution

Faced with the arbitrary nature of the product descriptions for parts on the database, NTT DATA proposed a proof of concept that consisted of an image-based search solution that leveraged AI and machine learning to identify and categorise each part. This development was also deployable on SAP BTP.

To find a part, each technician would take a photograph of the existing part to be replaced, which a primary algorithm would compare against the existing image database of all spare parts and return the best matches. However, at the start of the project, the client's existing database only contained approximately 10% of the total number of parts in use.

To tackle this, NTT DATA devised a secondary algorithm which not only provides responses detailing the best-matching images available, but also identifies all related spare parts for which no images are available. This second algorithm also categorises groups of similar parts, recognising text on any given object, for example, making it considerably more straightforward for each technician to determine the correct piece, as they would now only receive results that closely match what they were looking for.

Every search conducted would also add to the client's universal image database. With over 1,500 searches being made each month at the client's primary site in Europe alone, once the solution is fully deployed, they expect to have catalogued 50% of all parts worldwide within two years.

The tested algorithm is able to compare the technicians' images against the database in under a second, hugely reducing search times and producing results that only show relevant parts of similar functions or appearance. Full integration into the both client's existing app and SAP were designed, to demonstrate the solution's flexibility and commercial viability.

Furthermore, plans for full integration with SAP Field Service Management will ultimately make this a simple 'Click and Deploy' solution.

The result

The accuracy and speed of the image recognition algorithm demonstrated that time spent searching for parts would be reduced by 30% in the first month alone. Furthermore, the efficiency of the algorithm will increase over time, as more and more parts are catalogued and the machine learning algorithm improves the accuracy of its results. Once the fully functional product is built and implemented across all the client's sites, time savings are ultimately expected to be as high as 80%.

The machine learning element of the solution will leverage its text recognition facility to allow for standardised naming conventions across the group. The solution could also therefore result in uniform naming, numbering and part recognition across the client's entire operations.

Some 50% of all of the parts in the database will have been catalogued with images within two years of implementation.
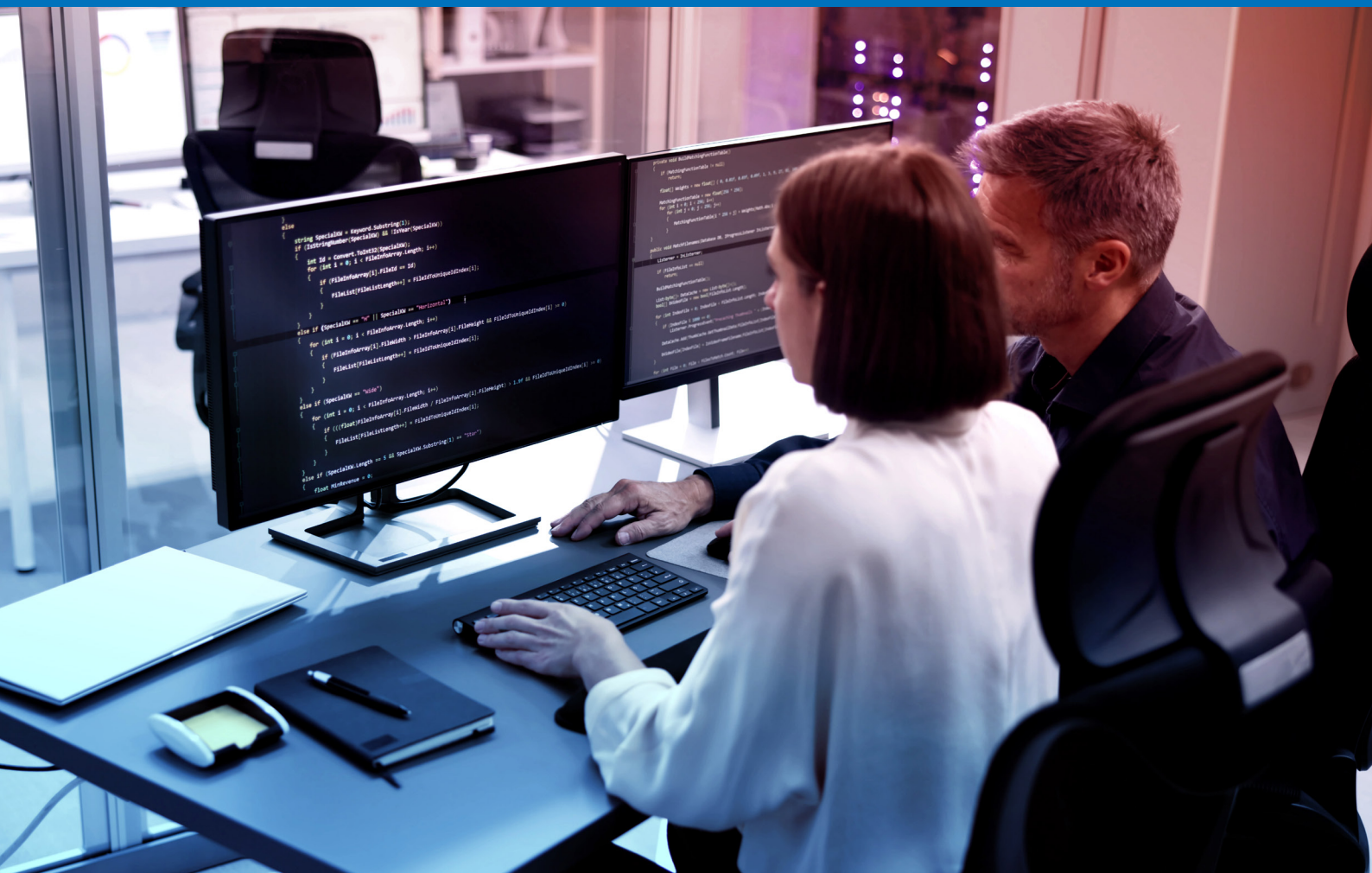
Why NTT DATA

As a long-standing collaborator, NTT DATA had already gained the client's trust with extensive previous work in the field of plant maintenance. The client was also well aware of NTT DATA's demonstrable experience in AI-related projects, and knew they had the capabilities to deliver an innovative solution for what had proved an extremely challenging issue.

Furthermore, NTT DATA's proven methodology for managing innovation projects, alongside their proven data science expertise—a capability that the client did not have in-house—ideally placed NTT DATA to undertake this project.