

CASE STUDY: Stud Weld Quality in Automotive Assembly Lines

About DataProphet:

We are an AI company specializing in the development of AI solutions for Industry 4.0—with a specific focus on heavy industries.

We are the creators of OMNI: an AI-enabled process parameter optimization solution that actively reduces scrap and rework. We are also the creators of OMNI Vision: a state-of-the-art computer vision module to further augment OMNI by actively recognizing surface defects on manufactured components—providing an automated quality gate and additional data for OMNI to optimize process parameters.

Our solutions are proven to provide real value for manufacturers, and industry-leading companies rely on us to make the most of their data.

CLIENT



Our client is a major luxury and utility vehicle manufacturer that pride themselves on the quality, safety, and reliability of their vehicles. The company operates a high-capacity automotive assembly plant in South Africa, where their manufacturing activities contribute significantly to job creation and the local economy.

The Challenge

Within our client's manufacturing process, the body shop is one of the most complex areas, with at least 200 robots in operation. It is within this area that they were experiencing some challenges in their stud welding operations—with plant-wide implications. The main problem was the significant increase in downtime due to stud welding faults, resulting in substantial costs to the business.

Due to the inherent complexity of the stud welding process, traditional statistical solutions fall short in trying to address the problem. Since our client prides themselves on maintaining premium quality in their completed vehicles, they decided to approach DataProphet to help find a durable solution to the

The Solution

We sent a dedicated team of data science experts to the facility. After an initial data collection phase, we implemented OMNI, our AI-enabled process parameter optimization solution, at their facility.

Because no two manufacturing facilities are alike, OMNI took into account the uniqueness of our client's production facility, seamlessly integrating with their existing data and IT infrastructure. A dynamic control plan would be produced with recommendations for the optimal set points and control limits for each welding parameter.

OMNI was able to identify over 800 stud types used in the facility's welding operations—describing optimal process parameter values for all 800 stud types simultaneously.

Due to the complex interactions underlying our client's stud welding process, a vast number of process parameters influence the quality of their welds, including weld time and current. OMNI captured these complex interactions in our client's processes—consistently predicted weld quality.

The Outcome

After implementing OMNI, our client was able to reduce stud welding defects by 55% within the first month.

55% reduction in stud welding defects

This increase in weld quality led to an equally significant reduction in defect-related downtime at the facility. For our client, these situations meant estimated monthly cost savings of between 120,000 and 140,000 USD. By implementing OMNI, we helped our client maintain superior quality in a facility that was already enjoying a high level of quality maturity.

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