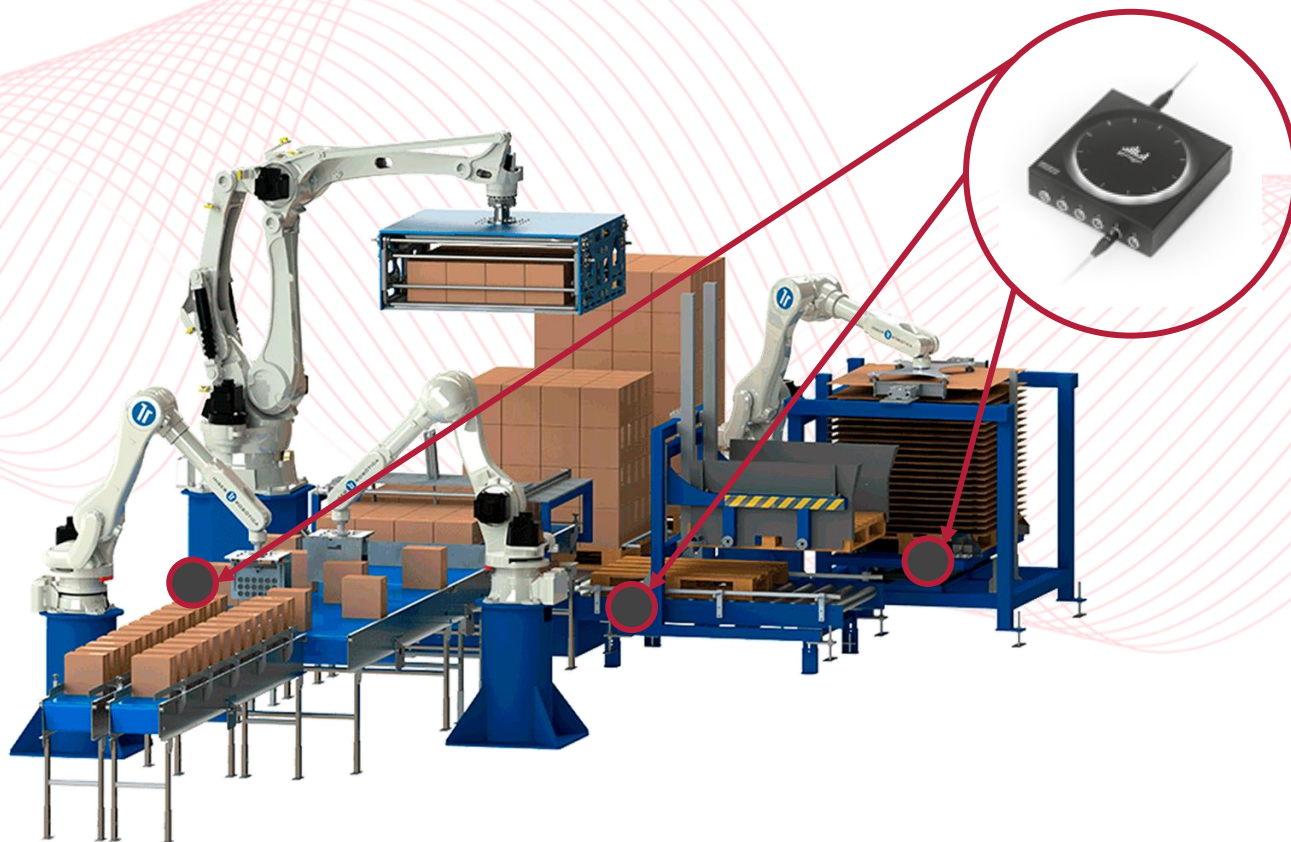


Automotive Industry Case Study

How to reduce unwanted production stoppages and save money on less frequent maintenance?



PRODUCTION PROCESS

The production machine produces metal parts with the takt time of approx. one piece per minute. The machine is tightly integrated with the material and parts handling system (robots, parts holders, loading units) into an automated work cell. Production operators are not present at all times as they must also oversee the rest of the production line. However, they know by experience that a characteristic sound usually signals a coming incident.



PROBLEM

Incidents happen unexpectedly, on average two times per day, most frequently in the automated handling system. Due to the takt time of production, the response time must be very short. Production operators fix the incident manually by stopping the work cell, which may also disrupt the rest of the production.



UNPLANNED DOWNTIME AND COSTS

If operators do not respond within minutes, there is a risk of further damages, which can result in costly unplanned maintenance in the work cell and a longer downtime for production, which might be a risk for JIT deliveries to customers.

5 Steps by Neuron soundware to improve the manufacturing process



1. Hardware Installation

We installed our proprietary IoT recording device with six microphones to closely monitor the two critical sections of the work cell, in which incidents occur.



2. Data Collecting and Labeling

We collected data for a few weeks. We closely collaborated with the production operators to label the incidents accurately. Together, we found a way how to simulate some incidents which enriched the training data set and accelerated AI learning.



3. Algorithms Training and Validation

We trained a couple of detector algorithms to evaluate each audio channel separately. We remotely validated the detection results and selected the best performing algorithm.



4. Final Deployment and User Training

We deployed the algorithm on our IoT edge device and integrated the detection results with the signalization system. We trained the operators on how to use the AI solution to prevent incidents and the management on how to use the online dashboard to see results remotely.



5. Continuous Service Improvement

We collect feedback from both the operators and management and further improve the service. The algorithms' performance gets improved with quarterly updates as more data is collected and more samples of incidents are labeled.

INDUSTRY 4.0 SOLUTION IN REALITY

The development of the whole solution took about 4 months in total. It uses modern IoT infrastructure, i.e., the AI runs on the edge device which is directly integrated with the shop floor signalization system. Raw data is not streamed outside the factory; only the detection results are pushed to the cloud in order to visualize it in an online dashboard. Detections are consistent, and the amount of false alerts is reasonable. We proofed that AI can effectively detect mechanical system failures on the client's shop floor and that digitalization is the key to increased productivity and reliability.



CUSTOMER TESTIMONIAL

Neuron soundware's AI solution continuously monitors our automated handling system of metallic components. It learned quickly and accurately to detect the characteristic sound anomaly that usually signals the coming incident in the work cell. Thanks to the integrated signalization system with a siren, our production operators can now **respond in time to 9 out of 10 incidents**. In a few months project, we managed to significantly reduce unwanted production stoppages and started saving money on maintenance.

Innovation Project Manager
Tier 1 Automotive Supplier in the Czech Republic

