# Forecasting Reliability in Manufacturing

Organizations

KLS Ljubno is a Slovenian SME that is a leader in the production of rings for vehicle engine flywheels.

MaTec Gummiwerk is a German SME that manufactures individual high-tech products in the field of technical rubber parts.

The Austrian-German **Pumacy Group** is a specialist in Applied Knowledge Processing in manufacturing. Its Plexalytics system supports customers in the machinery, renewables, and automotive industries.
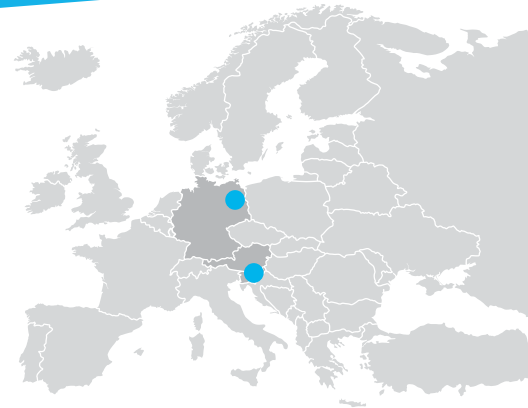
End Users

Technology Expert & HPC Provider

The Challenge

It is essential for medium-sized part suppliers to identify production errors early on. The most important characteristic to measure and improve in this context is reliability: how consistently a product or system performs the required functions without failure under stated conditions for a specified period of time. It is subject to a random process and cannot be measured directly – a challenge for small-sized manufacturers like MaTec as well as mass producers like KLS. Both have to identify, save, and analyse all relevant data during production. Saving gigantic numbers of parts with simultaneous recording, storage, and evaluation of relevant parameters over a longer period of time requires extensive storage space. Automated evaluations with stochastic methods, artificial intelligence, and machine learning processes require high computing power. Hence, large companies have a significant competitive advantage here: As a rule, these challenges are taken on by the internal data centres or by IT service providers working exclusively for the company with their own hardware or hardware that is rented on a long-term basis. An HPC-based solution would also give small to medium manufacturers the chance to professionally forecast and influence reliability.

Industry Sector
Manufacturing

Technology used:
**HPC,
Distributed Search-Based
Applications**

The Solution

Using the Plexalytics SaaS platform, the experiment developed HiPerRel, a solution to improve the reliability of metal and rubber parts manufacturers by collecting more data from machines. Since SMEs lack their own data centres, an external High-Performance Computing centre is integrated to check and apply measures for enhanced reliability and reduced failure probability. HiPerRel provides overnight reliability information and allows immediate production parameter adjustments if needed.

The Impact

The connection of the Plexalytics Search Based Application platform to the HPC architecture provides the first business model with which not only large corporations but also small to medium-sized series manufacturers can be served.

The result of the experiment helps small to medium metal and rubber parts manufacturers recognize errors and their influence in a very early phase of the production process, statistically check and apply the relevant mitigation measures to increase the reliability of the products, and reduce the probability of failures. KLS and MaTec will experience substantial future gains as a result of these advancements, leading to improved reliability of their parts and, consequently, increased customer satisfaction.

The capacity for early calculation of reliability reduces the number of failed parts. This not only improves the quality assurances of the manufacturer SMEs but also achieves substantial savings in material and energy resources which bring contributions to carbon reduction and improved use of natural resources.

Benefits

- Using HPC and Plexalytics within service-based software enables overnight calculation of parts reliability models, instead of taking 8 days. This swift analysis allows for quick interpretation of failure causes and adjustment of production parameters within a day.
- KLS and MaTec report an approximately 15% reduction in the long-term part failure rate due to the application of HPC to Plexalytics.
- Due to the application models for reliability predictions in highly-automatised serial production as well as in small-batch manufacturing, the technology provider will expand its customer base by approximately 25% within the next three years.