

Case Study

Machine Condition Monitoring
Asset and Operations Optimization



Bergi-Plast Optimizes Their Manufacturing Operations and Improves Quality Control with Optalio's AI and Advanced Vision Analytics Platform

Optalio is helping plastics manufacturer, Bergi-Plast, improve defect detection, reduce waste, and maximize their data with cutting edge vision analytics optimized with Intel® technologies.



About Optalio

Optalio is a software as a service and product lifecycle management provider that performs complex data analyses for process and production optimization. They provide AI and machine learning supported and scalable solutions, allowing customers to boost productivity, reduce their energy consumption, improve efficiency, mitigate idle times, reduce CO2 emissions, and provide additional insights and resources for businesses.

Meeting the Market with Heightened Expectations

In today's environment, manufacturers, energy companies, and other high intensity production-based industries are under increasing pressure to perform more quickly and efficiently.¹ Whether it's labor shortages, supply chain disruptions, inflation, customer demands, or sustainability regulations, these challenges require manufacturers to be more efficient, flexible, and innovative in their production and quality assurance processes.² One way to address these challenges is by using vision analytic solutions, which can help manufacturers automate and optimize various tasks, such as visual inspection, product identification, quality control, and traceability.

The Bergi-Plast Challenge

Bergi-Plast, a manufacturing company that specializes in plastics technology and injection molding, was searching for a solution to help improve resource and operational efficiency. Their plastics are used in critical operations for a variety of industries like automotive, cosmetics, food distribution, and chemicals, where high quality is paramount for consumer and product protection.

They needed a solution to address their primary operational challenges:

- 1 Machine downtimes:** Unplanned machine downtime slows production, can create distribution delays, and requires additional man hours to find, diagnose, and correct issues.
- 2 Defects and resource waste:** When production anomalies or defects in their products occur, it can result in significant costs for Bergi-Plast. If even one piece is defective, it can lead to the waste of an entire production batch. A wasted batch also means increased carbon emissions for recompleting orders and for the additional distributions.
- 3 Inefficient inspection:** Due to the large quantities of plastics they produce it was not always possible to avoid defects with their systems alone. Bergi-Plast has had to rely on traditional quality assurance to identify and correct defects in their products. These methods are often time-consuming, which limits the frequency of testing. In addition, testing equipment is required which must be frequently maintained and calibrated, which only adds to the operational costs.

Bergi-Plast wanted a better, more cost-effective approach to maintenance and defect mitigation and a path forward to actionable insights from their data. While in the past they had been able to collect their machine data, they had no way to leverage it to streamline their processes or analyze it for data-driven decision making. Bergi-Plast recognized the need for an advanced vision analytics solution and needed a partner they could work with collaboratively to improve their operations while providing them with data analysis expertise. That's where Optalio came to help.

The Solution: Overcoming Operational Challenges Through Vision Analytics Software and Collaborative Partnership

Optalio GmbH is a software-as-a-(SaaS) and product lifecycle management provider that performs complex data analyses for process and production optimization. They provide AI and machine learning (ML) supported and scalable solutions, allowing customers to eliminate bottlenecks in production via defect detection, plan against finite capacities in real time, and improve delivery processes and traceability. Optalio can help empower their customers like Bergi-Plast to monitor machines and systems for holistic predictive maintenance or continuous energy savings.

Optalio's vision analytics solutions were exactly what Bergi-Plast was looking for to drive their goals. Through their partnership, Bergi-Plast hoped to drive progress towards implementing a zero-defect strategy to reduce waste, improve customer satisfaction, enhance brand reputation, and increase profitability. Reducing waste is especially important to their sustainability goals as a plastics manufacturer, as mitigating defects will reduce their production waste and curb their carbon footprint.



Initial discussions: Optalio brought together experts from both companies to understand Bergi-Plast's current state of operations, what solutions had been attempted in the past, and what key outcomes they were looking for.



Facility visit and roadmap creation: After these initial discussions, Optalio visited Bergi-Plast's facilities to deepen their understanding of their production processes before adjusting and deploying their software for data analysis. As Dr. Bernstein of Bergi-Plast had already identified the target areas they were looking to improve, Optalio and their data analyst teams were able to quickly develop a roadmap for the solution and deployment.



Establishing a baseline: To deliver actionable insights and automatic detection capabilities, Optalio AI and ML models needed to first be run and trained using historical data and then matched with parameter change logs of the machine and quality assurance deviations (such as internal deviations and complaints). Bergi-Plast collected between 18 to 20 process parameters and sent the information twice a week to the Optalio analytics team. To address Bergi-Plast's primary need of enhancing production quality and reducing waste, Optalio data experts leveraged the provided time series data from the injection molding machines and mathematical models from their software to process data from the machine interface. Optalio's software solution analyzed the time series data for measurements like pressure, temperature, speeds, and more to set a performance baseline of Bergi-Plast's operations to better track their progress going forward.



Creating a report routine: After understanding the baseline performance of Bergi-Plast's operations and optimizing the Optalio software to align to their operations, Bergi-Plast then began sending Optalio CSV files and visual data at weekly intervals. These sources are consolidated and then uploaded to a server which preprocesses the data for evaluation. After Optalio has analyzed the information, they provide a report to Bergi-Plast with actionable insights for data-driven decision making such as calibration steps for their machine setters, early detection of defects, and downtime forecasts.



The Impact

Optalio's collaborative approach and customization enabled them to provide a tailored solution that empowered Bergi-Plast to:



Optimize Machine Runtime:

The regular insight reports from Optalio help machine setters calibrate machines after production change over to improve performance and limit machine downtime. Optalio has helped anticipate machine downtime varying from thirty minutes up to two hours before it occurs. This is critical as the injection molding machines are often running twenty-four seven and any disruption to production can quickly create back logs or impact delivery timelines.



Reduce Waste and Improve Sustainability:

Optalio's AI models can detect anomalies within the process data and correlate these abnormalities with individual processes and machines. This enables early detection of component faults and helps reduce associated the number of unnecessary rejects. Mitigating rejects has improved facility energy consumption and reduced excess CO2 emissions created from correctional distributions.



Improve Inspection Processes:

Optalio's accurate operation snapshots and anomaly detection has helped setters intervene quickly when machines start operating outside of their normal parameters. Providing automatic quality detection at night and for employee off times is crucial for maintaining operational efficiency. Optalio has a high prediction rate with a low false alert rate keeping Bergi-Plast focused only on legitimate anomaly concerns. The user-friendly nature of the solution was particularly critical as the manufacturer needed to ensure setters were able to manage and facilitate the solution without it being overly technical or requiring data science expertise.

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The cooperation with Optalio was from the beginning very pleasant and always constructive - from the contacting us via the first meeting with us on site until today. Since then, we have felt perfectly met and after every conversation we have that the needs of the customer are always the top priority.

We also notice this in the excellent support. Here the focus is clearly on real problem solving, and in the most direct way. We are looking forward to soon enjoying the first tangible benefits thanks to the solution and to develop further potentials together with Optalio”.

— Dr. Ronald Bernstein,
Managing Director of Bergi-Plast

Continued Collaboration

Bergi-Plast aims to continuously modernize their operations, and remain in close collaboration with Optalio to improve results and develop new capabilities to get another step closer to their zero-defect goal. In the next phase of the engagement Optalio is now working to automate the process so that they can push time series data being captured at millisecond intervals to the cloud to achieve near real-time reports and real-time part quality comparison. They continue to fine-tune the models with continuous training and improvement for enhanced accuracy and performance.

Optalio is also working to deploy their dashboard, which will provide Bergi-Plast and their machine operators insight across all their relevant data and process results. They will also be able to use Optalio's tool to view the energy consumption of their machines and other operational data. This will allow Bergi-Plast to monitor their operations quickly and to work proactively to mitigate concerns.

Optimizing Performance with Intel® Technologies

Intel technology plays a pivotal role in optimizing the performance of Optalio's solution offerings. Optalio uses modules from the library of Python programming language for various data science methods. Intel has optimized some of these modules (e.g. Scikit-learn-intelex, modin.pandas) for hardware to fully take advantage of the properties of Intel® processors. As a result, they are able to gain a significant speed advantage by reducing the runtime of data science methods and processes which then benefits customers like Bergi-Plast.³

For Optalio's software, they use the optimized modules and Intel hardware in the following three areas: Data preprocessing, model calculation, .dem or fitting or training, and model evaluation.

The phases of preprocessing include ingesting, normalizing, and aggregating data. Optalio is able to increase process performance using the modin.pandas module, which is optimized for Intel hardware. Functionally, this means that while Optalio previously had to wait 100 seconds for the pre-processed data, the time is now reduced to 20 to 25 seconds.³ This helps Optalio deliver reports faster, like the machine data information they provide for Bergi-Plast.

Using model calculation, Optalio looks for a function that makes predictions for individual data points. For example, they use this process to predict machine failures in advance to prevent lengthy downtimes for Bergi-Plast. First, they analyze data and select a lead time at which an imminent failure can be identified. In addition to the times of a machine failure, all data points within the corresponding lead times are then interpreted as an error class in the data set. They use this to calculate a prediction function that maps the data points as well as possible to their previously defined class. These can then be used to classify newly added data points and immediately identify them as errors in the event of deviations from the normal state. Due to the large number of data points, the model calculation is very computationally intensive. But with the optimized modules, Optalio is able to improve the runtime and performance by up to 96% on Intel hardware.³

The final step for data-based predictive maintenance is model evaluation. Here, the previously calculated prediction function is evaluated for new data points (e.g. every minute) in order to detect real anomalies during operation. If data appears in a fault class outside the state classes due to the prediction function, potential failures are announced. Then a machine can be paused and repaired prematurely and without serious damage. Using the Intel optimized modules, Optalio is able to realize a runtime optimized by up to 99% with Intel hardware.³

Conclusion

Optalio continues to help Bergi-Plast optimize their operations and ensure product quality by mitigating product defects and machine downtime. They work collaboratively to provide useable insights on machine performance so machine setters can better calibrate and anticipate machine and business needs. With Intel Technology, Optalio has been able to expedite their modeling processes and gain more benefits for Bergi-Plast. Optalio and Bergi-Plast look forward to their continued partnership.



Maintaining Privacy

Optalio does not store any personal data. All other data that they store, and process are stored in relational or time series databases. Authentication always takes place via users with corresponding user roles. For this purpose, they use applications to manage access and identify users. Security-relevant information (such as keys, for example) are stored in a vault, which in turn is only accessible to authorized users.

About Bergi-Plast

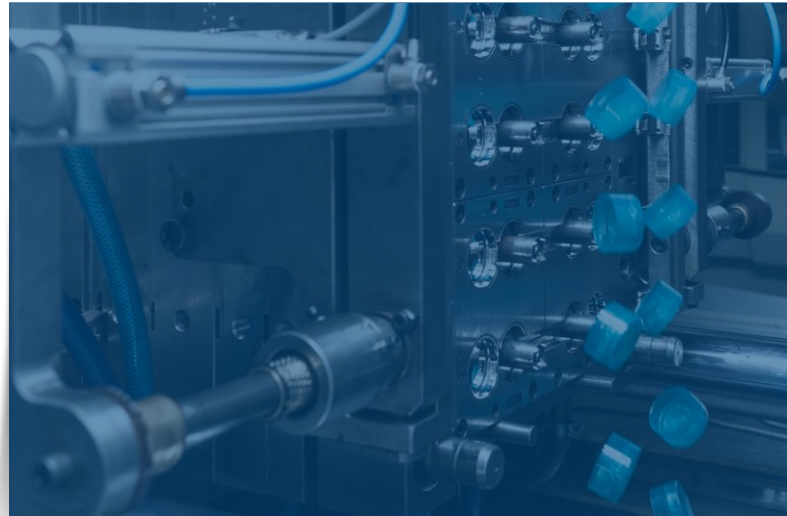
Bergi-Plast is plastics manufacturing company that specializes in plastics technology and injection molding. Their quality plastics are used in critical operations for a variety of industries from cosmetics to the automotive industry. They support customers through tool design and prototype production all the way through serial production.

Learn More

Get started with Optalio's monitoring suite, see here for details: [Optalio Monitoring Suite Webpage](#)

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- [Intel® Optimization of Modin Introduction](#)



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4. Data from internal tests results of Optalio. Intel does not control or audit third-party data. Please review the content, consult other sources, and independently confirm if the data provided is accurate.

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