

Manufacturing
Case Study

MONITIZER PRESCRIBE AT CONDALS GROUP

CONDALS IMPLEMENTS **MONITIZER | PRESCRIBE** TO
DELIVER **AI-DRIVEN SCRAP REDUCTION**

Digitally transforming casting quality.

DIGITALLY TRANSFORMING CASTING QUALITY

Spanish foundry group Condals saw its scrap rates drop significantly after adopting the Monitizer | PRESCRIBE digital solution, a technological partnership between DataProphet and DISA. Scrap rates dropped by 39% and 45% for two products during production testing with the Monitizer | PRESCRIBE AI-driven optimisation deployment.

During the project, DataProphet PRESCRIBE trained and modelled AI algorithms from live and historical process data in conjunction with Monitizer | Global on one of Condal's casting lines. Next, the Monitizer | PRESCRIBE Artificial Intelligence (AI) solution was deployed to improve Condal's casting quality and reduce scrap.

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We were interested in finding an AI solution that would help us lower our scrap rate as much as possible,” says David de la Cruz, CIO at Condals Group. “DISA offered a complete solution with Monitizer. Other competing solutions only look at parts of the process in detail and only optimise certain parameters – mould alignment, temperature, porosity – whereas Monitizer | PRESCRIBE optimises the entire process to reduce scrap. That was exactly what we were looking for.

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TOWARDS THE DATA-DRIVEN FOUNDRY

At its two Spanish and Slovakian locations, Condals Group's three DISAMATIC® moulding lines produce over 43,000 tons of iron castings each year. “Our goal is to be a data-driven company, taking decisions based on the data from our process,” says de la Cruz. “We already had Monitizer | CIM installed and that had worked well for us. Monitizer | GLOBAL lets us do a lot of additional things and is a really powerful tool for putting all our data in one central place and making it easily available, but reducing scrap was always the main goal.”

DataProphet's suite of AI products and DISA's Monitizer together support any foundry at any stage of its digital journey. Once data is collected and warehoused, these manufacturing IIoT applications move quickly to more sophisticated, data driven innovations: DataProphet PRESCRIBE is an AI-driven prescriptive analytics solution which, once deployed on a production line, gains production value the more it learns about the manufacturing process it has been trained to understand. In this use case, Condals' Monitizer | CIM upgrade made reliable, time-stamped, structured data available from DISA equipment and unlocked other advantages such as improved automation and recipe management and optimization.



BUILDING A SOLID DATA FOUNDATION

Monitizer | GLOBAL gave Condals a live view of its entire process while storing the merged data for historical analysis. The foundry previously took days to manually cleanse and merge its process data. By November 2020, Condals had 12 systems connected with almost 2000 different data points available through over 40 different dashboards. In Slovakia, there are currently two systems connected supplying over 500 data points to six dashboards.

RAPID RESULTS WITH PRESCRIPTIVE ANALYTICS

With the data foundation in place, Monitizer | PRESCRIBE was the next step. DataProphet PRESCRIBE's AI-driven analytics deliver dynamic, real-time process analysis across an entire production line to significantly reduce scrap and improve profitability.

The team extracted, transformed and loaded Condals' historical production data into the Monitizer | PRESCRIBE platform. Over 700 parameters described the processes across sand preparation, the melting line, the moulding line, and during casting.

Time-synchronising the different data feeds is often challenging, with multiple methods employed to track molten metal and individual moulds and castings, such as mould numbers and pattern keys. Where no tracking method exists, DataProphet introduces software tracing techniques that can detect process events like molten metal leaving the holding furnace and being poured, then calculate the time taken to move between them. For example, a spike in pouring ladle temperature and weight would mark exactly when the ladle was filled with metal.



AI-DRIVEN SCRAP REDUCTION

Predicting a low scrap process

By mid-May, a unified, time-synchronised data set was ready to support model creation and training. Through advanced, unsupervised machine learning, the AI's neural network model calculated and established the correlation and interaction between the hundreds of input process and machine variables, and final casting quality data. This procedure produced two initial models that would automatically specify the optimal operating regime for two of the five patterns under test.

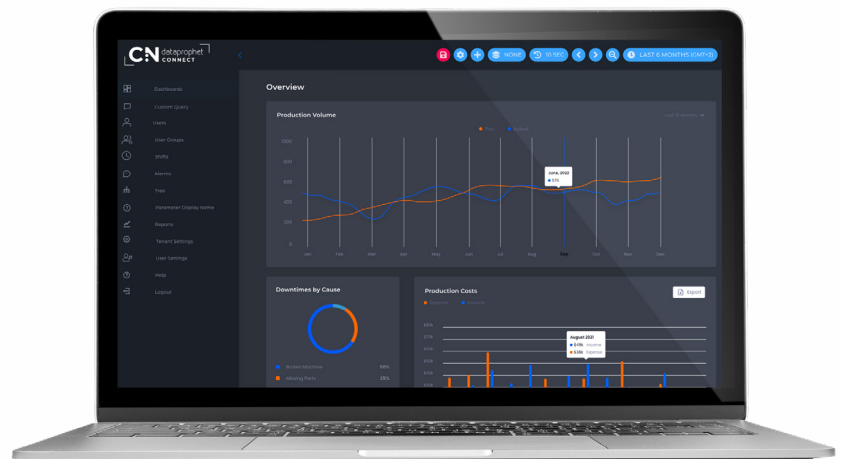
Each pattern has its own dedicated model that generates custom prescriptions to optimise each pattern's recipe. After rigorous checking with test data to confirm the models' predictive accuracy, real-life commissioning started in October 2020.

Commissioning work began in live production – and improvements arrived quickly. One test pattern already had a very low scrap rate but that was reduced by a further 39%. The other pattern had a high existing scrap rate which PRESCRIBE's pre-emptive recommendations helped cut by 45%.

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These initial commissioning results are very encouraging,” explained de la Cruz. “The scrap rate is staying at the lower level and actually still dropping slowly. Though we are still at an early stage with results for only two patterns, this is the right approach and we are going in the right direction. We definitely expect further improvements in future.

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MONITIZER | PRESCRIBE

The focus is now on fine-tuning model performance and implementing the advice in the prescriptions to move the process parameters into the desired optimum operating range. Sometimes that simply means turning a dial but other adjustments are more challenging. One example is controlling the cooling rate of poured moulds; this cannot be changed directly but has to be influenced by adjusting numerous other parameters.

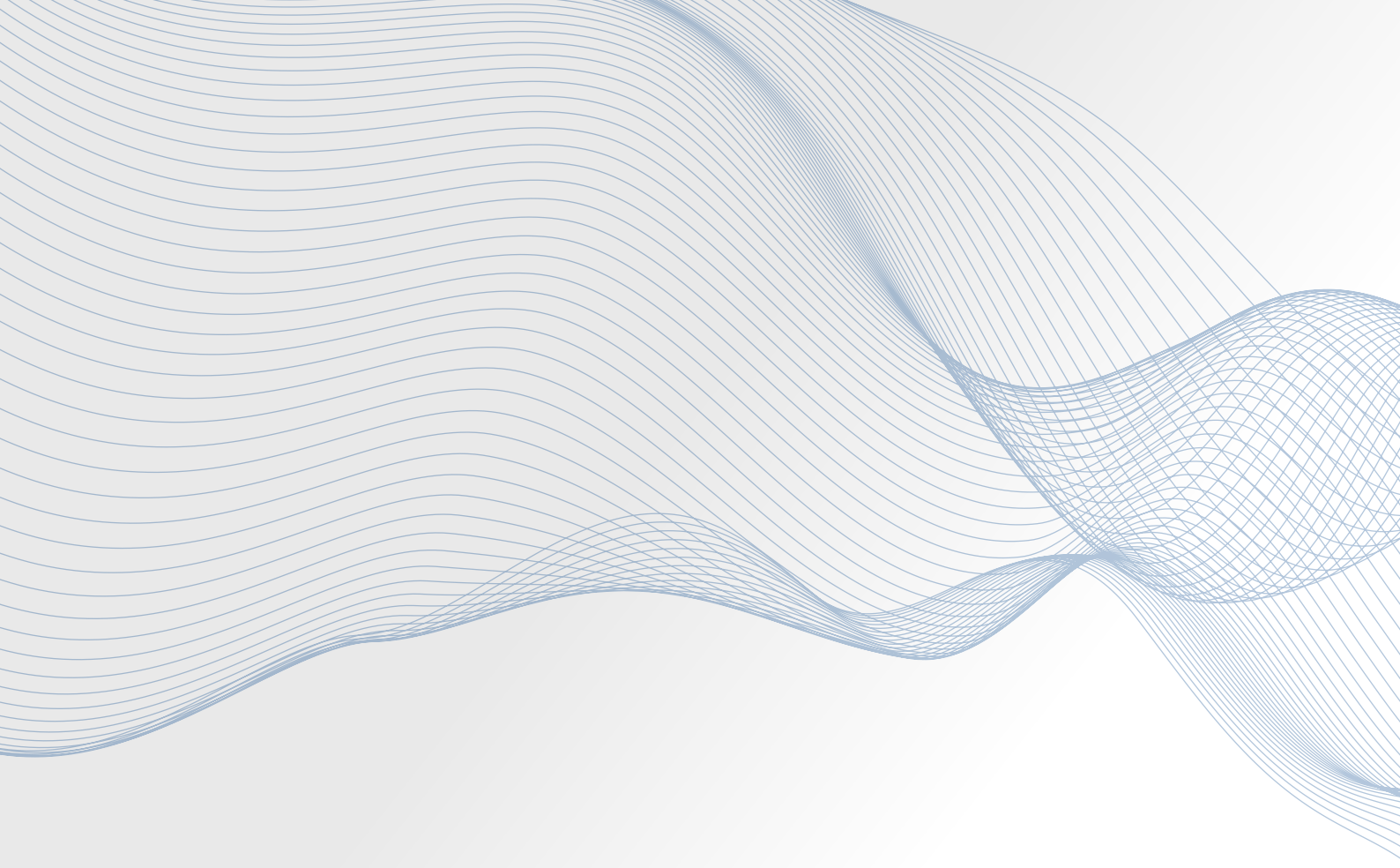
These include holding furnace temperature, the percentage of scrap and other metals, like copper, initially added to the iron mix, and how much of then previous batch of iron remains in the melting furnace. To help with fine adjustments, Monitizer | PRESCRIBE gives Condals an “ideal” iron recipe to aim for while an ahead-of-real-time model predicts how changing the metal composition will produce the desired adjustment in the metal cooling curve.

Prescriptions are currently delivered, reviewed and implemented weekly by a dedicated in-house team, but the aim is to move to immediate implementation as soon as possible. When that happens, machine operators will see recommended machine settings pop up in their dashboards.

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*“One of the current goals is to bring the prescriptions from **PRESCRIBE** back onto the factory floor so operators can use them immediately,” explains de la Cruz. “We don’t want to change everything we have been doing for the last 20 years immediately but will gradually make the prescriptions part of our process.” “I can for sure recommend the complete Monitizer package,” concludes de la Cruz. “The great thing about PRESCRIBE is that it brings everything together to predict its influence on scrap and gives you a clearer picture of what is really happening – that is one of its biggest attractions. The prescriptions are pointing us in the right direction, for example, in showing us which variables have the most influence on our process and so what our priorities should be.” “**Monitizer | PRESCRIBE** is also a very easy solution to understand and use. **PRESCRIBE** is definitely the right approach, it shows us the key ways to reduce the scrap rate and is already giving us excellent feedback.”*

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