KISTLER

measure. analyze. innovate.

Intelligent injection molding monitoring

Accurate predictions of part quality

Sartorius monitors production of plastic parts with ComoNeo

sartorius

Sartorius opts for Kistler's ComoNeo process monitoring and control system for high-precision quality monitoring of plastic parts for pipette systems at its facility in Helsinki. The ComoNeoPREDICT functionality delivers accurate forecasts of part quality while the injection molding process is still live – providing a sound basis for intelligent monitoring.

Products in the medical technology sector have to meet extremely high manufacturing requirements: processes must not only be very precise, but also repeatable and stable so that production results can be verified and undesirable influences can be excluded. Sartorius is a German corporation that can look back on a lengthy tradition of leadership in products for the laboratory and pharmaceutical segments. Founded in 1870, this exchange-listed enterprise operates across the globe from its headquarters in Göttingen. Sartorius supplies laboratories and research facilities with specialized equipment such as high-precision balances, filtration units and centrifuges. The company's Liquid Handling segment is located in the far north of Europe. Its mechanical and electronic pipette systems are developed and parts are manufactured in Helsinki. These products alone account for around six million individual parts every year, and Sartorius has another Finnish facility where it produces vast numbers of pipette tips – over 600 million units per year.

Mechanical pipette systems made by Sartorius

Accurate predictions of part quality while the process is still live

Tomi Villilä is one of the 'plastics supremos' at Sartorius in Helsinki. As Development Manager Injection Molding, he shoulders responsibility for the quality of the injection molding processes for as many as 50 individual parts that make up one pipette. In response to ongoing developments, he and his strong team recently began using Kistler's ComoNeo process monitoring system with the ComoNeoPREDICT function. Online quality prediction allows forecasting of part quality during the injection molding process, based on numerous learned process parameters and related part-specific quality criteria. Villilä has garnered over ten years of experience in the plastics processing industry, and he is no stranger to the use of cavity pressure sensor technology: "I've known about Kistler for a very long time, and I'm well aware of the excellent performance their sensors deliver. In fact, I focused my degree thesis on cavity pressure sensors made by Kistler! And since then, I've often been involved with Kistler products throughout my career, so I'm very familiar with them."

Although ComoNeo only went into operation just recently, users at Sartorius are already convinced of the system's benefits: "We started out with a fairly non-critical part – a fixture – so we could get to understand the system, practice using it and improve our own process. But even after a short time, the results have been so good that we're planning to deploy six to eight additional ComoNeo units for other critical components as the next step."

ComoNeoPREDICT is especially suitable for processes where the quality requirements are very demanding. The first step is to use the associated Stasa QC software to generate a testing plan – known as Design of Experiments, or DoE – that includes all the parameters needed to determine the process. Which dimensions are to be achieved? How must the machine be set to achieve them? Might it be possible to reduce the cycle time? Comprehensive and precise answers to many questions such as these are provided by the Stasa QC PC software and the ComoNeoPREDICT

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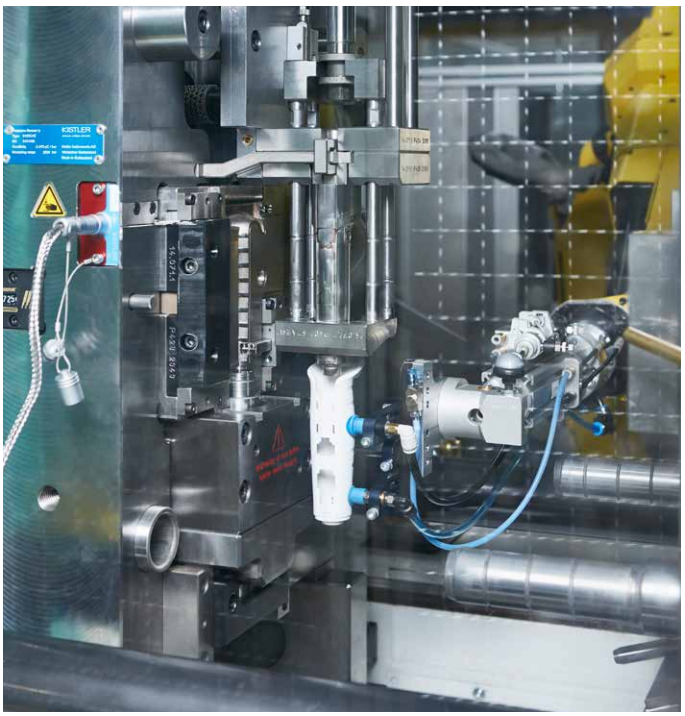
Sartorius Biohit Liquid Handling Oy, Laippatie 1, 00880 Helsinki, Finland, www.sartorius.com



Sensor technology installed in the mold supplies the basis for transparent process management of all material-related and part-specific attributes – the part's 'fingerprint'

process monitoring feature. For convenience, the DoE can be generated on a PC and implemented digitally in ComoNeo at a later stage. The Kistler sensor technology installed in the mold supplies the basis for transparent process management of all material-related and part-specific attributes – the part's 'fingerprint', so to speak. Based on the measured cavity pressure and the specific part characteristics measured in relation to it, Kistler's system delivers a prediction of part quality while the injection molding process is still in progress. The benefit: intelligent optimization is possible with no need for time-consuming quality measurements. It took Sartorius only two or three days' work with ComoNeo to set up the specific DoE for modeling of the injection molding process for the fixture; then, following optimization with Stasa QC and ComoNeoPREDICT, very precise results were obtained. Because such large numbers of machine parameters are considered, users gain a clear understanding of the limits of the injection molding process and the relevant part characteristics – paving the way for intelligent process monitoring. It takes very little time to understand what is happening in the injection mold, and to gain knowledge about the entire process. Villilä notes enthusiastically: "Even colleagues without lengthy experience can achieve outstanding results in next to no time!"

Fast setup and intuitive operation

Based on the prediction model that is generated, ComoNeo can significantly reduce the percentage of bad parts, and they can be segregated automatically if desired. Here as in other respects, simple operation and integration are the keynotes: "This system is really simple to handle – almost like a smartphone. You only need five or ten minutes to understand how it works. And setting up a DoE poses no problems either, thanks to the software that comes with the product. You don't have to be a mathematician to understand the whole system – which is not the case with other programs. Once you've generated the DoE, you can simply upload it into ComoNeo and then you already get accurate feedback for process optimization in the test phase," Villilä explains.

He already has ambitious plans for the future: "I'm certain that the benefits we can achieve with ComoNeo will also be of interest to other Sartorius units – especially because this system is so flexible. I already gave a presentation to our colleagues about our experiences with ComoNeo at the company's gathering of experts in London. If it were up to me, all Sartorius technical parts that require high precision would be produced with the Kistler system in the future." With this idea in mind, a workshop will soon take place in Helsinki with a practical demonstration of ComoNeo, ComoNeoPREDICT and the online quality prediction feature for interested staff members from the entire Sartorius group.

The ComoNeoPREDICT process monitoring feature

To enhance the accuracy of results from online quality prediction, Kistler has integrated an additional function that delivers a variety of benefits:

Stasa QC

- Lean and intuitive DoE software, tailored to the injection molding process
- Simulates the relationship between actuating variables and quality in injection molding
- Determines the optimal operation point
- Makes production start-up faster because less time is needed for trials and tests

Operation point navigator

- Ensures consistent part quality thanks to process stabilization
- Ideal for optimizing live production processes
- Improves process knowledge because relationships between setting values and quality are determined automatically

DoE interface

- Reduces additional effort and expense on documentation
- Automatically stores quality-relevant process variables based on cavity pressure
- Automatically evaluates process stability

Online quality prediction based on cavity pressure

- Predicts underlying part-specific quality characteristics during the injection molding process
- Automatically evaluates good/bad parts to reduce pseudoscrap
- Provides support for operators with determining and optimizing the process
- Cuts costs thanks to shorter setup times and cycle times, lower scrap rates and predicted process capability

Find out more about our applications:
www.kistler.com/applications

Kistler Group
Eulachstrasse 22
8408 Winterthur
Switzerland
Tel. +41 52 224 11 11

Find your local contact on
www.kistler.com

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