Customer Story

Challenge

With advances in technology bolstering the demand for manufactured electronics worldwide, Murata sought a more creative, data-driven solution to optimizing not only their processes, but also their end products.

Mining big data propels increased product miniaturization

Engineers apply JMP and innovative thinking to create cutting-edge electronics

You may know Murata as a major supplier of high-end smartphone components – or you may recognize the company as an innovator in concept robotics. The MURATA BOY, a bicycle-riding robot who has delighted crowds at many a tradeshow, relies on state-of-the-art gyro-sensing and ultrasonic technologies to achieve seemingly impossible states of balance.

In fact, Murata views its concept robots as a way to showcase its many electronic manufactures. Among these, the highlights of Murata's catalogue include ceramic capacitors, inductors, gyro and ultrasonic sensors, filters, communication modules, ferrite beads and crystal units. In its industry, Murata is a global leader in product quality homogenization, miniaturization, high performance, thinness and accelerated Kaizen cycles.

As increasing global innovation enlarges the market for leading-edge electronic components such as these, Murata acknowledges that manufacturing processes must keep up with the innovative spirit of the company's products. Unwieldy and inefficient processes limit growth.

So it falls to Murata's Monozukuri Enhancement Department to dig deep into the company's production systems data in search of clues as to how the company might design and implement strategic improvements. With massive and complex data sets, however, data mining is no easy task.

Since adopting JMP in 2001, Murata has systematized its quest for improvements. By trolling the data for new ideas, the company keeps pace with their ever-evolving product offerings.

Murata mines production data to generate process improvement insights

There was no doubt by early 2001 that data mining would be the secret to Murata's continued success. With the inauguration of a devoted data analysis team the same year, Murata used SAS® to construct a database integrating manufacturing data and information from across the entire global company. So while it is the role of SAS to accumulate and store data, it now falls to JMP to point at how that data might be used to resolve daily manufacturing challenges small and large.

At the helm of this effort is Osamu Shimoyae, Senior Manager of Production Innovation at Murata. "Data mining helps us to determine improvements through the analysis of mass production data generated during both the production process and site integration," says Shimoyae.

Murata's on-site data analysis team uses JMP to conduct multivariate analysis, making visible the relationships between variables by examining myriad possible variable combinations. Shimoyae says that, in rare cases (e.g., with highly novel products), unexpected relationships between factors emerge. However, many problems can be solved by quantitatively verifying the relationship between two variables based on a hypothesis within organized segments.

jmp®
Statistical Discovery.™ From SAS.

We use data analysis to prioritize challenges and tackle those for which we anticipate large improvement effects. By aggregating results in JMP, we've created an easy way to systematize operational evaluations across departments.

Osamu Shimoyae, Senior Manager, Production Innovation Sec.2, Monozukuri Enhancement Dept., Monozukuri Engineering Group, Murata Manufacturing Co.,Ltd.

"We evaluate ROI strictly," says Shimoyae. "We use data analysis to prioritize challenges and tackle those for which we anticipate large improvement effects. By aggregating results in JMP, we've created an easy way to systematize operational evaluations across departments." Analysts then use site visits as a way of verifying trends they observe in the data. Sharing results on-site, analysts and engineers collectively brainstorm targeted, creative solutions.

Data analysis in real time

Murata believes that maximum improvement results when real-world science merges with data science – from production machinery sensor data to engineers' knowledge and know-how. And lucky for Murata, JMP has provided a useful forum for this fusion.

"The appeal of JMP," says Shimoyae, "is that the data is searchable." JMP can process data in real time, reflecting users' thought patterns and ideas. If you have a quandary, you can run it through JMP and have an answer straight away.

And such process improvements pay off, says Shimoyae. Noticeable results are produced on the factory floor and these changes affect Murata's bottom line.

Analyses make possible increased product miniaturization

In addition to standard processes, new products account for around 40 percent of Murata's overall production, so measures to shorten product life cycles are essential. Accordingly, in order to offer products that meet market and customer needs, timely improvements are essential.

Variations in the shrinkage factor of ceramics arise due to issues in the calcination process such as laminate density, furnace temperature or friction between the calcinated product and substrate. As such, Murata collects the data generated in the production process and, using JMP, isolates variables that affect the shrinkage factor.

By understanding this relationship, Murata's engineers have succeeded in stabilizing variations in the shrinkage factor by improving the calcination process.

It was also possible to limit calcination-related shrinkage to the processing department's size requirements. "If there are large variations in shrinkage, increased gaps between parts are inevitable," says Shimoyae. "By stabilizing the shrinkage factor, we were able to narrow the gap between products and reduce product size as a result."

Standardization is also crucial. As are insights from Murata's on-site engineering teams. So Shimoyae and his colleagues use JMP as a means of standardizing methods for setting variables and narrowing down segments by systematically consolidating and documenting application methods.

"We continue to champion data mining as a means to achieve major process improvements," says Shimoyae. "And that is how, ultimately, we continue to improve product quality."

Solution

Murata's engineers now rely on JMP to translate objective data analysis results into demonstrable on-site improvements.

Results

With JMP, Murata streamlined elements affecting the ceramics calcination process shrinkage factor, creating an alternative control system by which to stabilize variation and reduce product size.

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