Customer Story

Ciena

Challenge

As the manufacturing process has become more geographically dispersed with the establishment of new global partnerships, the quality of raw data has decreased. The need for comprehensive data analysis has consequently never been more urgent.

Product engineers at Ciena adapt to the globalization of manufacturing

Data analytics software provides a powerful tool for harmonizing measurement systems, building process knowledge and maintaining quality across a global supply chain

Perhaps no industry has experienced as much transformation as the telecommunications industry in the last three decades, undergoing massive growth, rapidly evolving technology and changing manufacturing practices. David Seniuk, Senior Product Engineer at Ciena – a network systems, software and services company – has experienced this shift first-hand during his career."When I was first in the industry back in the '80s, we did everything in-house," he explains. "We built our technology from the ground up, but nowadays the majority is outsourced." Now, Ciena – like most prominent equipment suppliers – contracts with specialized manufacturers around the world to contribute parts to their final products. Though this global approach makes the manufacturing process more efficient overall, integrating multiple stakeholders into a harmonized system is a challenging prospect. "These companies all have their own ways of doing things, so they collect data differently… and they analyze data differently," says Seniuk.

The globalization of manufacturing introduces new challenges for quality assurance

Whether in-house or further down the supply chain, factories are a crucial source of raw data. And at Ciena, engineers like Seniuk welcome the abundance of information. Seniuk uses data sets to detect issues, understand differences in outputs between batches or facilities, and determine the root cause of device failure in order to optimize production and deliver consistent, high-quality network infrastructure products to Ciena's customers.

In the past when Ciena manufactured its own products, Seniuk didn't have to venture far to conduct his evaluations – all manufacturers were located within the region surrounding his home base of Ottawa and he routinely worked with the same teams, making it easier to collaborate and implement standard processes for data collection and analysis. As manufacturing has dispersed globally, however, Seniuk has had to adapt his approach to account for the decreased control and standardization of manufacturing processes between facilities.

DOE helps optimize production

Working with contract manufacturers, Ciena must closely monitor production activities as well as inputs and outputs to ensure that these different production lines create products that work together. The design of experiments (DOE) method is a systematic approach that identifies cause-and-effect relationships between the various factors present in manufacturing, and both Ciena and its suppliers use this methodology to evaluate their production lines.

As the customer himself in this case, Seniuk advises and monitors processes to maintain as much consistency as possible between his diverse set of suppliers. Though the suppliers set up and run their own DOEs, Seniuk checks the design in JMP® – a statistical discovery software package with robust DOE capabilities – and gives feedback where necessary. "[Our suppliers] usually pick up the same main effects and interactions, but JMP has the variability gauge platform," he explains. Variability gauge charts allow Seniuk to analyze continuous measurements, evaluate how the measurement is working and see any variation in the data from a bird's eye view.

The resulting charts show Seniuk and his suppliers how the data responds to all the many factors involved in production. "It's been valuable because a lot of times when you're doing a DOE, you don't spend time looking at every data point," Seniuk explains. But JMP outputs let users recognize issues that may otherwise have been missed.

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>
> David Seniuk, Senior Product Engineer

With this information, they can exclude a problematic data point, run the analysis again and investigate further.

Seniuk first began using JMP several years ago when dealing with an extremely low-yield laser manufacturing process. With JMP, he developed a model that identified correlations between different structures and was subsequently able to identify parts of the process that were limiting their efficiency. By targeting these problem areas, Seniuk and his team were able to improve the overall yield from 1 percent to 5 percent. "We had so many lasers we didn't know what to do with them," Seniuk remembers. "At that time, I really didn't see any other software that could do that so easily, so I was a JMP fan from that point on."

Data-driven monitoring sharpens quality and process methods

Though Ciena's engineers are encouraged to use a variety of software tools, Seniuk says that he often turns to JMP to monitor and manage the quality of suppliers' products. When evaluating yield for a particular supplier, Seniuk has used models in JMP to ultimately identify outliers that didn't fit the model. In one instance, the contract manufacturer responsible for making a particular component was surprised that Seniuk's team identified an issue that the manufacturer didn't know about.

"Things that fall outside these models usually tell a particular story about what's going on in [the supplier's] process that they didn't expect," Seniuk says. Because each facility produces large quantities of data, it can be easy to miss less obvious problems. As such, the fact that JMP could identify issues otherwise overlooked by the component manufacturer made the software's contribution highly valuable. "It was a recurring problem that [the supplier] was not aware of that reoccurred on particular batches, and they managed to fix the problem … so it was a good find."

Harmonizing disparate data collection systems for accurate analyses

With manufacturers across North America, Europe and Asia, Seniuk has to review data measured and collected by antiquated systems that are difficult to update and lack the functionality and flexibility he prefers. And with each facility setting their own standards and processes, even more challenges are introduced. "You can tell the good suppliers from the bad right away, just by their methods and what state their [measurement systems] are in," he says.

Seniuk therefore relies heavily on the comments entered in the system by site engineers to collect the critical information he needs for his analyses. Given the geographical diversity of the facilities involved, however, the engineers responsible for providing this vital feedback are often non-native English speakers. Spelling mistakes or other grammatical structures in free-form text fields make comments difficult to analyze using only the standard tools. But, Seniuk says, "The text analysis platform in JMP has been incredibly valuable to us because it is flexible enough to allow defect categorization into pareto charts from comments made by people whose first language is not English. It handles all the variants almost magically."

Still, the data from a given manufacturer is not very useful unless it can be compared to data from the rest of Ciena's component facilities. "This is where JMP really comes in handy," says Seniuk. The software's connectivity allows him to combine databases and review the data collectively as one large, complex data set. "You can analyze some data and connect to a factory in an MES system, or their data collection system or FTP server, and pull the data in to join to somebody else's data." Once all the data is compiled and standardized, Seniuk and his team can conduct their analyses and assess Ciena's manufacturing processes as a whole, from the component's components to the end product.

"From an engineering point of view, JMP is great because it gives you the speed, connectivity and analysis very quickly. And it handles lots of data," Seniuk says. Not to mention, it's user-friendly and scalable. With a splintered manufacturing process, large number of users and wide variability in statistical skill levels, it's critical to have a powerful, intuitive software that can be implemented in various environments.

Solution

JMP has enabled Ciena to collate large quantities of data and provide new manufacturing insights that ultimately drive product improvement.

Results

Engineers at Ciena now use data to build process knowledge, boost consistency and identify previously unknown areas for improvement.

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