



## Challenge

STMicroelectronics' 13,000 researchers are setting the standard in the design and production of a wide range of semiconductor devices. The manufacture of these devices requires that extremely complex processes be carried out within aggressive time frames.

# Developing smart power with confidence

STMicroelectronics engineers find a welcome source of ease and efficiency

STMicroelectronics is the world's fifth-largest maker of semiconductor devices, producing one of the industry's broadest product lines, from discrete diodes and transistors to complete platform solutions.

Headquartered in Geneva, this multinational corporation is a leader in fields as varied as semiconductors for the industrial market, automotive circuits, camera modules for mobile phones and the rapidly expanding market for microelectromechanical systems, which are used, for example, to make temperature sensors and accelerometers for airbags and pacemakers.

STMicroelectronics – or, as it's more familiarly known, ST – excels in a highly competitive arena. The call for more advanced technologies is unrelenting, production processes are complex and turnaround times are tight.

Among the ST engineers responsible for meeting these challenges are Matteo Patelmo, Diego Gerosa and Vincenzo Palumbo, who are based in the Italian town of Agrate Brianza, near Milan. Their focus is ST's smart power technology – devices capable of handling high-voltage and high-power applications. Smart power comprises a good share of ST's business, and Agrate Brianza is the R&D and production center for this technology.

graphical features that make data so accessible and by the software's ease of use. He did not have an extensive background in statistics, just a bit of university coursework. "But I didn't need it with JMP," Patelmo says. "You really don't need to know much more than the fundamentals – standard deviation, that sort of thing."

JMP "encourages curiosity," Patelmo adds. "When you look at the results of an analysis, you may see some terms that you're not familiar with, and so you investigate and try to understand what they mean. Then you find that they're giving you useful information – and you've learned something new and helpful."

Patelmo and his colleagues are managing the ramp-up of a couple of technologies that have yielded several new products in recent years. At the end of every production process, they test to ensure that all parameters are within specifications. However, new products are sometimes developed before the production environment is completely established. This is a big obstacle.

"We need to move products at a very fast pace. But we need to ensure that they're all conforming to specifications, even if the environment isn't yet fully in place," Patelmo says. "JMP allows us

## JMP promotes data discovery with exploratory analysis

Matteo Patelmo, a device-engineering manager, has used JMP for nearly a decade. Like many users, he was first attracted to the

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Matteo Patelmo  
ST Engineer



to manage this task quite easily" by, for example, emulating production tools before they're available.

## Engineers use analytics to troubleshoot flaws in the manufacturing process

When a product moves into production, the process can involve 400 to 500 steps and require as long as three months. If a problem is discovered at the end of the process – perhaps a parameter was out of specification – Patelmo's team can use the Partition platform in JMP to examine the history of the lot, see which equipment was involved in manufacturing and compare the flawed lot with a good one. JMP helps the ST engineers identify which tool is suspect, so they can take appropriate action.

"I think this sophistication is very particular to JMP," Patelmo says.

"Partition is difficult, and it's very powerful. We don't have issues every day, fortunately, but sometimes we do. Knowing that we can manage the data very easily is a comfort."

## Customized, designed experiments help correlate specific parameters

Diego Gerosa is a device engineer who uses JMP to manage extremely large sets of data from various origins. He says he appreciates the ease and speed with which he can analyze and manipulate data from different sources. Design of experiments (DOE) is another tool that's very useful during product development, he says. Gerosa designs experiments to examine a wide range of variables, such as the effects of temperature and pressure on the product.

Vincenzo Palumbo, a technology line engineer in research and development, uses JMP to correlate different parameters or to determine which parameters are having the greatest impact on, for example, wafer characteristics. For him, it's a problem-solving and troubleshooting tool. "My work doesn't require analyzing huge amounts of data," says Palumbo. "I usually analyze the parameter measure on new components and architectures." Palumbo uses DOE, box plot and correlation features in JMP, as well as the Variability/Gauge Chart platform.

The ST team also values JMP as a means of presenting data. "With JMP, once you've synthesized huge amounts of data into one chart, it's very easy to give the right message to your audience," says Patelmo. "You can prepare a graph showing just the data you want to show and how you want to show it."

Gerosa agrees. Using links between data tables and graphs, for example, "I can build a live presentation of my data and much more clearly demonstrate what that data really means."

## Converting to JMP®

Patelmo has created several JMP scripts that are now used extensively in the ST community to automate routine analysis. "We've converted quite a number of people. I've encouraged all the members of my team to use it."

How would Gerosa describe the software's benefits? "In a word, 'ease,'" he says, "the ease of handling huge amounts of data, correlating them and showing them to others." "JMP is an everyday tool for me," Palumbo says.

### Solution

JMP® has become an everyday tool for the company's Italy-based engineers. Use of the software is expanding into other areas of the organization.

### Results

JMP allows engineers to analyze and manipulate extremely large data sets, perform experimental designs on new products, and present findings clearly and concisely.

To contact your local JMP office, please visit: [jmp.com/offices](http://jmp.com/offices)



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