



Roche

Challenge

Perfecting the production of diagnostic biosensors.

Fine-tuning the tools of quality health care

Roche provides biosensors that allow health care professionals to get bedside readings of the quality of a patient's blood. JMP® statistical discovery software helps Roche produce more finely tuned devices.

Raghavendran Swaminathan was trained as an engineer – he has a master's degree in microsystems engineering and microelectronics – so he learned the fundamentals of statistical analysis.

Today Swaminathan works as a Senior Process Development Engineer in the diagnostics division of Roche Diagnostics International in Rotkreuz, Switzerland. And his work very much involves statistics, beyond the basics: ANOVAs, regression, means comparison, screening effects, design of experiments and more. The broadening of his knowledge on such things has come on the job, in the school of JMP.

JMP® statistical discovery software from SAS is a fundamental tool in Swaminathan's work, which involves fine-tuning the production of diagnostic biosensors. These biosensors allow health care professionals to gain access to more information more quickly, in many cases right at a patient's bedside.

Previewing data with JMP Query Builder

One such device is Roche's cobas b 123 point-of-care system, a biosensor used by hospitals to measure blood gases; electrolytes, such as potassium, sodium and calcium; and metabolites, including glucose and lactate. The cobas b 123 is a tabletop device that involves 22 screen printing steps and 16 dispensing steps. With a single click, it provides information on the quality of a patient's blood.

The objective of Swaminathan's work on the cobas b 123 is to establish key performance indicators in the production process. He and his team

are using JMP. They define and document SQL queries with which they can obtain data from the manufacturing execution system. They then connect with JMP Query Builder and analyze the data.

"It's very helpful to be able to have an early look at the data so that we can react right away if there are any issues," Swaminathan says. "The production process is highly complex, and the sensor performance is dependent on many parameters, such as screen-printing thickness, dispense volume, drying temperature, storage conditions, the time interval between processes, material properties."

Understanding the interaction between those parameters is a challenge. "Right now, we're working on a data model to judge the sensor performance based on our hypotheses and the interaction between them. We use JMP to make the model and to predict the sensor performance."

Stepping up to JMP, accelerating productivity

Prior to turning to JMP, Swaminathan was an Excel user. The advantages of JMP were immediately apparent to him.

"First," he attests, "is the amount of data JMP can handle. Excel was too slow, or it crashed, or its application in a production environment

My productivity increased dramatically with JMP. I noticed this right away.

Raghavendran Swaminathan, Senior Process Development Engineer



was too limited." He was then impressed with the range of features JMP offered – features he found easy to get comfortable with, and that expedited his work. "My productivity increased dramatically with JMP. I noticed this right away."

He discovered, for example, statistical process control charts, which separate common and special causes, including problem investigation, out-of-control conditions and ongoing monitoring of stability. Building these charts allows him to proceed much faster, and to see more detail than Excel afforded.

SPC charts allow him to monitor, for example, the thickness of screen-printed film. "There are multiple layers and the thickness has to be controlled. We monitor this with a control chart." He and his team also use SPCs to monitor the resistance of the printed layers.

Graph Builder: 'Easiest thing I've ever seen'

Graph Builder has also played a central role in this work. "Graph Builder is the easiest thing I've ever seen," Swaminathan avows. "You have a platform, and you have the data, you pull it in, you pull it out, you can do whatever you like with it."

"You have the point chart – based on how you define the data, ordinal or nominal – and it's automatically sorted." He uses time series plots, histograms, pie charts, "and I also use heat maps to determine the variation in the process cycle times."

Everything is in one place, and he loves that it's drag and drop. "It's very quick and very handy – unlike with some graphic tools, where you have,

say, 'This is my x, this is my y,' and then you have to define everything." With JMP, "It's all immediately visual."

"And it's automatic," he adds. "The script is ready and anyone can open the journal at any time, click 'obtain data' and run the analysis. With two clicks, you have all this information available as a PDF or an XHTML."

"Everybody can use it, and it's quite helpful. We've been using this as a standard tool in our shop floor meetings for KPIs. Everyone is very satisfied with what JMP can show, and they also find it helpful for finding why throughput may be down – whether there are bottlenecks."

In sum, Swaminathan says, it's all about enhancing productivity – how quickly inferences can be made from the data set and how quickly it allows you to respond. He finds himself exploring his data in much more depth than he could before. "It's like a free-flowing kind of thing."

"All of this happens so quickly. We've really improved our productivity."

Gaining insights each day

Swaminathan loves that each day his work presents new questions to be answered, the potential for groundbreaking discoveries. He continues to gain insights into the science behind biosensors.

"I come from an electrical engineering background," he says, "and now I'm working in the medical field. There are so many new things to learn." JMP is helping expand his field of knowledge. "It's challenging," Swaminathan affirms. "And it's exciting."

Solution

Roche engineers are using a wide range of JMP tools to expedite research and enhance productivity.

Results

Roche is placing increasingly sophisticated tools into the hands of health care professionals.

To contact your local JMP office, please visit: jmp.com/offices



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