Rope. It’s one of human history’s oldest technologies. In fact, scientists have found fossil evidence of primitive two-ply cordage dating back more than 28,000 years. “Rope is older than the wheel, newer than the sharp stick,” but that doesn’t mean you can’t reinvent it, says Greg Mozsgai, Research and Development Manager at Samson Rope, the world’s leading manufacturer of high-performance ropes.

Over the course of its 140-year history, Samson Rope has earned its stripes by investing in a rigorous R&D program targeted at developing products that solve new and evolving engineering applications. At the year of its inception, Samson’s keystone product combined a traditional braided cord with a central reinforcing core. This principle is still in use today in a variety of products within the company’s now diverse portfolio of specialized technologies.

Though the spirit of invention runs deep at Samson Rope, the motivation to innovate didn’t originate in a vacuum. Like any manufacturer, the company faces a variety of challenges in an increasingly competitive marketplace. But there are also a few quirks unique to being in the business of what Mozsgai calls “old technology.” The way he sees it, there are two primary challenges:

1. The need to reach new geographies and industries. Over the last 50 years, Mozsgai says, modern markets have encouraged global competition. “We still do all of our production in the United States, which is unusual for a big commodity product like ours,” he says. “But it’s a challenge because we now have to compete with manufacturers coming out of less expensive local markets.”

2. The need to differentiate. “Another important challenge is figuring out what can we bring to the table, besides just rope,” explains Mozsgai’s colleague Steve Czupryna, a Quality Process Engineer for Samson Rope. Czupryna explains that Samson strives to differentiate itself as a service provider, rather than just a commodity producer.

Testing and evaluating new designs with data-driven experimentation

Their most formidable R&D challenge to date? One of Samson Rope’s most innovative new products is K-100, the first synthetic fiber rope to be certified for use on industrial cranes. It all began with the recognition of an opportunity; no rope maker had ventured into the crane industry before. “So we first had to understand what happens in the field, the conditions that the ropes would be under,” recalls Czupryna. The next step was to take those factors and design a prototype.

New product design requires a huge amount of testing with Samson’s mammoth crane simulator – a fully instrumented, programmable machine that was built in-house and can run unattended for hours, simulating all the types of operations that take place on a real crane site. “A lot of times, what we have a hard time predicting are secondary characteristics; for example, how well the rope spools onto a winch,” Mozsgai explains. “If we have half a dozen variables that go into the rope design, how will we know which combination of variables will produce something that spools really well?”

This is where a design of experiments (DOE) approach comes in; a targeted, data-driven experimentation plan helps Mozsgai and Czupryna
Streamlining quality control processes helps reduce waste

“One of the things we’ve been able to do with JMP is to transform our thought process from a discrete world into a more continuous time-scaled world,” Mozsgai says. Take, for example, the process by which the team tests component material quality. By looking at the data in aggregate over time, engineers can tell which suppliers are most consistent – and consistency is gospel in the rope-making business, where Samson’s products are only as strong as their component fibers allow.

Therein lies another challenge: The best way to quality-test tensile strength is ultimately to destroy the sample product, and that process can be both expensive and wasteful. “You run into this fundamental sampling limit,” Mozsgai says. “It’s not economically feasible to have a very, very high sampling rate because the more we sample, the more we waste. We have a direct material cost to our sampling.”

Fortunately, JMP enables them to build statistical models that help extrapolate test data and gain insight into products that have not been subjected to break-point testing. “We’ve been able to use JMP to create some pretty slick models,” Mozsgai says. “By lumping our relatively small sample sets together, and interpreting them properly, we can effectively reduce the total number of test runs they must perform, thereby also reducing the overall cost of experimentation. With so many factors to account for, the team relies on JMP® software from SAS to explore and exploit multifactor opportunities through a suite of interactive DOE applications. “Once I started using JMP, there was no comparison,” Mozsgai recalls. “The attractive part [about JMP] really is the approach to workflow. It’s not a toolbox,” Czupryna says. “Minitab is a statistical toolbox; JMP is not. … it gets people thinking, saying, ‘Hey, how about if we slice and dice this data a different way?’ It’s this workload that we find to be incredibly valuable as opposed to the toolbox approach.”

Catalyzing a culture change

Perhaps the most valuable aspect of Samson’s recent transformations, however, isn’t hiding in the data. Rather, it’s the profound cultural sea change that more interactive data analytics has brought with it. Czupryna explains: “JMP process capability, for example, has changed the way (I), the quality group, the production supervisors, even production operators understand the distinction [between the voice of the process and the voice of the customer]. It used to be ‘I’m in spec, I’m good.’ Now, they say, ‘Well, I’m in spec, but am I in control?’ Ah, now we’re making progress.”

This kind of critical thinking is valued at all levels of the organization. So when quality technician Canh Khong became concerned about the underutilized brainpower of Samson’s frontline plant operators, he sought a way to improve morale by bringing everyone into the decision-making process. What Khong saw in JMP was a powerful yet accessible tool that could empower operators to not only think creatively about ways to improve measurement and data quality, but also to understand causal relationships within the manufacturing process. And share critically important insights with engineers to make processes better.

“We got people thinking,” Czupryna says of this effort, which later became the subject of a joint conference paper he presented together with Khong. “By turning people into statistical thinkers and data visualizers and abandoning Excel spreadsheets, we’ve gotten people curious about things. They’re abandoning the daily grind, putting their thinking caps on and contributing to continuous improvement. "JMP equips us to study things that we took for granted for 140 years. We’ve challenged a lot of status quos and a lot of entrenched habits, and JMP has helped us accelerate that process.”

Solution

Respond proactively to new market opportunities with advanced analytical methods in JMP®. Maintain high-quality performance by using process data to drive decision making.

Results

JMP has provided Samson with invaluable new process knowledge. A culture change within the organization means all personnel, from engineers to operators, are now contributing to continuous improvement.

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