MEP National Network™

MONTANA SUCCESS STORY

CUE THE FIREWORKS: ENGINEERING COLLABORATION DRIVES AUTOMATION INNOVATION AT PYROTECHNICS FIRM

ABOUT STAGE FX. Where can you find an ideal location to create and manufacture high-grade theatrical pyrotechnics? If you ask the team at Stage FX, the answer is Columbus, Montana, population under 2000. This high-desert town offers not only plenty of space but also the perfect low-humidity climate for working with moisture-sensitive chemicals. It's here that Stage FX founded its business in 2001 and began creating high-quality, reliable – and spectacular – pyrotechnics for the indoor entertainment industry (think professional sporting events and rock concerts). To expand their technical capabilities and production capacity, the company moved into a 240-acre manufacturing facility in 2015 that includes a state-of-the-art laboratory and an indoor testing facility. Stage FX's team of 25 employees now designs and produces devices for customers worldwide.

THE CHALLENGE. Stage FX prioritizes high standards of quality and safety for its products and its work environment. Starting in 2022, the company began exploring automation options that could address safety and ergonomic needs while maintaining throughput. For example, the company president, Lyle Salmi, identified assembly areas where employees reported fatigue after production runs, so he sought assistance in developing equipment design options that could reduce or eliminate stressful or difficult assembly tasks.

MEP CENTER'S ROLE. Stage FX partnered with MMEC Business Advisor Lane Gobbs to review production processes and identify design and automation opportunities. The first project automated steps in a soldering process. Gobbs, a mechanical engineer, designed and built a custom fixture for a soldering machine to hold workpieces. Using CAD, he created 3D models, manufacturing drawings, and assembly drawings. He then machined the custom components, assembled the system, and helped integrate it into the soldering machine. The design improvements eliminate repetitive manual steps for employees and enable quick-change tooling for enhanced throughput.

In subsequent projects, Gobbs helped connect the company with engineering assistance from the Montana State University College of Engineering capstone program, in which teams of engineering students tackle a one-year special project for a business and develop a custom solution. Stage FX hosted three capstone projects: the first team designed a device for a beveling machine that prepares the paper tubes the company packs with pyrotechnics. The device aligns and feeds the tubes into an automated drill press. The second team designed and fabricated a device that connects the pyrotechnic control wires to prevent detonation during shipping and handling, a process called shunting. The third developed an autodrill system for gerbs, a specialty firework that produces jets of sparks.

With MMEC's assistance, StageFx was able to access hands-on design and engineering support from both an MMEC manufacturing specialist and university design teams. The results were custom, cost-effective enhancements that enable StageFx to expand its use of automation to meet its throughput, quality, safety, and ergonomic goals.

RESULTS

- **$12,000** increased/retained sales
- **2** increased/retained jobs
- **$60,000** in new investment
- **$24,000** in cost savings

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MONTANA MANUFACTURING EXTENSION CENTER

"The equipment we work with is very specialized. We can't just go out and buy it, so upgrades require engineering. The devices developed by Lane and the student teams were improvements that we could plug right into our production processes."

-Lyle Salmi, Company President