

CUSTOMER SUCCESS STORY

ENGINEERING CELEBRITY JOE GRAND USES ALTIUM DESIGNER TO CREATE “CRAZY” BUT CHALLENGING ELECTRONICS DESIGNS FOR POPULAR TV SHOW



Joe Grand has been involved with computers and electronics since he was seven years old - back in the early 1980's, when growing up with an Atari 400 home computer was enough to set a curious young mind on the path toward electronic engineering.

He began building projects out of Popular Electronics magazine and hand-etched his first circuit board when he was 13, using ferric chloride and rub-off PCB symbols purchased at Radio Shack.

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Joe Grand

Joe went on to earn a degree in computer engineering before founding his own company, Grand Idea Studio, a product design, development, and licensing firm that specializes in creating consumer and household devices, and modules for electronics hobbyists.

The Challenge

In 2008, Joe received a phone call that would temporarily alter the direction of his life. The Discovery Channel was creating a new engineering entertainment program, Prototype This, and the producers wanted Joe to appear in it.

The premise of Prototype This involved four real-life engineers who were tasked with creating a unique, novel, and often wacky prototype each episode. This “dream team”

would use their skills in mechanics, electronics, materials science, and software engineering to design, build, and test the prototype as cameras recorded the team's activities.

When the producers approached Joe and asked him to join the show as co-host and engineer in charge of custom electronics design, control, and interfacing, he wasn't sure he wanted to be in front of a camera. But Joe's wife soon convinced him. “She told me ‘Don't be a wimp! This is the perfect opportunity to share engineering with the masses.’ I eventually agreed.”

The foursome made 13 episodes of Prototype This. Joe recalls, “We ended up building ridiculously crazy contraptions like a mind-controlled car; a truck that could elevate itself to drive over traffic and move in any direction; giant, ten-foot boxing robots; a computer-controlled water slide simulator; and high-tech fire-fighting gear.”



But Prototype This was first and foremost a TV show. The production schedules and timelines trumped the more thoughtful engineering processes normally required to design and build complex products. “Producing the show turned out to be a difficult and frustrating process, as we not only had to be on-screen television hosts, but we also had to actually engineer, design, build and test the prototypes.”

Most episodes were allotted only two weeks from concept to finale. Much of the team's time was spent in front of cameras, traveling, or doing interviews. In reality, Joe typically had just a few days to complete the electronics portion of the project. “I usually had to go from hand-built breadboard to finale-ready circuit board in a matter of days.”

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The Solution

This is where Altium Designer came in. Joe was already familiar with the Altium suite and knew it was an easy-to-use tool that made fast work of designing both simple and complex circuit boards. "I needed a professional design suite that wasn't limited in its capabilities and would allow me to create designs very quickly. When we were putting together our dream lab for the show, it was an easy decision to go with Altium Designer."

Because much of Joe's time was scheduled for production, he could not afford to waste time on a design resource that might be hit or miss. "We had to rely on the tool. That's one of the reasons I wanted to use Altium. Whatever design we built had to work the first time, so we had to use really quick, reliable tools."

Besides speed and dependability, Altium Designer also offered a fully unified, efficient system to ensure that data was synchronized between design domains. "The Altium design integration features were a big help," says Joe, "because I could switch back and forth between schematic and PCB views, and know that changes that I had made would be reflected in all the levels of design."

It was this ability to synchronize all elements of the design that made Altium Designer so valuable during the filming of Prototype This—it removed the potential for error. "The integrated design features helped me create my systems quickly, and I could trust that they would work right off the bat," says Joe. "And given our ridiculously tight production schedules, we just didn't have time for mistakes."

The Results

Perhaps Joe's favorite example of the tool suite's value came in the episode called "Traffic Busting Truck." Here, the team took on the challenge of retrofitting a pickup truck to elevate itself and drive over traffic. The truck used omnidirectional wheels and gigantic, hydraulically-powered steel legs, and it could either move autonomously or be remotely controlled with a video game controller.

"It was a futuristic, crazy looking vehicle," says Joe, "and it was very complicated in terms of electronics and mechanics." Joe designed a circuit board that handled sensor inputs, controlled the hydraulic system, generated the correct signals to move the wheels, and interfaced with a wireless PlayStation 2 controller. "It was a crazy, complicated build, and to make it worse, the PCB had to be designed, fabricated, and assembled in two days in order to meet our filming schedule. There was no room for mistakes."

Using default installs and auto-routing in Altium Designer, Joe was able to quickly complete the schematic capture and PCB design, which was then sent out for single-day fab. When the board came back, it operated exactly as Joe had intended and the film shoot came off without a hitch.

"It was a great testament to the reliability and power of Altium Designer," says Joe. "We had no room for error, and we pulled it off in a single design iteration."

Prototype This is no longer in production, though it's still airing around the world and episodes can be found on the Internet. Joe is away from the camera eye and back to being an independent electrical engineer. He still uses Altium Designer.

"The success of my projects can be partially attributed to Altium Designer," says Joe. "The integration of schematic capture, footprint creation, PCB layout, and document generation saves me hours, if not days. I can focus on designing products instead of worrying about potential errors generated by using inferior tools or by trying to interface multiple, discrete tool sets."

And Joe is passing Altium enthusiasm on to the next generation. He taught his son to solder at 3 years of age, and now the two are designing boards together using Altium Designer and a T-Tech PCB prototyping machine. "There's no need for him to use any other design tool," says Joe. "He's going to use Altium. It's his birthright."

ABOUT ALTIUM

Altium Limited (ASX:ALU) creates electronics design software. Altium's unified electronics design environment links all aspects of electronics product design in a single application that is priced as affordable as possible. This enables electronics designers to innovate, harness the latest devices and technologies, manage their projects across broad design 'ecosystems', and create connected, intelligent designs.

Founded in 1985, Altium has offices in San Diego, Sydney, Karlsruhe, Shanghai, Tokyo, Kiev, with value added resellers worldwide. For more information, visit www.altium.com. You can also follow and engage with Altium via [Facebook](#), [Twitter](#) and [YouTube](#).