

Case study

Motus Motorcycles

Reinventing a new breed of motorcycle with HP Z Workstations



Industry

Manufacturing

Objective

Design new performance-oriented, distinctly American motorcycle

Approach

Motus Motorcycles standardized on SOLIDWORKS running on HP Z Workstations

IT matters

- HP Z Turbo Drive doubles the performance of SATA SSDs to accelerate boot up and input/output functions

Business matters

- HP Z Workstations enable stable, reliable 3D modeling and review to enhance productivity
- Eight-core Intel® Xeon® processors, combined with up to 64 GB RAM and NVIDIA® Quadro® professional graphics, enable real-time interaction with large, complex 3D models
- HP DesignJet enables large format printed schematics with highly professional results



“We certainly couldn’t do what we do today without having excellent technology, and our HP Z Workstations are the foundation of it all.”

– Brian Case, Vice President and Design Director, Motus Motorcycles



When two motorcycle enthusiasts decided to launch a brand new American motorcycle company, they set out to create something entirely distinctive. High performance design technology provided a foundation to create the new breed of American motorcycle from the ground up to compete with large, established companies. They standardized on HP Z Workstations for design and design-to-manufacturing systems, leading to a successful product launch.

In search of a new American motorcycle

Motorcycle buddies Lee Conn and Brian Case sat down one day after a long ride and imagined aloud what their ultimate motorcycle would be like. They wanted a bike with the spirited performance of some European makes — BMW, Triumph and Ducati — but imbued with a distinctly American muscle culture.

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“In my mind, there were analogs in the car world — something like a Z06 Corvette,” recalls Case. “So what we envisioned was a kind of two-wheeled Corvette.”

The bike they envisioned didn’t exist. So they set out to build it.

A year later, in 2008, the duo launched Motus Motorcycles in Birmingham, Alabama. Conn, who became president of the company, brought a background in aircraft manufacturing. Case, who is vice president and design director, brought product development experience, including design of the Confederate Wraith motorcycle.

Case began designing Motus’ first bike the old-fashioned way — with a sketchpad. He knew he wanted to create a new American bike, a departure from the classic American cruiser with design cues from the first half of the 20th century.

He started, interestingly enough, by concentrating on a new engine design. Being a self-described “car guy”, he wondered what it would be like to develop an engine based on an American muscle car. So he started sketching V-shaped designs based on small-block, hot rod engines. He zeroed in on a V4 design that would have a distinctive, lopey cam sound and distinctive exhaust note. Today that MV4 “Baby Block” engine is the heart of every bike that rolls out of Motus’ factory.

Next, he worked on the design of the bike itself. He wanted a conceptual design that would stand up over many years, with classic, subtle lines. What emerged was the Motus MST, a uniquely American sport-touring motorcycle.

Built with professional workstations

Making the transition from design sketches to the world of CAD, Motus initially got by with consumer grade PCs. But as Case moved deeper into the design process, it became clear to him that the company needed more powerful technology in order to accelerate product development.

“When we first started out, it would take forever to do any complex assembly on our consumer computers,” Case recalls. So he committed to a big technology upgrade: HP Z Workstations running SOLIDWORKS software.

“I’m a big fan of HP products. We have a handful of high-end HP Z Workstations, and we’re doing really well with those systems. They’ve made a huge difference in our productivity.”

Case uses an HP Z230 Workstation for engineering and industrial design. Design engineer Tom Vaeretti works on an HP Z420 Workstation equipped with the HP Z Turbo drive. The company’s first product, the Motus MST, has 1200 individual components, each one modeled in 3D using SOLIDWORKS. Using the HP Z Workstation, Case says he or Vaeretti can easily maneuver in the massive file.

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“That’s why we chose HP Workstations. I’ve come to appreciate the reliability. It’s the key to working productively, day in and day out,” Case says. The Z420 Workstation features an 8-core Intel® Xeon® processor and up to 64 GB RAM. “You can never have too much RAM or processing power when you’re doing 3D design.”



Adds Vaeretti, “When I open the whole motorcycle model in SOLIDWORKS, I can rotate it, see it with no artifacts, and work with it in real time. With other computers, if you’re rotating the model, you might click on something and find that the video card hasn’t updated, so you’re actually not clicking where you think you are in the model. So you have to go back and start over. I don’t have that problem with HP Workstations.”

The HP Z420 Workstation’s Z Turbo Drive is a PCI-connected solid state drive that dramatically reduces boot times and input/output times. “My HP Z Workstation boots up and retrieves data superfast,” Vaeretti continues. “From the Z Turbo Drive, it takes about 2-3 minutes to load the whole 2.6 GB SolidWorks file. It’s at least twice as fast as my old hard drive.”

Workstation speed matters

Speed is important, of course. It means being able to design more quickly. And for a startup company like Motus, that means getting their first product to market faster.

In fact, Case says, the design technology that includes HP Z Workstations has enabled Motus to develop at such a rapid speed, and in new ways, that just weren’t possible even a few short years ago.

For example, he now leverages 3D printing as a prototyping process to speed up CAD design. “That’s something that just wasn’t available for small companies like ours in the past. But in the last few years, the technology has trickled down. And that means we can

prove out a design more quickly and move the development process along.”

One example is the intake design of the MV4 engine. After an initial prototype of the engine, it became clear the throttle body needed to be changed. “We had an existing model in CAD that we needed to reconfigure and quickly make into a prototype, and then test the engine,” Case recalls.

CAD changes are made in a few days. Next, the team produces the part on the 3D printer. In this example, within a week it had a 3D printed model in Bluestone, a very dense high-temperature material that could be integrated with metal parts for testing.

“In a couple of weeks, we had gone from a design idea to a working, running mechanical assembly on the engine,” Case says. “The same project in the past would have taken at least four times longer. You would have to build it in material capable of withstanding 400-500 degree temperatures — probably aluminum. It would take several weeks for a competent machine shop to fabricate.”

Tech enhances design

Case explains that having the horsepower of an HP Z Workstation has an important design impact. “When we started with consumer grade PCs, the limitations can impact your decisions. If you’re in the planning stage of developing something complex, you might say, based on the technology we have, it’s going to take this long to do it, so let’s try something simpler.

Customer at a glance

Hardware

- HP Z230 Workstations
- HP Z420 Workstations
- HP DesignJet T520 printer
- 3D printer
- Coordinate Measuring Machine (CMM)
- HP Z24i IPS Display
- HP Z Turbo Drive
- HP ZBook 15 Mobile Workstation

Software

- SOLIDWORKS
- Adobe® Creative Suite
- Alias Sketchbook
- Faro Cam2 Measure 10

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Even in manufacturing, the company’s design technology plays an important role. Once a design has been finalized, the SOLIDWORKS file for a part or assembly is sent to a fabricator. The fabricator produces a few parts and sends them back to Motus to be approved.

At that point, Case uses an HP ZBook 15 Mobile Workstation to drive a coordinate measuring machine (CMM). The CMM is used to scan the part castings and compare them to the CAD model, as part of a final quality assurance check prior to final assembly.

When the design team needs to enlarge schematics beyond the size of a computer screen, it looks to the professional quality print output of the HP DesignJet T520 printer. “I am amazed with how precise this professional-level printer is, especially when printing full-scale drawings, and having reliable technology you can count on is extremely valuable to our design team,” says Case. While the team may do real

color renderings from time to time, in addition to high resolution photo and poster enlargements, they primarily use it to enlarge engineering drawings and wiring schematics. “It’s extremely helpful to see the real color renderings of components on the bike,” he says. “That detail supports us moving quickly to the next prototype,” says Case.

From dream to reality

Today Motus offers two versions of its all-American bike: the original MST, and the premium upgrade MSTR with a 12.5% bump in power from additional brake horsepower (bhp) and torque. The company caters to experienced sport bike riders seeking to unleash the performance of the American V4 engine, enjoy the rush of the road and command comfort on longer rides.

Conn and Case have realized their dream of creating a new American motorcycle. Now the challenge is to keep the dream alive by continuing to innovate so Motus Motorcycles will attract a continuing stream of new buyers.

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“I spend six hours a day entrenched at my HP Z Workstation working to enhance our products,” Case says. “It’s integral to my productivity. We certainly couldn’t do what we do today without having excellent technology, and our HP Z Workstations are the foundation of it all.”

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