BUB Enterprises Inc.

BREAKING THE WORLD'S FASTEST MOTORCYCLE RECORD WITH SOLIDWORKS



CHALLENGE:

Design, manufacture, and test a powerful, aerodynamic motorcycle that is capable of capturing the world motorcycle speed record.

SOLUTION:

Utilize SolidWorks design software to develop a custom motorcycle engine and body parts in 3D.

RESULTS:

- Produced world's fastest motorcycle
- Reduced development and testing costs
- Optimized vehicle components for performance
- Developed world record-setting motorcycle with five-man team



Ever since he visited the Bonneville Salt Flats in Utah as a kid, Denis "BUB" Manning dreamed of building the fastest motorcycle on earth. Manning's team at BUB Enterprises Inc., where the motorcycle enthusiast serves as CEO and president, achieved that goal on Sept. 24, 2009, when the *SEVEN* streamliner established the new motorcycle land speed record of 367.382 mph.

Manning's passion for speed has nothing to do with riding motorcycles and everything to do with designing, manufacturing, and building them. After decades working with motorcycles through BUB Enterprises, a renowned manufacturer of high-performance motorcycle exhaust systems, the world record holder gained the expertise and assembled the talent that has enabled him to design and build seven of the twelve fastest motorcycles in history.

In the time since he first set the motorcycle land speed record in 1970, Manning and his BUB team have traded the record with competing teams. Each time the record has fallen, the BUB team has come up with a new motorcycle streamliner design to retake the title. As high-performance streamliner designs grew increasingly sophisticated and more complex, the BUB team realized it needed to utilize advanced mechanical design, simulation, and manufacturing technologies to keep pace with its competitors.

"Until recently, going really fast basically required money," Manning explains. "Breaking the record used to be pretty much, 'Gentlemen, start your checkbook.' Now it's, 'Gentlemen, start your gray matter.' The designs that have a legitimate shot at speeds over 350 mph require a whole new level of engineering know-how and technology."

When the BUB team began developing the *SEVEN* streamliner, Manning and collaborator Joe Harrelson, a retired mechanical engineering professor, decided to leverage 3D design, simulation, and manufacturing technologies to build a motorcycle that could carry a man over 350 mph.

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> Denis Manning CEO and President





Using robust SolidWorks design tools, BUB was able to minimize expensive rounds of prototype testing and improve performance.

The BUB team selected the SolidWorks[®] 3D design system because it is easy to use, includes large-assembly tools, and provides 3D visualization capabilities, which help the team tackle its many technical challenges. The team also values the integrated SolidWorks Simulation application for stress and vibration analysis and SolidWorks eDrawings[®] software for design communications.

Designing the world's fastest motorcycle

In addition to setting the record in 2009, the BUB *SEVEN* streamliner was the first motorcycle to travel over 350 mph in 2006. BUB's achievement is the culmination of years of design work and development, all of which the team did in the SolidWorks environment. One of the important innovations for the motorcycle was a custom-designed V-4 motor, an effort that Harrelson spearheaded.

"I first used SolidWorks at the California State University at Sacramento," Harrelson recalls. "The software is very intuitive, and gave us the ability to model and optimize the vehicle's components before building them."

"Using a tool like SolidWorks, our five-person team was able to do things on a worldclass level," Manning notes. "Having the fastest motorcycle on earth means a lot to me, and SolidWorks allowed us to develop the streamliner cost-effectively. We were able to do things I would never have imagined back when I started."

Simulation to minimize testing

Using the stress and vibration analysis capabilities of SolidWorks Simulation software, the BUB team will be able to minimize expensive rounds of prototype testing and improve vehicle performance. These studies will enable the team to reduce stress and vibration in the streamliner.

"FEA (finite element analysis) modeling is the key to doing this without breaking the bank," Manning maintains. "SolidWorks Simulation tools not only duplicate the information provided by testing, but also provide additional insights that testing might miss, such as the fact that the vehicle's wheels will expand by a certain amount at higher speeds."

Pushing the 400 mph barrier

Because BUB set, lost, and re-established the speed record within a three-year period, Manning plans to keep going. He says he wants to continue development so that he can break BUB's own record. "My goal is to go 400 mph," he stresses.

"SolidWorks software is what lowers the barrier for us to do this," Manning adds. "Because of the design and simulation tools that we have available, we no longer have to build and smash the bike a few times, or blow an engine, before we are ready for a record attempt. We know the numbers, we know how to do this, and we will continue our work to set a new record someday."



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