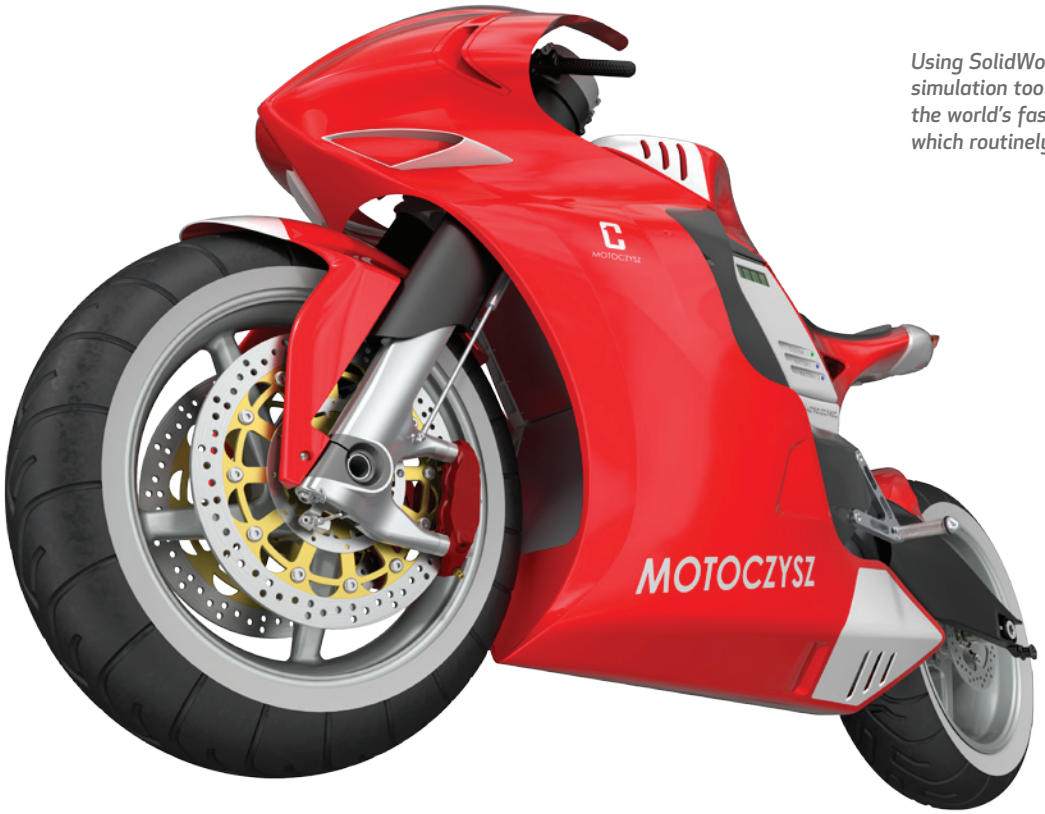
MOTOCZYSZ

Driving design of the world's fastest electric racing motorcycle with SolidWorks



Using SolidWorks design, analysis, and flow simulation tools, MotoCzysz has developed the world's fastest electric racing motorcycle, which routinely pushes speeds of 200 mph.

Motorcycling has been an important part of the Czysz family for nearly as long as motorcycles have existed. It's no wonder that MotoCzysz founder Michael Czysz continued a family tradition established by his great-grandparents by founding a company that builds the world's fastest electric motorcycle.

Czysz founded MotoCzysz in 2006 to develop American-made motorcycle racing contenders. The company soon focused on creating the electric drives and technologies that push the limits of what an electric motorcycle can do. Since introducing the E1pc prototype in 2009, the Oregon-based innovator has produced a series of electric bikes that drive the top-winning race team on the electric motorcycle racing circuit. The MotoCzysz E1pc model routinely pushes 200 mph and was the the first American-manufactured motorcycle to win the Isle of Man Tourist Trophy, the most prestigious event in motorcycle racing, since Oliver Godfrey won the 1911 Tourist Trophy on an American Indian bike.

Czysz admits to having a "personal connection and emotional attachment" to the product, which is inspired by his vision for electric-powered vehicles. "To transform my initial ideas and early prototypes into a polished, top-performing bike required a high level of engineering and integration," Czysz explains. "There are important design elements that remain my domain, but I have to push these ideas through engineering. For that, I need the assistance of my skilled engineering team and have to make sure that they have the tools they need to succeed."

Lead Motorsports Engineer Nick Schoeps says that designing the world's fastest electric racing motorcycle demands a robust 3D design environment that supports both engineering and style requirements. "MotoCzysz needed one integrated package to support the mechanical aspects of the design, including simulation of design performance, and incorporate design aesthetics through advanced surface modeling," Schoeps explains. "We found the right package for satisfying both requirements with SolidWorks®."

Challenge:

Accelerate, optimize, and stylize development of the world's fastest electric racing motorcycle.

Solution:

Implement SolidWorks Professional design, SolidWorks Premium design and analysis, and SolidWorks Flow Simulation computational fluid dynamics (CFD) analysis software.

Results:

- Cut motorcycle weight by 20 percent
- Created industry-leading energy dense battery packs
- Improved design aesthetics
- Supported top-winning electric motorcycle race team

SOLIDWORKS

MotoCzysz implemented SolidWorks® Professional design and SolidWorks Premium design and analysis software after completion of its first prototype, and has since added SolidWorks Flow Simulation computational fluid dynamics (CFD) analysis software. Schoeps says the ease of use and complete integration of applications made the SolidWorks platform the obvious choice.

"It's very powerful when you have access to all of the design and engineering tools that you need in a single environment," Schoeps stresses. "You don't have to deal with different systems or data conversion or translation issues. We're striving to create motorcycles that will go as fast as possible for as long as possible. With SolidWorks, we can take that same approach to our design and engineering work."

Simulation reduces weight while maintaining strength

Using the simulation capabilities of SolidWorks Premium, MotoCzysz engineers can analyze the bike's overall weight to maximize speed, balance, and performance, while preserving an acceptable factor of safety. Simulation tools have enabled the company to reduce the overall weight of the MotoCzysz E1pc by 20 percent while maintaining the strength required to ride safely at 200 mph.

"Weight is our most important consideration—in terms of speed and efficiency as well as how it affects balance," Schoeps notes. "With SolidWorks simulation tools, we can optimize where we can add and shave material. This allows us to reduce weight without impeding safety or performance."

Aesthetics through advanced surfacing

The MotoCzysz E1pc is one of the coolest-looking motorcycles that you'll ever see. Some of the bike's fine lines and sleek contours are for aerodynamics, which the company plans to optimize with SolidWorks Flow Simulation software. However, most of the organic, curvy shapes that are part of the bike are intended to integrate the components and systems of the motorcycle in an aesthetically pleasing design.

"Surfacing is where art comes into play," Schoeps explains. "With SolidWorks surfacing capabilities, we can add Michael's artistic vision to our engineering and create a bike that is a true work of art. For example, the batteries that power the bike are no longer tacked on as an afterthought. We've reduced the number of batteries required by more than 90 percent, and have made the battery packs an integral part of the motorcycle design."

Innovating technologies with future implications

SolidWorks is also helping MotoCzysz adapt many of its patented technologies for other applications, such as for use in passenger cars. "Our work on the electric motorcycle has resulted in important innovations in power systems technology," Schoeps points out.

"Our patented cooling system and drive line certainly have applications for automotive drive systems," Schoeps continues. "SolidWorks has allowed us to develop some really great technology that will power the electric cars of the future."

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Nick Schoeps
Lead Motorsports Engineer

SolidWorks solutions have helped MotoCzysz produce a series of electric motorcycles that drive the top-winning race team on the electric motorcycle racing circuit.

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