

## CERO DESIGN

### Case Study



Photo courtesy of CERO Design

#### Challenge

Spanish design and engineering firm CERO Design works with composites to produce the lightest, fastest superbikes. It needed an advanced composites engineering capability to enhance its design-to-manufacturing process and keep abreast of increasing customer and industry demands around complexity, performance and quality.

#### Solution

CERO Design adopted the 3DEXPERIENCE platform and CATIA for the design of composite structures, covering full definition from concept to engineering. Dedicated functionality integrates structural,

assembly and manufacturing requirements early in the design phase and supports collaboration between cross-functional teams.

#### Benefits

Using CATIA, CERO Design can optimize the definition of complex structures, simplify the layering process, anticipate issues upfront to avoid trial and error on the shop floor and solve complicated manufacturing scenarios. With predefined layouts, the company is able to reuse designs and knowledge from previous projects and reduce the number of physical prototypes from fourteen to two.



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– Cesar Rojo, Founder, CERO Design

## LIGHTER, STRONGER, FASTER

Ultra-light, strong and resilient, composites are an ideal material for producing lightweight structures with tremendous performance capabilities. However, designing and making production-ready composites parts at scale is a complex and expensive process that requires special expertise.

With his team at CERO Design, Cesar Rojo knows what it takes to create the lightest possible structures with maximum stability. The former World Cup mountain bike downhill racer founded the Spanish design and engineering firm in 2010, bringing his racing experience and knowhow into the design world to help bike brands including Mondraker develop cutting-edge frame designs that deliver both in terms of what Rojo would want as a racer and a customer. Today, CERO Design has a global reputation as a specialist in lightweight development – they say their DNA is made of carbon fiber – and is responsible for some of the most groundbreaking bike and suspension designs in the mountain biking industry over the past decade. Counting the most high-profile bike and automotive brands in the industry among its clients, the company has also built its own UNNO superbike range from scratch. Each frame is handcrafted from sheets of premium carbon fiber with a pioneering “long and slack” geometry that has since been adopted industry wide.

Rojo explained that UNNO was created from a desire to implement the latest technology without restrictions and put all of CERO Design’s expertise into making one of the lightest production frames.

“For us, it was about learning,” he said. “We wanted to learn about composites. It was a personal dream; it was never meant to be a big brand. It’s basically a project where we have learned a lot and it has helped us with other activities in the company. With customers, we have limitations, particularly in terms of cost and time. But with UNNO we didn’t, and we could really bring our dreams to life.”

Blending the very best materials with the most innovative design features, UNNO bikes are known for their premium woven cloth carbon frames and long geometry for maximum energy absorption, optimal balance and greater stability. Each model takes around 200 hours to construct and the entire production process is handled by the CERO team in house.

“We’ve really fine-tuned the geometry and suspension and have total freedom with the way we take care of all the details,” Rojo said. “It’s more expensive and takes longer to build our bikes ourselves, but we like the full control this approach gives us.”

Working with composites requires dedicated software and machines, and a whole new way of working. This was the key driver for implementing **3DEXPERIENCE®** and its CATIA composites module.

“The main reason we moved to the **3DEXPERIENCE** platform and CATIA was for the sophisticated composites functionality,” Rojo said. “Our existing CAD technology didn’t have any composites modules so when we started doing more in this area, it was very important for us to have this capability. We needed software that could help us make the ply books, layups and integrate with simulation. Even though we looked at other solutions on the market, CATIA was the most powerful and user friendly and offered all the capabilities we needed.”

## COMPOSITES CAPABILITIES

CATIA brings together a complete set of process-oriented functions that allow CERO Design’s designers and engineers to imagine, create, simulate and manufacture composite structures on a single platform. This dedicated environment for the design of composite structures puts robust surface modeling tools in designers’ hands. These tools help them to prepare composites data for manufacturing, access advanced feasibility analysis with fiber simulation for hand layup and fiber placement, generate flat patterns, and consider structural, assembly and manufacturing requirements early in the design phase.

“It was the composites functionality in CATIA that we were really excited about,” Rojo said. “If we want to do composites very well and be ahead of the competition, this was the only direction we could take.”

CERO Design worked with local Dassault Systèmes business partner CADTech to implement **3DEXPERIENCE**. From start to finish, the project took three months, including training to use the software.

“We’ve been working with CADTech for around five years since we bought our first CATIA V5 license,” Rojo said. “From that point on, they’ve been really helpful and truly looked after us.”



Behind and in front of UNNO bike is a small and dedicated team led by Cesar Rojo, engineer and accomplished ex-World Cup downhill racer.



When we implemented **3DEXPERIENCE**, they made sure that the team all knew how to use the software so we could really take advantage of it. The company is a CAD and PLM specialist and really understood our composites requirements. They customized the training for us, and any time we had an issue, they were there on the phone. It was a great experience."

Some of CERO Design's team were already CATIA users, so were able to get up and running on the software very quickly.

"We had a few team members that were already fluent in CATIA, so it was really plug and play for them," Rojo said. "They didn't know the composites module, but they learned pretty fast."

Equipped with this technology, the team at CERO Design now have the tools they need to advance their composites capabilities. This is critical for the company as it focuses more on using carbon fiber in future projects.

### SIMPLIFYING COMPLEX PROCESSES

Using CATIA, CERO Design has been able to switch from manual to digital design and development of its carbon fiber frames and other composites projects. "The biggest business impact of the software so far has been simplifying the layout process," Rojo said. "Before, we were doing it by hand – making the patterns, scanning and tracing them all out individually before cutting them. Now that we can use the software to do all this makes the process much quicker. It's been a game changer."

Critically, CATIA allows designers to try out new layouts digitally before committing to a physical prototype. It also means that the team don't have to start from scratch each time they want to rework a design or evolve it.

"Every time we wanted to try out a new bike design for a new evolution or change, either we had to scan and trace everything or decide to start again from the very beginning, which was very time consuming," Rojo said. "Now, we have a lot more control. We've started doing a lot of simulation with composites and can now define the layout in the computer and generate the right flat patterns. It brings a lot to the table already having it defined from the start. It means that we can have the first five/six iterations done completely digitally, between simulation and CAD. Then once we have a layout we're happy with, we do the first physical prototype."

Backed by the **3DEXPERIENCE** platform, CERO Design can now easily manage the vast amounts of data related to each bike model and the hundreds of plies generated, from design to manufacturing. The team benefits from the ability to check manufacturing feasibility and consider constraints before entering production. With the ability to design in context, everyone can ensure that each part meets structural constraints, and can be manufactured and assembled. This helps to reduce fabrication cycle times, keep composites development, and build costs under control.

"Before, we had to create a lot more physical prototypes, which is a very time-consuming and expensive process," Rojo said. "Making changes was really slow too. The difference is really day and night since we've started using the composites module. Using CATIA, we've been able to significantly cut down on the number of prototypes we need to make. The latest bike we worked on only required two prototypes, compared to the 14 or 15 prototypes that we'd usually make."

#### More about the solution:

Perfect Consumer Product is the answer for home and lifestyle large and mid-market brands that face the challenges inherent with satisfying a wide diversity of consumer needs by integrating all design, engineering and production disciplines, including suppliers, in a single collaborative environment based on the 3DEXPERIENCE platform.

#### Benefits:

- Digital continuity from engineering to production
- Improve time to market
- Enhance product quality
- Reduce product development cost



*Top image:* Cero Design's team at work

*Bottom image:* Expert in lightweight design and engineering, Cero Design uses leading technologies for its composites parts.

### Focus on CERO Design

CERO Design is a multidisciplinary design and engineering studio based in Barcelona, delivering design, engineering, simulation, composites, prototyping and testing services in the fields of superbikes, motorbikes, motorsports, sports equipment, electronic devices and appliances. The company is an expert in lightweight design and works with new composite materials and manufacturing technologies to deliver cutting-edge products in partnership with its clients.

**Services:** Design, engineering, simulation, prototyping, consulting

**Employees:** 60+

**Headquarters:** Barcelona, Spain

**For more information:** [www.wearecero.com](http://www.wearecero.com)

### Focus on CADTech

CadTech provides CAD/CAM/CAE/PLM consultancy services and is an official value-added reseller of Dassault Systèmes technology, implementing their software across Spain and Portugal. Specializing in CAD and PLM integration, the solutions provider helps businesses effectively manage their product lifecycles, processes, projects and assets, including data simulation and management.

**For more information:** [cadtech.es](http://cadtech.es)



### INDUSTRY TRAILBLAZER

As the company continues to be at the cutting-edge of lightweight design, Rojo and his team can investigate new composites materials and construction methods confident in the knowledge that they have a powerful technology platform that can help them bring their ideas to life.

"Our customers come to us for the whole package we offer," Rojo said. "We do a great deal of research into the materials we use and then we can take advantage of our technology to deliver the most innovative result to our customers."

Looking ahead, Rojo and his team are excited about the huge potential of composites in this field as they continue to explore the potential of a new generation of carbon fiber materials and resins.

"We're doing more and more composites projects," Rojo said. "This is an area of our business that we see a great deal of potential in and will keep growing. The platform and CATIA give us a huge advantage. Other CAD software doesn't have the composites functionality or relies on a third-party plugin. This is a very powerful tool, so the idea is for us to make more and more use of it."

## Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the 3DEXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our 3DEXPERIENCE platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit [www.3ds.com](http://www.3ds.com).

