3DEXPERIENCE® Works

CALOI®

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IMPROVING THE DEVELOPMENT OF CYCLING PRODUCTS WITH 3DEXPERIENCE WORKS SIMULIA SOLUTIONS

Case Study

By adding **3D**EXPERIENCE Works product development and **3D**EXPERIENCE SIMULIA simulation solutions to its existing SOLIDWORKS installation, CALOI cut its product development costs in half, reduced errors and related scrap and rework by 50 percent, and shortened time to market by 25 percent.

DASSAULT SYSTEMES

Challenge:

Shorten design and physical prototyping cycles—while simultaneously cutting development costs—to accelerate time to market and maintain the company's leadership position in the cycling market.

Solution:

Add **3D**EXPERIENCE Works modeling, design, simulation, data management, collaboration, and communication solutions—including SIMULIA structural simulation and collaboration solutions—which operate on the cloud-based **3D**EXPERIENCE platform, to its existing SOLIDWORKS CAD installation.

Results:

- Cut development costs in half
- Shortened time to market by 25 percent
- Reduced design cycles from two months to two weeks
- Decreased errors and related scrap and rework by 50 percent

"Weight and resistance are important factors in delivering increasingly lighter and more resistant equipment. We develop and parameterize a 3D model with SOLIDWORKS, which we use for pre-interference analysis. Then, we use 3DEXPERIENCE Works SIMULIA Structural Mechanics Engineer to simulate the design and determine whether it is within required parameters—based on our norms and rules—before releasing it for production. With this approach, we reduced our design cycles from two months to two weeks, which frees up our team to design more in the same amount of time, enabling us to optimize our workforce."

— Leandro Timótio da Silva, Product Engineer

For more than a century, CALOI has been the leading manufacturer of bicycles and related equipment in South America. Founded in 1898 by Luigi Caloi, the Brazilian bike manufacturer has continually grown over the years and now produces every kind of bicycle imaginable at its development center in São Paulo and factory in Manaus, including road bikes, mountain bikes, racing bikes, urban bikes, leisure bikes, children's bikes, folding bikes, motorized bikes, and electric bikes.

CALOI bicycles were—and are—part of the daily lives of countless people, who discovered that cycling is not only about exercising and improving health, but also about smart mobility, sport, and competitiveness. The bike manufacturer strives to fulfill its mission of creating the best riding experience for every type of cyclist and leading the bicycle industry as the preferred business partner across every channel it serves.

In keeping with that commitment, CALOI set out in 2023 to find a finite element analysis (FEA) simulation solution that would help the company maintain its leadership position by reducing lengthy and costly prototyping cycles, shortening design and manufacturing operations, and accelerating time to market. According to Product Engineer Leandro Timótio da Silva, CALOI sought a simulation solution to replace its long reliance on only physical prototyping. "In the past, we spent a lot of time and money on physical tests that were carried out by a specialized company in Portugal as well as in our internal laboratories at our Manaus plant," Timótio da Silva explains.

"We are longtime users of SOLIDWORKS® CAD software, and initially were considering SOLIDWORKS simulation solutions," Timótio da Silva recalls. "That's when we learned about **3D**EXPERIENCE® Works SIMULIA® simulation tools, which run on the cloud-based **3D**EXPERIENCE platform and are fully compatible with SOLIDWORKS, and the MODSIM approach from CADWorks Brazil, our SOLIDWORKS reseller." MODSIM is a joint modeling/simulation approach to design that results in better performing designs.

CALOI chose to add **3D**EXPERIENCE Works modeling, design, simulation, data management, collaboration, and communication solutions—including SIMULIA structural simulation and collaboration solutions—to its existing SOLIDWORKS installation. The **3D**EXPERIENCE Works product innovation portfolio leverages the cloud-based **3D**EXPERIENCE platform to give customers

access to the power of industry-leading tools from Dassault Systèmes for design, simulation, manufacturing, data management, and marketing.

"The **3D**EXPERIENCE Works SIMULIA product and cloud services are far ahead of their competitors," Timótio da Silva says. "The difference with its competitors is undeniable."

SPEEDING TIME TO MARKET WITH MODSIM APPROACH

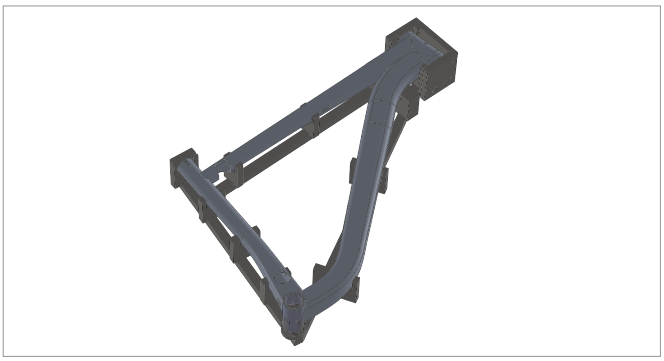
Since implementing the **3D**EXPERIENCE Works SIMULIA Structural Mechanics Engineer and Simulation Collaborator roles, and adopting a MODSIM approach to development, CALOI reduced its development cycles from two months to two weeks and decreased time-to-market by 25 percent. "Weight and resistance are important factors in delivering increasingly lighter and more resistant equipment," Timótio da Silva notes. "We develop and parameterize a 3D model with SOLIDWORKS, which we use for pre-interference analysis.

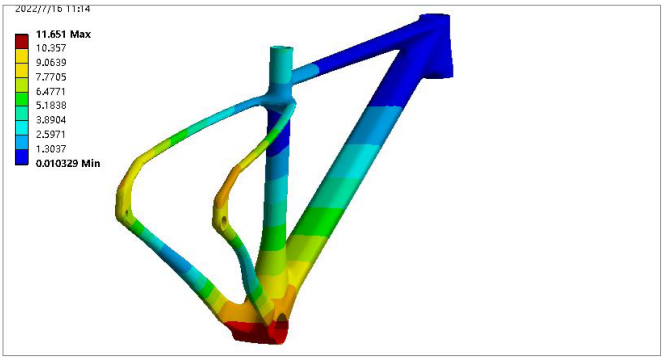
"Then, we use **3D**EXPERIENCE Works SIMULIA Structural Mechanics Engineer to simulate the design and determine whether it is within required parameters—based on our norms and rules—before releasing it for production," Timótio da Silva adds. "With this approach, we reduced our design cycles from two months to two weeks, which frees up our team to design more in the same amount of time, enabling us to optimize our workforce."

SLASHING PROTOTYPING, SCRAP, HARDWARE, AND REWORK COSTS

In addition to compressing design cycles and shortening time to market, the implementation of **3D**EXPERIENCE Works SIMULIA simulation solutions has helped CALOI reduce development costs related to its former physical prototyping process, as well as scrap, hardware, and rework costs. "By adopting the [**3D**EXPERIENCE Works SIMULIA] solutions, we have reduced the cost and time of our prototyping process by at least 50 percent," Timótio da Silva stresses.

"We now have more agility, because the [SIMULIA] software performs our resistance analysis virtually, and the adjustment process is much faster," Timótio da Silva continues. "We haven't stopped doing physical tests, but we do them today only as a final validation of what we have simulated countless times via SIMULIA. Because we've completely interrogated the design with simulation, we've realized a 50 percent reduction in design errors, resulting in cutting scrap and rework costs in half. Lastly, using SOLIDWORKS, SIMULIA, and the **3D**EXPERIENCE platform for the entire virtual prototyping and testing process, we don't have to invest in heavy hardware or incur additional IT infrastructure costs because the simulations run in the cloud."





CALOI leverages **3D**EXPERIENCE SIMULIA Simulation tools to improve design performance while reducing prototyping and SOLIDWORKS VIsualize photorealistic rendering solutions to better support design approvals and supply the company's marketing effort with high-quality visuals well in advance of actual production.

PLANNING ON TOOLING SIMULATIONS AND INTEGRATION WITH SOLIDWORKS

Due to the success that CALOI has had using **3D**EXPERIENCE Works SIMULIA simulation solutions for virtual prototyping of bike frame designs in the cloud, the bike manufacturer also plans to deploy SIMULIA solutions for tooling and fixture design. "Another area of concern is the expense of our tooling development," Timótio da Silva points out. "While we have not used SIMULIA for tooling design in the past, we are in the process of developing these parts using SIMULIA, which will help us save a lot of additional time and money.

"The other benefit of using **3D**EXPERIENCE Works SIMULIA simulation solutions is that we didn't have to replace SOLIDWORKS," Timótio da Silva says. "We have our own library of SOLIDWORKS designs, which helps us a lot when starting new projects. We are able to reuse these designs on countless projects with small adaptations to make a new bike, which saves additional time and money. We are challenged to develop efficient and attractive bikes, which is another reason that integration between SOLIDWORKS and **3D**EXPERIENCE Works solutions is vitally important. We use SOLIDWORKS Visualize to create photorealistic renderings of a design for approval by the team to make sure we meet these goals, and our marketing team can use these visuals to create marketing materials even before the bike is produced."

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VAR: CADWorks Brazil, Santo André, São Paulo, Brazil

Products:

- SOLIDWORKS CAD
- SOLIDWORKS Visualize
- SOLIDWORKS Composer
- SOLIDWORKS eDrawings®
- Collaborative Designer for SOLIDWORKS
- Collaborative Industry Innovator
- **3D**EXPERIENCE SIMULIA Structural Mechanics Engineer
- **3D**EXPERIENCE SIMULIA Simulation Collaborator
- Learning Experiences for **3D**EXPERIENCE Works
- 3DSwymer

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

Dassault Systèmes, the **3DEXPERIENCE** Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 250,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.

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