

CLAAS TRACTOR

Case Study



Photo © CLAAS Tractor

Challenge

CLAAS Tractor in France designs and manufactures tractors for the CLAAS Group, one of the world's leading agricultural machinery manufacturers. The company, which produces 8,000 tractors per year from its Le Mans factory, needed to effectively handle growing complexity in its machines and optimize its assembly line, which processes a wide range of models simultaneously.

Solution

The company is using the 3DEXPERIENCE platform with *Concurrent Equipment Engineering* for digital continuity across engineering and manufacturing, *Single Source for Speed* for multidisciplinary collaboration and *Ready to Make*

to digitally plan and drive production with full traceability as part of its mission to modernize its factory. These solutions allow everyone to work from a single data source and manage all design and production processes in 3D.

Benefits

By connecting its design and manufacturing process disciplines, CLAAS Tractor is able to plan ahead and digitally validate tractor 3D designs before they enter production. The team can now simulate new designs and handle design variants with ease, checking manufacturing feasibility early on in the development process to optimize its assembly line.



“The factory of the future must integrate the products of tomorrow that have not yet been imagined.”

– Etienne Bourasseau, Industrial Director,
CLAAS Tractor

TREAD LIGHTLY, FARM SUSTAINABLY

The CLAAS AXION 900 TERRA TRAC is a new product line that incorporates a crawler track system at the rear, traditionally used on combine harvesters, with a more conventional drive wheel at the front. It is the first half-track tractor with full suspension on the market, combining the comfort of a standard tractor with the advantages of a track-laying tractor in terms of traction and soil protection. The large contact areas of the crawler track reduce soil compaction, helping farmers improve soil health and increase crop yield in a more sustainable way.

Produced at the CLAAS Tractor manufacturing facility in Le Mans, France, the AXION 900 TERRA TRAC is also the first produced on the company’s completely modernized assembly line. CLAAS Tractor, which manufactures approximately 8,000 tractors a year for CLAAS Group, has made widespread upgrades to its plant as it seeks to improve product quality, increase output and handle growing complexity.

“Before, the factory was a standard factory, quite dark, with relatively congested workstations where the operator had to wait for the parts to arrive on the assembly line,” said Etienne Bourasseau, industrial director at CLAAS Tractor. “Today, workstations are much more open, ergonomic and airier. We now offer the best possible working conditions and can guarantee the highest quality service levels.”

Le Mans factory is now one of the most modern tractor manufacturing sites in Europe, winning the “Vitrine Industrie du Futur” award from the Alliance Industrie Du Futur national body in France in collaboration with the French Ministry of Industry.

“This award demonstrates that our assembly line is at the cutting edge of technology, and that we have implemented the necessary production set-up to deliver a high-quality product, made in France, at the right price,” Bourasseau said. “This sends a very strong message to our customers that goes hand in hand with our premium image – premium in our products, but also in our operating methods.”

VIRTUALIZE TO MODERNIZE

At the core of CLAAS Tractor’s modern facility is its new technology platform, which enables the company to adopt innovative design and manufacturing methods, including 3D modeling and virtual simulation. As a long-time user of Dassault Systèmes’ design application CATIA, the company made the decision to adopt Dassault Systèmes’ **3DEXPERIENCE**® platform and ENOVIA to establish digital continuity among its departments. At the same time, it selected DELMIA to virtually model its assembly line to improve product quality, boost

output, and handle its increasingly complex and diversified product range.

CLAAS Tractor digitalized its factory in parallel with the development of the AXION 900 TERRA TRAC – the first machine designed and produced using the **3DEXPERIENCE** platform.

“The factory of the future must integrate the products of tomorrow that have not yet been imagined,” Bourasseau said. “It’s the first time that we developed caterpillar tracks on our assembly line. Having 3D views on the platform allowed us to see how the process, previously set up for standard tractors with four wheels, could be adapted to a new tractor model with caterpillar tracks.”

By developing the new model virtually in 3D, designers and engineers could assess the feasibility of the new design and set up the assembly line before production.

“The **3DEXPERIENCE** platform was key when the factory was modeled, given that everything related to production, such as lifting and clamping tools, could be validated virtually,” said Nathan Dufourg, architect engineer at CLAAS Tractor. “We have been able to adapt our design to the new equipment installed in the factory. For example, the rear caterpillar tracks of the AXION 900 TERRA TRAC completely change the architecture of the tractor. As the caterpillar tracks are longer than tires, the tanks had to be moved above the tracks, next to the cabin. We have to lift them to fix them to the tractor. Having the new factory digitalized enabled us to make sure it was possible to make it.”

MASTERING COMPLEXITY

CLAAS Tractor produces machines for customers worldwide, which comes with its own unique set of challenges.



“Since adopting the 3DEXPERIENCE platform, we have reduced the number of product redesigns due to process issues.”

– Franck Bruneau, Industrial Process
Architect, CLAAS Tractor

“The agricultural tractor market is very difficult and diversified with varied demands coming from Europe, Asia and North America,” Bourasseau said. “We have to manage the seasonality of the market with significant order variations. Technologies embedded in our products are more and more complex too.”

When implementing its new technology platform, one of the company’s major goals was to find a better way of managing the growing complexity in its products, allowing it to cater better and faster to individual customer requests while reducing the burden on its workforce.

“We hardly ever produce the same tractor twice in a year,” said Franck Bruneau, industrial process architect at CLAAS Tractor.

“At any one time, we can have 20 different models on the same assembly line, and in these models we have more than 300 options, which means we have unique assembly combinations every day. The **3DEXPERIENCE** platform was the only way to anticipate the integration of specific options and to plan the process upfront.”

Backed by the **3DEXPERIENCE** platform, CLAAS Tractor is now able to consider customizations early in the product development process and account for how they will need to be managed on the assembly line.

“Thanks to the platform, we have the configuration of each tractor ordered by our customers,” said Marc Dassé, process methods technician at CLAAS Tractor. “You can view the customized tractor in its final configuration as well as its specific assembly process. It’s very easy.”

Using the simulation capabilities in DELMIA, engineers can determine how each product will be manufactured and flag any issues before they occur.

“The platform allows us to simulate, verify and optimize the different assemblies in relation to various options,” Bourasseau said. “We can then check that each combination won’t be an issue during the assembly process. It also allows us to control that the product is compatible with the process at each workstation.”

BUILDING FIRST-TIME RIGHT

Franck Bruneau and his team are responsible for defining the manufacturing process for each tractor. Since using the **3DEXPERIENCE** platform and ENOVIA’s collaboration capabilities, Bruneau said they have been able to plan ahead more easily, collaborate effectively with the R&D department and significantly reduce errors.

“The platform allows process engineers to co-design the product with product engineers, anticipate assemblies and improve the process and product quality,” Bruneau said.

Close collaboration between process and design is especially important as the product design office is located in Vélizy-Villacoublay, 200 kilometers away from the Le Mans production plant.

“The platform makes it possible to share data on a single environment and bring together employees from the design office, methods and factory teams that are not located on the same site,” Bruneau said. “It has enhanced communication and helped us collaborate on the product-process design.”

The design engineers created the AXION 900 TERRA TRAC and exchanged the 3D model with the process engineering team in Le Mans. The process team was then able to virtually test the assembly of the new tractor on the virtual assembly line and report any issues to the design office. Establishing a continuous digital thread across the entire product lifecycle empowers everyone to carry out their role to the best of their ability and build each machine first-time right.

“Digital continuity is an asset for us,” Bourasseau said. “It links the product designer and the assembly operator who will use the operating instructions. The platform makes it possible to verify that the design concept can be used by the operator, in compliance with industrial, ergonomic and quality requirements throughout the development cycle of our tractors.”

More about the solutions:

Concurrent Equipment Engineering provides the digital continuity needed to manage all engineering, simulation and manufacturing information consistently.

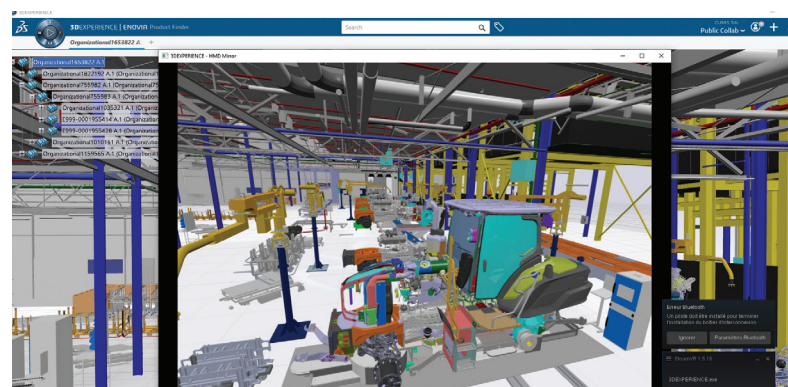
Ready to Make delivers optimized planning, Manufacturing Operations Management (MOM), and a virtual environment to engineer processes for continuous improvement to address complex global and local manufacturing challenges.

Single Source for Speed is a single data driven, model-based product backbone that offers digital continuity and governance capabilities – from product engineering to manufacturing to service and maintenance.

These solutions help manufacturing companies to capitalize knowledge, intensify collaboration, improve productivity and stimulate innovation.

Benefits

- Connected collaboration and communication
- True concurrent engineering
- Accurate product quality and flexibility
- Performance driven design
- Improved time-to-market
- Increased efficiency and reduced cost
- Optimized planning and agile manufacturing.



Top image: 3D modeling of the future CLAAS Tractor facility in Le Mans, France, with the **3DEXPERIENCE** platform

Bottom image: The CLAAS Tractor plant has modernized its assembly line to meet its customers’ evolving expectations.

Focus on CLAAS Tractor

CLAAS Tractor is part of the CLAAS Group, one of the world's leading agricultural machinery manufacturers. Based in France, the company designs and produces a wide range of tractors, selling its products to agriculturalists worldwide.

For more information: www.claas.com

VIRTUAL TWIN VALIDATION

3D models are now used across all departments at CLAAS Tractor.

"The **3DEXPERIENCE** platform makes it possible to use 3D at all levels within the company," Bruneau said. "Virtually immersed in their future working environment, operators understand the assembly of the future product and how to use their future equipment. The plant manager can make the right decisions regarding the material and its maintenance. And the customer can view the product they ordered, including all the options, before it's even produced."

Having a virtual twin of both its products and the factory is having a particularly positive impact on CLAAS Tractor's design to manufacturing process, helping to ensure that each component can be produced within the Le Mans factory using existing equipment and will work within the finished tractor.

"We model the different parts of the tractor in 3D like sheet metal, hydraulic pipes and electrical harnesses," Dufourg said. "We share this 3D model with the factory to make 100% sure the parts can be assembled. In the design office, we use CATIA to create the tractor parts. In product architecture, we especially use the Mechanical System Design feature, which allows us to represent the kinematics of the tractor. It enables us to create mobile parts in 3D and make sure they do not interfere with other parts when the tractor is in action."

This approach also helps the design team handle changes effectively and rectify errors quickly.

"As an architect, we use the Volume Filters feature a great deal," Dufourg said. "For example, when an assembly issue or damage is reported, a part must be modified. The Volume Filter highlights the area around the part that is affected. Then the platform provides the bill of materials to make sure we do not forget any options or create interference with nearby parts."

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.

IMPROVING UNDERSTANDING AND TRAINING

Switching from 2D paper-based processes to 3D digital modeling has completely revolutionized the way CLAAS Tractor's factory operators work.

"We used to build a prototype tractor in a testing area to describe in 2D its assembly process, and sort this documentation in folders by product bill of materials," Dassé said. "We also used this 2D documentation for operator training and to update our operational documentation. Process updates were very complicated. With the **3DEXPERIENCE** platform, we can anticipate assembly operations with overviews, and carry out assembly tests even before we receive the parts and without any physical prototype. Operators really appreciate it."

It's now far easier for CLAAS Tractor to train its operators and prepare them to work on new models.

"Today, with DELMIA, we are one step ahead," Dassé said. "I can run through the tractor manufacturing process in detail, and operators can be trained and understand the assembly processes before the tractor physically exists."

Being able to share virtual models of the new factory and future tractor designs also helped CLAAS Tractor get its workforce onboard with its company-wide digital transformation.

"The AXION 900 TERRA TRAC has been designed to be assembled on the future assembly line, but operators couldn't imagine the future process," Dassé said. "As they were able to see the tractor and factory model in 3D, they quickly realized that the new approach would be much clearer and more fluid."

EXPANDING CAPABILITIES

Based on the success of the implementation, plans are now in place to bring CLAAS Tractor's new capabilities to other organizations and factories within the wider CLAAS Group.

"This is the pilot project for CLAAS Group that will be deployed in other factories involving a product design office," Bruneau said. "For me, this experience made it possible to innovate at CLAAS Tractor, to connect departments around the same data and to anticipate production rather than endure it."

"To sum up this transformation, I would say that it has been about passion, exciting new tools, openness to new innovative solutions, but above all delivering on our objective to serve the customer with the best products," Bourasseau concluded.

