

Pioneer Solutions Designs Heavy Equipment using Deep Expertise and Cutting-Edge Tools from PTC®

Pro/ENGINEER® and its advanced motion and analysis tools give small engineering services business a competitive advantage

Pioneer Solutions, LLC, Cleveland, Ohio

When a major off-highway truck manufacturer moved its operations outside the United States, five of its former engineering managers identified a niche for starting their own business. And thus, Pioneer Solutions, LLC was born in 2004 as a small engineering services and project management business that today employs some 40 engineers and designers. By hiring industry veterans, company founders knew they could offer their customers valuable, in-depth knowledge, along with the engineering expertise necessary to become a preferred partner to the heavy equipment industry. To that end, Pioneer Solutions' mission is to provide high-level professional engineering solutions that consistently exceed clients' expectations.

The Challenge: Industry Requires Unique Skills & the Best Tools

The design and engineering of mobile and off-highway heavy equipment requires unique skills. The electrical, hydraulic, metallurgical, mechanical, and structural systems for construction and mining equipment are very different from consumer vehicles, and thus these systems demand a special expertise. Pioneer recognized this and hired the best engineers and designers for the job. And, to be successful, the Pioneer Solutions team also knew they'd need the most effective design and engineering tools to provide customers with immediate value and quality deliverables.

The Solution: Experience and PTC Design Tools

Deep expertise, coupled with the most powerful 3D design tools, enables Pioneer to meet client timelines and budgets while delivering superior parts and assemblies. And, though Pioneer needs to work with a variety of engineering software packages to satisfy its many clients, a majority of their customers request that their design work be performed with Pro/ENGINEER, the 3D CAD software solution from PTC. In addition to Pro/ENGINEER, Pioneer also uses Pro/ENGINEER Mechanica® to understand structural and thermal product performance, and Pro/ENGINEER Mechanism Dynamics Option (MDO) to simulate real-world dynamic forces on the product. Pioneer Solutions leverages PTC's engineering tools to reduce the costs and time associated with physical prototypes.



Pioneer Solutions designs complex construction machines with the help of PTC Solutions.

The Result: Better Quality with Lower Expense

Pioneer Solutions is a testament to the fact that smaller design and engineering firms don't necessarily work on just small, simple projects. Pioneer can design and engineer both single components and entire complex assemblies. PTC solutions have enabled Pioneer to "get it right the first time," by allowing engineers to understand product performance early in the development cycle. With PTC tools, engineers can fully evaluate and optimize their designs, improving product quality while reducing prototyping expense. Customers return to Pioneer Solutions because they recognize the quality, flexibility, professionalism, and overall value of the organization.

“Without the knowledge of Pro/ENGINEER solutions for design, motion, and analysis, we would not be as successful in the business.”

-Paul Pochatila
Director of Engineering
Pioneer Solutions, LLC

Blending the Best Experience with the Best Tools

Pioneer Solutions' core technical staff of approximately 40 engineers and designers offers decades of experience in the heavy equipment industry. The company is structured to operate in a project-oriented business model, focused on serving its clients' needs, with projects ranging from a specific failure analysis that might take a few days, to a major product development program that can span several years.

Within Pioneer, the staff possesses a broad range of skills, including knowledge of standards and understanding of how various suppliers, such as engine manufacturers and tire manufacturers, work. Clients can overcome their own shortcomings in a particular area by relying on the expertise of Pioneer for an entire project, or they may choose to bring in the engineering firm to expedite a critical project.

Pioneer has expertise in designing and engineering frames, hydraulics, transmission systems, and cooling systems, as well as electrical, mechanical and structural systems. Paul Pochatila, Director of Engineering and a founder of Pioneer Solutions, has been in the industry for over 20 years, and first became familiar with PTC nearly 10 years ago. At that time, he was working directly for a heavy equipment manufacturer and used Pro/ENGINEER Mechanica for designing and analyzing several main structures for rigid hauler mining trucks.

"After founding Pioneer Solutions, I realized a lot of our customers relied on Pro/ENGINEER," stated Pochatila. "So, it became very important to us to acquire that skill and become proficient with it."

After working with many design systems, he found that PTC solutions were the best at communicating with other CAD systems. This was crucial for Pioneer designers when working across various design software platforms. "Part of why we're so successful is because we're able to get information in and out of a product quickly," noted Pochatila.

Pro/ENGINEER quickly proved itself to be a time saver and a productivity enhancer. "In this business, it's all about getting a competitive edge," explained Pochatila. "Pro/ENGINEER is an integrated solution that can scale and work compatibly with the other systems we have in-house."

Motion Analysis Provides an Edge

In the mid-1990's, while still employed by heavy equipment manufacturers, many of Pioneer's staff members started using Pro/MECHANICA® Motion, a predecessor of Pro/ENGINEER MDO (Mechanism Dynamics Option), to calculate input loads for structural components.

In a short period of time, they became reliant on Pro/MECHANICA Motion to simulate static and dynamic conditions, calculate boundary conditions, and load the finite element models of the individual components. As their experience grew, they expanded the use of the product and started designing mechanisms, primarily steering and suspension systems. This solution quickly replaced older FORTRAN programs, which offered limited capabilities.

Pro/ENGINEER MDO was released about the same time that Pioneer Solutions was formed. Pochatila explains, "We selected (Pro/ENGINEER) MDO and (Pro/ENGINEER) Mechanica for Pioneer because of our previous positive experiences. This was regardless of having a predominantly non-Pro/ENGINEER staff. We recognized that Pro/ENGINEER was the preferred CAD package of the industry we're focused on."

With Pro/ENGINEER MDO, Pioneer can virtually simulate real-world forces and analyze how products will react to them, without having to build costly physical prototypes. Pro/ENGINEER Mechanica gives Pioneer's designers the power to understand structural and thermal product performance via simulation, before committing to physical prototyping. By gaining insight into product behavior early in the design phase, Pioneer can vastly improve product quality while saving time, effort and money.

An Extension of their Customers' Business

Whether the project calls for designing a single part, or a larger sub-assembly – or even an entire system, Pioneer has the agility and tools to deliver on time and within budget. Pioneer's breadth of skill and knowledge provides the engineering capabilities and technical depth of a much larger company. The team knows that the projects they work on are just as complex as those handled in-house by heavy equipment manufacturers or at larger engineering firms.

And, the benefits of their skill and expertise extend not only to Pioneer's customers, but to the end users of heavy equipment. For example, with the assistance of Pro/ENGINEER CAD, including Pro/ENGINEER Mechanica and Pro/ENGINEER MDO, Pioneer can help end users gain productivity by developing a superior steering system for a construction vehicle. With better steering, a truck can travel faster through rough terrain, fill up more frequently, and get a job done more quickly.

"Pioneer Solutions is most effective when we are allowed to adapt to a customer's specific needs and complement its situation," states Pochatila. "Our true value is realized in improved equipment reliability and productivity. We want to be considered as an extension of your business."

As Pioneer looks to the future, the company is exploring new products from PTC, including Pro/ENGINEER Wildfire 3.0 with its new, customizable Process Wizard that captures best practices and recommends approaches for various product development processes. The Process Wizard steers engineers through the analysis process, improving efficiency and making it possible to validate designs earlier and more frequently.

Since its inception, Pioneer Solutions has depended on Pro/ENGINEER as an essential tool to help embody the knowledge and expertise of its staff. "Without it, we wouldn't have the work," says Pochatila. "Pro/ENGINEER is better than all that's out there - it's 'a must.' We rely on Pro/ENGINEER as the one solution that really does scale to a variety of customers and a variety of inputs."