

AEROSPACE AND DEFENSE, AUTOMOTIVE AND TRANSPORTATION

Pronex

Leveraging a model-based value chain and digital twin to streamline creation of armored vehicles

Products

Solid Edge, Simcenter

Business challenges

Design and manufacture high-performance landward defense equipment

Manage complex regulatory requirements

Meet demanding manufacturability requirements

Keys to success

Establish end-to-end design process

Use Solid Edge for all design work and reduce time-to-market

Leverage synchronous technology for fast modifications

Use Simcenter for FE and CFD analyses

Results

Leveraged model-based value chain and digital twin to streamline product creation

Designed armored vehicles that have enhanced survivability

Used synchronous technology to reduce time-to-market

Pronex uses Solid Edge with synchronous technology to design landward defense systems with reduced time-to-market

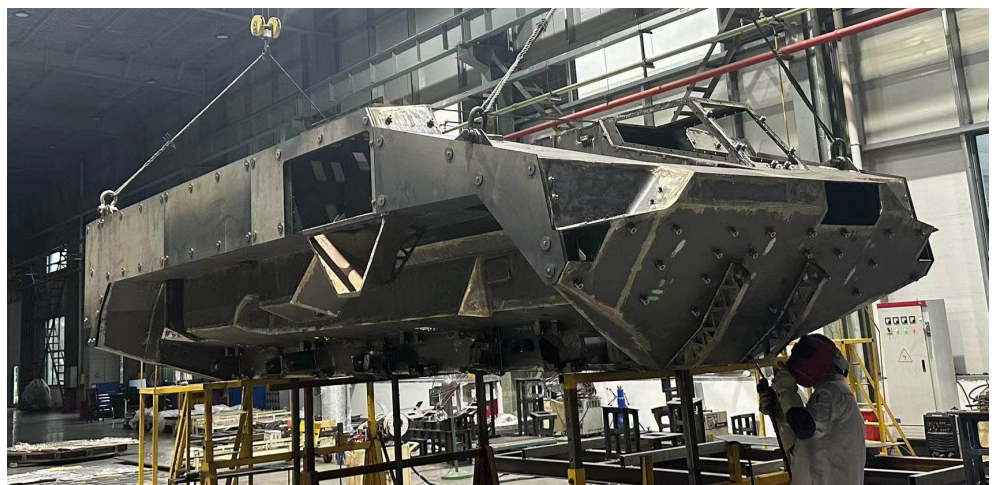
Shaping future defense systems

Pronex Engineering Management Consultants (Pronex), based in Pretoria, South Africa, is an independent defense and military engineering contractor specializing in landward defense system design such as armored vehicles. Pronex offers a full suite of services for developing and testing landward defense and automotive technologies for companies manufacturing armored vehicles around the world, ranging from defining systems to qualifying a product baseline. Pronex services include systems engineering, product development, rapid prototyping and testing services, which it

conducts in an International Organization for Standardization (ISO) 17025 accredited laboratory. Design work can either start from scratch or be based on reference data usually provided by customers in neutral file formats like STEP.

Meeting unique challenges

Pronex faces tremendous challenges for designing defense equipment for manufacturers who sell the product to armies and police forces around the world. The highly complex systems need to be deployable in all weather and terrain conditions. They need to be difficult to find, attack and destroy and offer maximum protection for personnel and equipment inside the vehicle. They also need to comply with a variety of regulatory requirements.



Pronex designs and tests landward defense systems such as armored vehicles for defense and automotive companies worldwide.

Results *(continued)*

Reduced time required for model variant creation by 85 percent

Enhanced armored vehicle manufacturability and maintainability

Since transporting damaged armored vehicles to maintenance facilities far behind the front lines is difficult and time-consuming and requires valuable manpower, it is vital to have the ability to conduct battle damage repair (BDR) to armored vehicles as close as possible to the front line. This enables equipment to be returned to action with minimum delay. To facilitate this, landward defense systems also require comprehensive, easy-to-interpret engineering documentation.

A model-based value chain

To achieve these goals, Pronex engineers build a digital twin of the systems they design, often starting with survivability modeling. They use Siemens Digital Industries Software's Solid Edge® software for designing and developing these systems.

Using Solid Edge provides a complete and flexible technology platform with solutions for all product development tasks. It comprises market-leading tools for mechanical and electrical design, engineering, simulation and technical publications. Small and medium-sized businesses (SMB) like Pronex profit from the ability to build a comprehensive digital twin within a uniform, easy-to-learn engineering environment. By weaving a digital thread throughout the product development phase, they can speed up design, verification and



Pronex uses Solid Edge software for all engineering work on defense equipment, including this landmine blast mitigation seat.

changes, resulting in detailed 3D data packs of mature products with a short time-to-market.

Pronex has been using Solid Edge for many years. "We began leveraging the features of Solid Edge immediately after changing from our previous CAD software," says Jason Vrdoljak, engineering manager of Pronex. "We used Solid Edge to complete the project in a short time and with a degree of quality that would not have been possible with our previous tool." Pronex engineers apply Solid Edge to all aspects of mechanical engineering from conception through the early phases to prototyping.

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Jason Vrdoljak
Engineering Manager
Pronex



By using Solid Edge with synchronous technology, it took us 12 hours rather than six days to derive an 8x8 suspension system from an existing 6x6, including structured and named assemblies, reducing the time by about 85 percent."

Jason Vrdoljak
Engineering Manager
Pronex

This includes using Solid Edge Simulation and Simcenter™ Femap™ software for finite element (FE) structural analyses and Simcenter FLOEFD™ software for computational fluid dynamics (CFD) analyses. It also includes using Keyshot software, a third-party software integrated with Solid Edge, to produce life-like renderings.

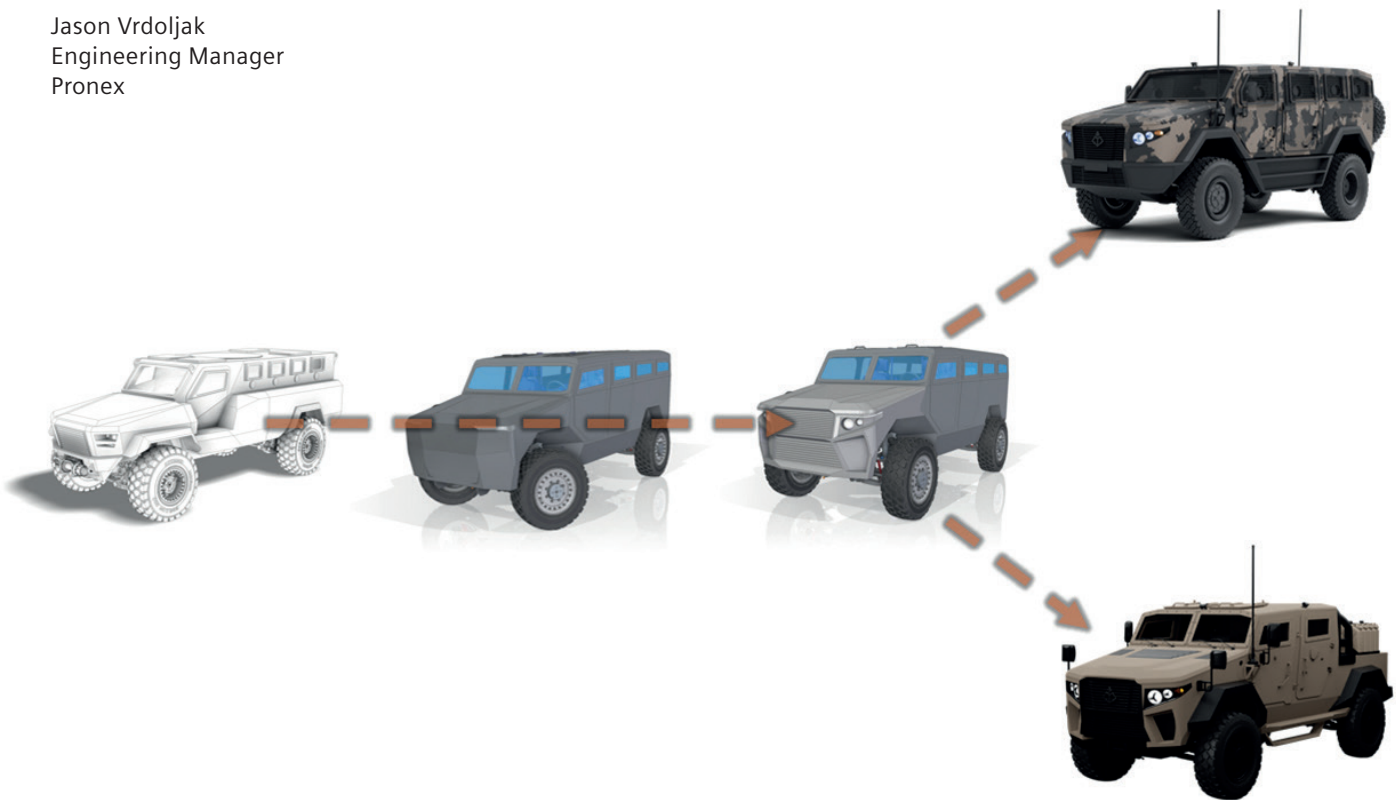
Fast, intuitive design

"The cornerstone of the Solid Edge portfolio is its market-leading CAD application featuring synchronous technology," says Michael Niebuhr, business development engineer with Ultimate Partner (Pty) Ltd, the South African Siemens solution partner supporting Pronex. "This open and extensible tool provides users with the freedom to easily design naturally and iteratively."



For instance, using Solid Edge saves us tremendous amounts of time when designing vehicle suspensions."

Jason Vrdoljak
Engineering Manager
Pronex



Pronex uses Solid Edge in all aspects of mechanical engineering from concept through the early phases to prototyping.

A 3D rendering of a vehicle chassis, likely for a truck or heavy-duty vehicle. The chassis features a prominent red frame and suspension system, including shock absorbers and control arms. It is equipped with six large, black, treaded tires mounted on dark wheels. The vehicle is shown from a low, front-three-quarter perspective, highlighting the robust construction of the frame and suspension. The background is a solid teal color.

Jason Vrdoljak
Engineering Manager
Pronex

Using Solid Edge with synchronous technology reduced the time to derive and 8x8 suspension system from an existing 6x6 from six days to 12 hours, a reduction of about 85 percent.

Synchronous technology contains built-in intelligence that interprets design intent regardless of where the design originated. It allows engineers to make modifications without having to dig into the design history, which would be required by solely parametric computer-aided design (CAD) software.

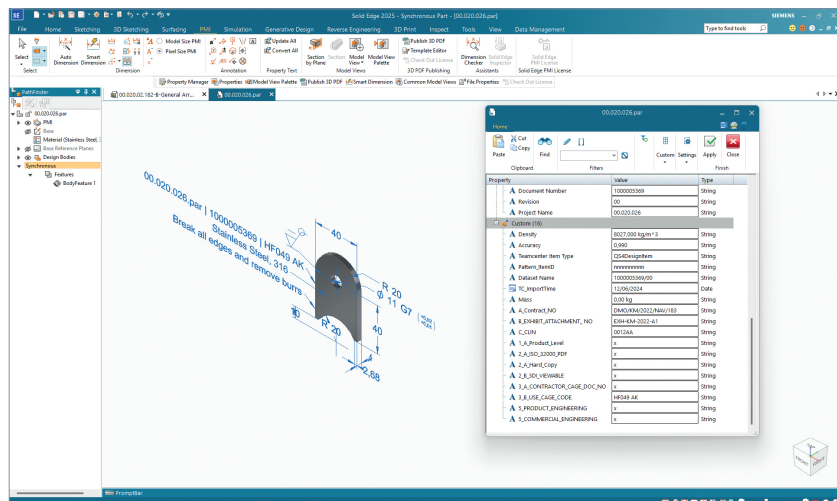
"For instance, using Solid Edge saves us tremendous amounts of time when designing vehicle suspensions," says Vrdoljak. "By using Solid Edge with synchronous technology, it took us 12 hours

rather than six days to derive an 8x8 suspension system from an existing 6x6, including structured and named assemblies, reducing the time by about 85 percent."

Reducing time needed to create documentation

In addition to tools for reverse engineering, generative design, convergent modeling and simulation, Solid Edge also features a model-based definition (MBD) software module. This allows engineers to reduce the time required to create engineering documentation. It facilitates augmenting 3D models with product manufacturing information (PMI) for dimensioning and tolerancing, largely eliminating the need to resort to 2D drawings, notes and instructions. Solid Edge has the capability to use the STEP data communication profile to import and export PMI.

In 2013, the United States Department of Defense (DoD) released MIL-STD-31000 Revision A to codify the use of MBD, termed supplementary technical data (STD), as a requirement for technical data packages (TDPs). This includes everything from surface quality to dimensioning and tolerancing. This is meant to support collaboration between suppliers by consolidating all this information in a 3D PDF document, which also includes the model's



Solid Edge features an MBD software module, allowing engineers to reduce the time required to create documentation. This also includes MBD complying with MIL-STD-31000 Revision A, which supports independent spare part production and battle damage repair.

Solutions/Services

Solid Edge
[siemens.com/solidedge](https://www.siemens.com/solidedge)

Simcenter
[siemens.com/simcenter](https://www.siemens.com/simcenter)

Customer's primary business

Pronex Engineering Management Consultants is a leading independent development contractor for defense and automotive companies worldwide. Based in Pretoria, South Africa, the company's 35 employees provide a one-stop service for systems engineering, product development, rapid prototyping, testing and product support services, currently generating a 7 figure US\$ yearly turnover.
www.pronex.co.za

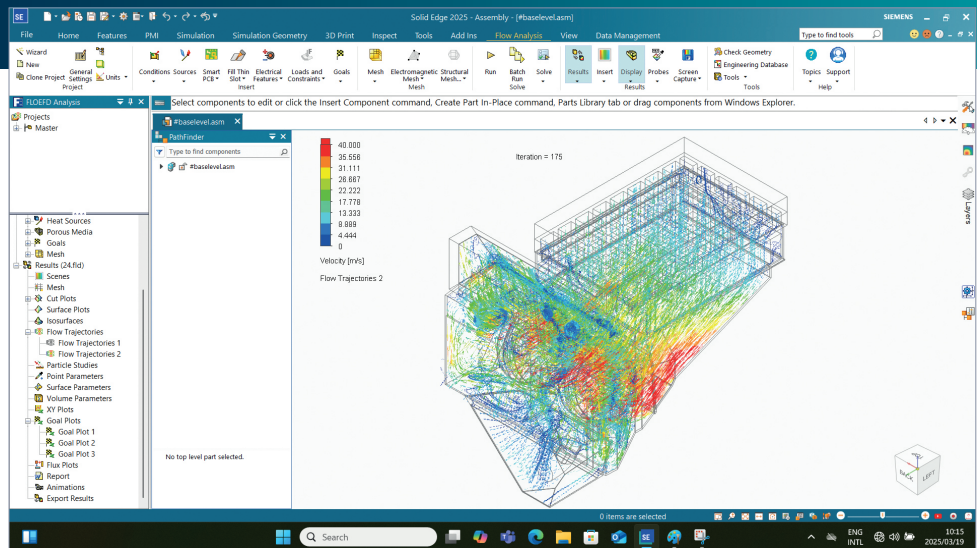
Customer location

Pretoria
South Africa

Solution Partners

Enginia
<https://enginia.nl>

Ultimate Partner (Pty) Ltd
<https://ultimatepartner.co.za>



Pronex engineers use Solid Edge Simulation and Simcenter Femap for finite element structural analyses as well as Simcenter FLOEFD for Solid Edge for CFD analyses.

STEP representation. One study found that using MBD reduced the time required for modeling and drawing by 42 percent.

"MBD complying with MIL-STD-31000 Revision A also goes a long way to support independent spare part production and battle damage repair," says Sander Doornbos, customer service manager at Enginia B.V., the strategic Siemens solution partner for the defense market in Europe and the Middle East. "This is why Siemens has integrated this functionality with all relevant Siemens Xcelerator solutions." In addition to NX™ software and Teamcenter® software, this also applies to Solid Edge.

Solid Edge, Simcenter, NX and Teamcenter are all part of the Siemens Xcelerator business platform of software, hardware and services.

"This substantially reduces the time engineers in the defense industry spend on administrative tasks, reducing the clicks required to start production by 50 percent," says Doornbos. "The Dutch Ministry of Defense recommends using Solid Edge and Teamcenter because it provides engineers with a single source of truth." Specifically in Europe, where armies need to join forces to jointly defend borders, several defense equipment manufacturers have already replaced legacy systems with Siemens Xcelerator software to leverage these functionalities.

"We have been using Solid Edge for quite some time so we can use the software to produce MIL-STD-31000 Revision A compliant TDPs without having to change anything major in our current workflows," says Vrdoljak.

Siemens Digital Industries Software

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Asia-Pacific 001 800 03061910
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