

ACADEMIC • AEROSPACE AND DEFENSE

Larsen Motorsports

Becoming a supplier for large OEMs as an SMB

Products

NX, Simcenter

Business challenges

Adapt to the industry 4.0 digital threads

Bridge the gap between academia and industry

Reinvent and adapt the manufacturing process for SMBs

Overcome initial manufacturing cost-to-change

Keys to success

Embrace digitalization by using NX to create digital twin

Leverage Siemens SMEs and thought leaders for modeling, process and tool adaptation

Gain expertise of manufacturing processes from NGC mentors

Results

Demonstrated how an SMB can become a supplier for large OEMs

Optimized manufacturing process by implementing digital twin technology

Reduced car body scan time from six weeks to three hours

Enabled student interns to gain industry-level experience on a real project with expected results

Mentored and trained prospective employees for NGC

Provided a live learning lab for students

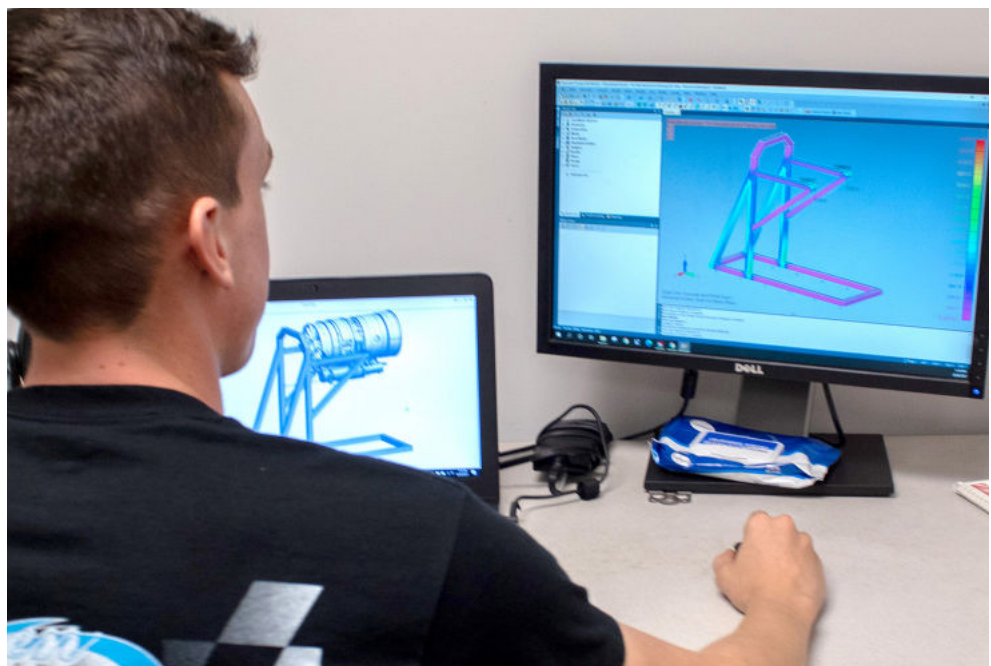
LMS uses NX and Simcenter to optimize its manufacturing process by implementing a digital twin

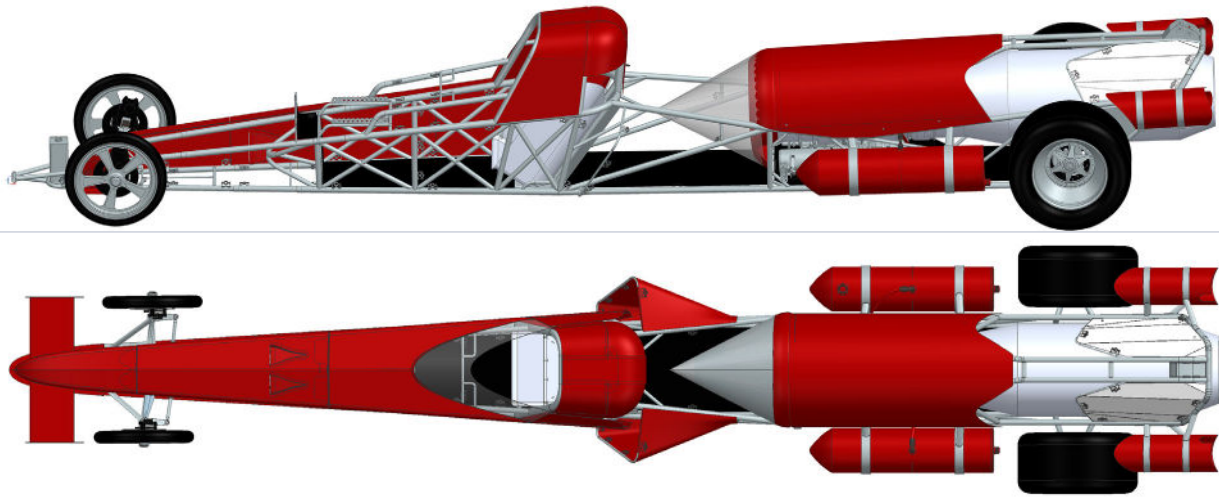
Building tomorrow's specialists

Based in Palm Bay, Florida, Larsen Motorsports (LMS) is a leading research and development (R&D) company in the jet racing sector and thought leader in the jet drag racing. Its unique blend of traditional and cutting-edge manufacturing technology sets it apart in the heart of Florida's space coast manufacturing and technology corridor.

Over the years, LMS' mission has shifted from solely being a racing team to a research center for the next generation of specialists.

Chris Larsen, chief executive officer (CEO) and co-owner of LMS and Elaine Larsen, president and co-owner of LMS, provide high school and college students with hands-on learning opportunities to prepare them for the workforce. LMS works as an incubator for industry-level talent, with 80 percent of its workforce being science, technology, engineering, arts and mathematics (STEAM) student interns from the Florida Institute of Technology. The degrees LMS leverages are in the areas of mechanical engineering, aerospace engineering, chemical engineering, digital communications and more. It is also a test bed for real-world system design software and highlights processes used in the automotive and aerospace industries.





“What used to be six weeks of work with two people and only as accurate as the humans measuring it, now takes one day of work and is fully accurate.”

Chris Larsen
Chief Executive Officer and
Co-Owner
LMS

Along with Florida Tech, LMS works with the Blazing Trails Foundation program (a non-profit science, technology, engineering and mathematics (STEM)/STEAM organization) and Brevard County School system. LMS produces jet-dragsters, fabricated vehicle frames, composite body panels, cockpit controls, test beds for alternative (bio) fuels, etc. Its products are generally used in the R&D of the Gen-6 program.

Reinventing traditional processes

The traditional manufacturing process is time-consuming; In an increasingly competitive realm, refining integral parts of this process is critical to succeed. Small and medium-sized businesses (SMBs) often feel significant amounts of competitive pressure from the market to evolve and reinvent their processes. Additionally, the skill gap between college graduates and industry-level equipped engineers demands better and more efficient manufacturing methods to train the next generation of experts. Providing students with hands-on experience is highly valuable and prepares them to succeed in the professional world after graduation. “We manufacture the next generation,” states Elaine Larsen.

LMS partnered with the Northrop Grumman Corporation (NGC) aero supply chain to bridge the gap between academia and the industry to prepare the next generation of engineers. NGC is a national security and space exploration technology company with a focus on digital transformation, manufacturing and sustainability. It is actively hiring thousands of engineers that need academic knowledge with real-world skills using products from Siemens Digital Industries Software on industry-level projects. Jeff Reed, corporate director of digital transformation for engineering at NGC states, “I’ve always been very appreciative of Florida Tech for the caliber of engineering students that we have encountered. So, I thought this was a huge opportunity for us to partner with the university.”

The collaboration between LMS, NGC, Florida Tech and Siemens is enabling student engineers to learn what it takes to perform as a proficient engineer in the aerospace industry by applying theoretical concepts from the classroom to industry-standard projects.

// We manufacture the next generation.”

Elaine Larsen
President and Co-Owner
LMS



Successful SMBs like LMS must reinvent and adapt their manufacturing processes to acclimate to the changing conditions of the aerospace industry; Siemens provides the technology to do so and NGC provides the thought leadership.

Working smarter

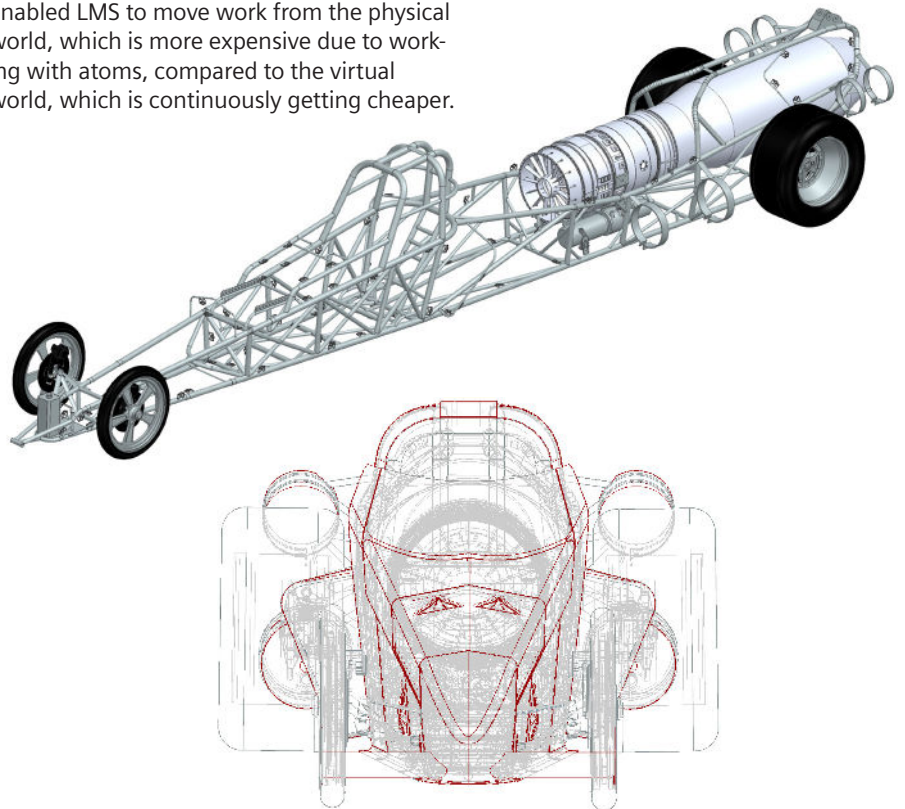
LMS is located in the Center for Advanced Manufacturing and Innovative Design (CAMID) facility which is a part of the Florida Tech campus. LMS hosts NGC mentors in their facility for intern meetings. Here, interns leverage the digital twin strategy for end-to-end design in jet-racing car manufacturing. It enables them to create a virtual representation that serves as the counterpart of a physical object or process and operates in real time to allow for adjustable system development, design, testing and support.

Digital twin technology is an integral element that small companies can use to reinvent their manufacturing processes. The team used NX™ software to create a comprehensive digital twin of the Gen-6 dragster, which is one of the first jet drag-racing vehicles that is reverse engineered in a virtual environment. NX is a part of the Siemens Xcelerator business platform of software, hardware and services.

NGC assigned mentors that were experienced in NX and Aerospace Engineering to assist and guide the interns in their everyday duties with the digital twin and design. Without the assistance from NGC, LMS would have faced difficulties in building the digital jet-racing car.

Running test scenarios with the digital twin

A significant benefit for LMS is the iterative test run scenarios the team executed in the digital world. This enabled them to save time and money in the long run. Using NX enabled LMS to move work from the physical world, which is more expensive due to working with atoms, compared to the virtual world, which is continuously getting cheaper.



The team originally had to manually measure the chassis and body of the existing car, which took six weeks by hand. By using the digital twin, it took them three hours. With the body scanned into the digital twin system, students refined and edited elements of the car such as tires, brake assemblies and ducts. Jet racing considers the presence of a human driver. The digital twin enabled the interns to run several test scenarios to establish functional optimization and safety for the driver.

The scope of the project mirrored NGC's product development lifecycle by beginning with requirements development and holding a formal systems requirements review (SRR). Design progression, preliminary and critical design reviews (PDR and CDR) were also conducted. At each stage gate, students

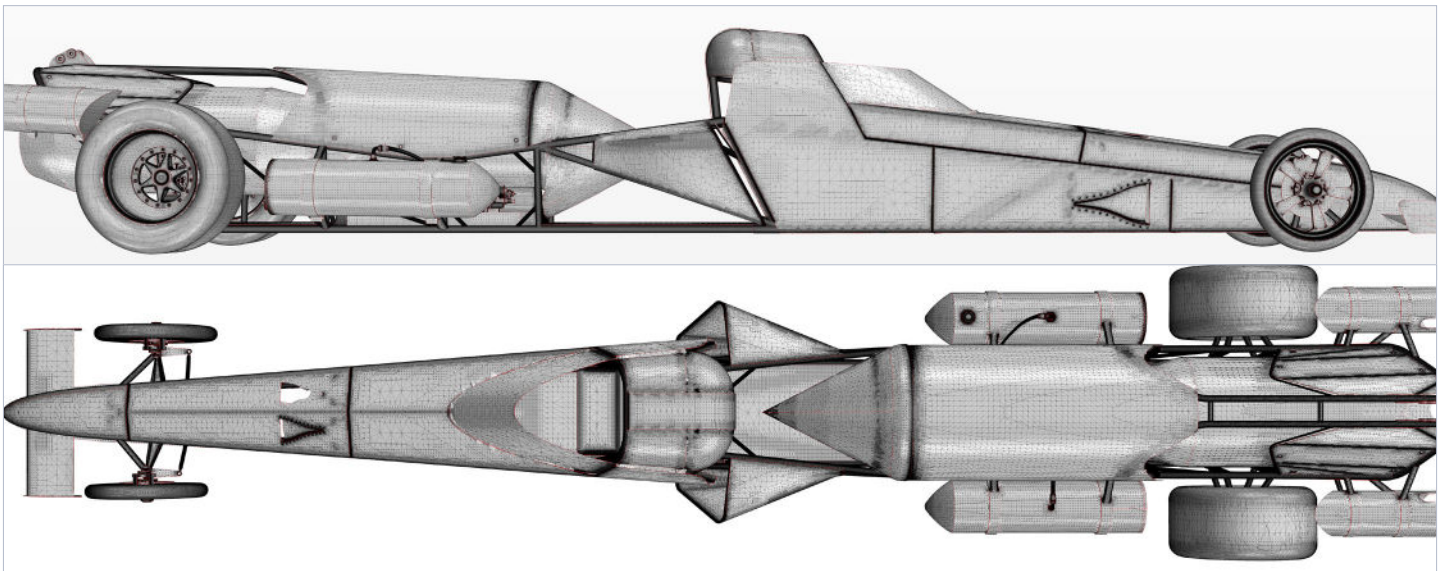
consulted faculty and subject matter experts (SMEs) from Siemens, NGC and LMS to make sure designs were progressing and meeting the requirements.

"What used to be six weeks of work with two people and only as accurate as the humans measuring it, now takes one day of work and is fully accurate. The entire chassis and body scan will be complete in one shift today," explains Chris Larsen.

Once all components were added to the digital twin, the team conducted virtual trials using Simcenter™ STAR-CCM+™ software for computational fluid dynamics (CFD) analysis.

LMS is transitioning into using Mendix™ platform by converting race time data into Excel for data mining to understand how to tune its cars to develop models.

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Solutions/services

Mendix
mendix.com

NX
siemens.com/nx

Simcenter STAR-CCM+
siemens.com/simcenterccm

Customer's primary business

Larsen Motorsports is embedded in the heart of Florida's space coast technology corridor. Its 30,000 square foot facility reflects the ultimate blend of traditional manufacturing and cutting-edge manufacturing technology. It is a leading research and development company with full concept, design, engineering and operational capabilities in-house.
www.elainelarsen.com

Customer location

Palm Bay, Florida
United States



Siemens' partnership with LMS and Florida Tech enabled students to be job-ready and gain experience with hands-on industry-level projects. This approach has also allowed NGC to access a pool of pretrained prospective employees. The cooperation between industry and academia opens future opportunities for similar partnerships.

Empowering the next generation

NGC has played a vital role in mentoring LMS interns and equipping them with the expertise and manufacturing processes to succeed. Furthermore, this project helped NGC gain confidence in the simulation outputs of Siemens' technology and the benefits it presents for future projects. Implementing Siemens' comprehensive digital twin technology enabled the transition to an advanced manufacturing process. Addressing this bottleneck enabled the LMS team to reduce costs and time, relieve competitive pressures and enhance innovation.

Additionally, Industry 4.0 is on the horizon and does not discriminate between genders or company size and LMS understands their mission to equip the next generation of talent. Elaine Larsen's impact goes beyond the track and challenges the acceptable status-quo by empowering the next generation of female engineers and leaders to pursue their dreams.

NX is so advanced that it also being used to create fully comprehensive digital twin models of humans – down to the blood in their bodies and their mannerisms. The LMS team plans to work with the biomedical, chemical engineering and sciences departments to create virtual versions of drivers and crew chiefs to perform fully adaptable vehicle customization, crash safety testing and racing conditions.

Siemens Digital Industries Software

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