SIEMENS

AUTOMOTIVE AND TRANSPORTATION

Hendrick Motorsports

Reducing setup time by 50 percent and achieving a zero-scrap rate while improving accuracy tenfold

Products

NX, VNCK

Business challenges

Create more powerful engines with repeatable results

Improve design accuracy to create better engine parts

Keys to success

Use a digital twin to simulate engine parts before physically prototyping them

Leverage VNCK to test out and write programs

Improve connectivity between data management to equipment on the shop floor

Results

Achieved a zero-scrap rate

Improved accuracy tenfold

Reduced setup time by 50 percent

Hendrick Motorsports uses NX, VNCK and the digital twin to create faster, more powerful auto racing engines

Striving for faster, more powerful engines

Founded by Rick Hendrick in 1984, Hendrick Motorsports is the winningest team in NASCAR Cup Series history. At the sport's premier level, the organization holds all-time records in every major statistical category, including championships, points-paying race victories and laps led. With more than 100 team members, its engine department supports over 500 auto racing events per year, providing horsepower for teams in the Xfinity Series and top-level Cup Series. Hendrick Motorsports engines have recorded more than 500 wins across NASCAR's three national touring series.

Since the art of racing depends heavily on horsepower, it is crucial for the engine to be efficient, powerful and durable. This requires integrating and leveraging cutting-edge technology and finding innovative ways to stay ahead of the competition.

To stay at the forefront of racing engine innovation, Hendrick Motorsports, with support from Swoosh Technologies, a

"We've always been a very Siemens-driven company. All our project lifecycle management is Siemens-based. However, we've never used a Siemens numerical controller for our manufacturing. So, since this is our first foray into using one, we reached out to Swoosh Technologies for help."

Michael Tummond
Engine Engineering Manager
Hendrick Motorsports

Siemens Digital Industries Software partner, used NX™ software and the virtual numerical control kernel (VNCK), which are part of the Siemens Xcelerator business platform of software, hardware and services.

Aiming for accurate and repeatable results

The main goal for the Hendrick Motorsports engine department is simple: make better engines. However, this required the team to overcome accuracy issues. To create better engine components, they needed repeatable and accurate results. Since the department had maxed out its old equipment, they decided to purchase higher precision machines.

After carefully narrowing down the available solutions, Hendrick Motorsports settled on new equipment that included Siemens controllers.

"We've always been a very Siemens-driven company," says Michael Tummond, engine engineering manager at Hendrick Motorsports. "All our project lifecycle management is Siemens-based. However, we've never used a Siemens numerical controller for our manufacturing. So, since this is our first foray into using one, we reached out to Swoosh Technologies for help."

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However, after integrating the new equipment, the engine department faced a new challenge: learning how to use it. With Swoosh Technologies and Siemens support, Hendrick Motorsports was able to quickly get everything up and running while learning how VNCK and a digital twin could help them create better engine parts.

"This move has been very good for us," says Tummond. "All of our product data management goes through Siemens software but that's where it stopped. We've always programmed our machinery using Siemens software; however, now that we have Siemens controllers on the machines, the connectivity and integration between the two has been nice."

Creating a more efficient engine design process

When Hendrick Motorsports switched to the updated equipment with Siemens controllers, they also invested in a machine simulation kit and postprocessor.

"The one piece of software that I took a sort of gamble on was VNCK since I didn't fully understand what it was," says Tummond. "Initially, I thought it was a way to get digital readouts and that it would be nice from an operator familiarity standpoint to see the controller at your desk, but it was a lot more. It was a full-blown digital twin."

With VNCK, the engine department could interrogate any parameter inside the machine tool at their desk.

"We now use VNCK every day," says Tummond. "It's been an excellent tool, not just for manufacturing and improving programs, but also as a teaching tool to help us learn the controller."

By using a digital twin, Hendrick Motorsports can streamline engine design and prototyping processes by finding mistakes a lot faster and without wasting money on potentially scrapping expensive parts.

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This improved process led Hendrick Motorsports to achieve a zero-scrap rate.

Embracing the world of simulation

Although the engine department did not originally use simulation when manufacturing its engine parts, thanks to these new solutions, the team is simulating everything.

"Previously, we weren't taking advantage of a digital twin or even machine simulation in general, just out-of-the-box toolpath verification in NX," says Tummond. "With these additional Siemens solutions, we have more confidence in our programming, which is important since we're doing increasingly complex programming for part alignment than in the past."

Using the Siemens controllers coupled with NX and VNCK, Hendrick Motorsports was able to focus on precision.

"Before we were happy to get something within a few thousandths of an inch," says Tummond. "Now, when we're looking at

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Solutions/Services

NX
siemens.com/nx

VNCK
swooshtech.com/machinum/vnck

Customer's primary business

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www.loremipsum.com

Customer location

Concord, North Carolina
United States

Solution Partner

Swoosh Technologies
www.swooshtech.com

the numbers, we can achieve better than that. We were content with holding a thousandth of an inch but now we're holding ten-thousandths of an inch, achieving accuracy by about 10 times what we were before.

"Anything of consequence gets run through VNCK; that way, if something doesn't come out right, odds are you messed something up on the shop floor, the part was bad from the beginning or it was a bad probe hit. This makes it a lot easier to diagnose errors and know where to look."

Additionally, by shifting to more integrated digital solutions, the engine department was able to reduce its setup time by 50 percent. Previously, setting up was done manually, such as the setup of an engine block taking approximately an hour to complete. Now, it can take just minutes, and team can evaluate before getting started, ensuring more accurate builds.

Racing to the future

Looking towards the future, Hendrick Motorsports is hoping to increase its use of the digital twin.

"We have 50 machine tools on our campus, and only three of them have this capability," says Tummond. "So, we need to flip the script. We need to get some higher-accuracy machines and leverage Siemens software more than we have been. Using the digital twin has opened our eyes to see what is available to make faster race cars."

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