SIEMENS

Hendrick Motorsports

Hendrick Motorsports speeds the pace of PLM

Industry

Automotive

Business challenges

Design the fastest cars and engines on the NASCAR circuit

Adopt new software to preserve a technology advantage

Keys to success

Implement Teamcenter to manage entire spectrum of engine and vehicle information

Results

Better-informed engineering decisions at the race track

Optimized engine configurations

Faster reactions to rule changes

Ability to drill into vehicle data and find information immediately online

Five month time-to-production sets a new record for the industry

Looking for a new advantage

Hendrick Motorsports (HMS) isn't your typical racing organization. Founded in 1984, Hendrick Motorsports fields four NASCAR Sprint Cup Series teams. It also builds 600 engines a year, some for use by its own teams and some that are leased to others. But the scope of its operation isn't all that sets Hendrick Motorsports apart. The organization has gone to Victory Lane more than 200 times and is the only one to win a Sprint Cup championship in five straight seasons.

Chief engineer, Engine Operations, Jim Wall, credits some of that success to the adoption of I-deas™ software in the mid-1990s. This technology enabled Hendrick Motorsports to reduce engine machining time and achieve an unprecedented level of machining consistency. Production costs dropped as well. These improvements correlated with success on the track. The first engines produced using the new technology finished first, second and third at the Purolator 500. Since then, Hendrick Motorsports has expanded its use of NX™ software to all parts of the car. Over time, however, more and more NASCAR teams have also adopted computer-aided design/computer-aided
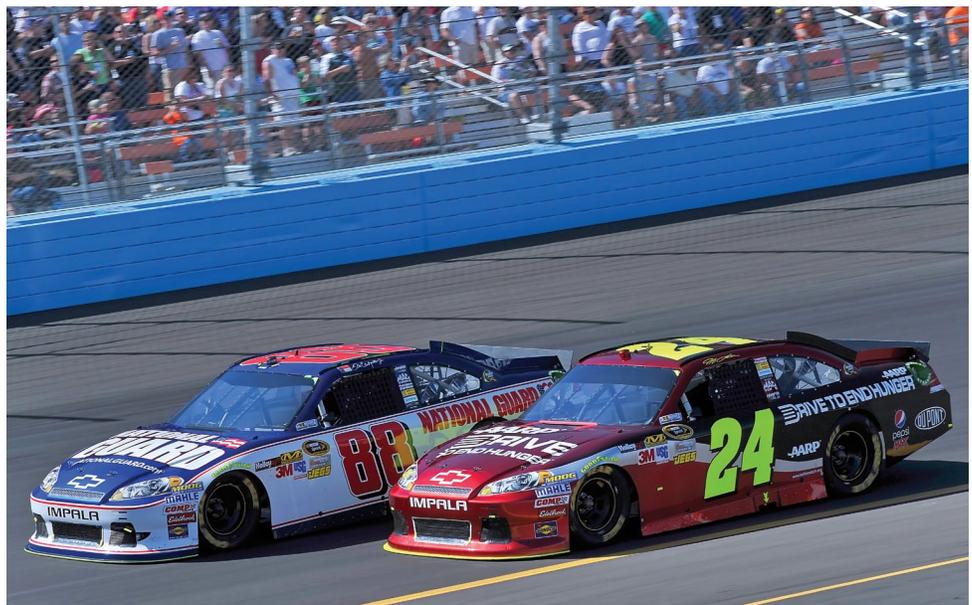
manufacturing (CAD/CAM) and Hendrick Motorsports has sought other ways to preserve its technology advantage using Siemens PLM Software.

Information management needed

One way Hendrick Motorsports plans to lead the technology race involves improving access to vehicle information across its large corporate headquarters, as well as when the teams are away at races. Hendrick Motorsports employs more than 500 people and at least three-quarters of them need access to vehicle information. These people include crew chiefs and engineers on the various teams, people involved in marketing and licensing, members of the chassis department, the engine department and so on. Yet, there is so much information, spread out on 25 physical servers and over 100 virtual servers in nine buildings across the team's 70-acre campus, that it can take people hours to find what they are looking for. The enormous data stockpile includes CAD models, CAM programs, digital simulation results, engine dynamometer data, chassis dynamometer data, wind-tunnel data, track test results and marketing and licensing materials – everything that goes into developing winning engines and cars.

"Without some way to manage all this information, we waste time and sometimes people aren't looking at the latest version of what they need," explains

Jim McKenzie, Hendrick Motorsports' applications manager. "If we have a problem at the race track, we have three days at most to fix it. If you spend a few hours of that time searching for data, it can really handicap you."

Broad PLM implementation at a record-setting pace

In an industry where speed is of the essence, it is only natural to pursue a solution for an information management problem at a record-breaking pace. Hendrick Motorsports selected Teamcenter® software as its product lifecycle management (PLM) digital enterprise backbone, and with the help of Siemens PLM Software's consulting organization, the time from project kickoff to full production was five months.

This five-month implementation sets a new record for the PLM industry, and it's a milestone for the racing industry as well. Hendrick Motorsports is the first NASCAR organization, to Wall's knowledge, to implement this technology. With the implementation complete and all of the product-related data contained within Teamcenter, finding the right piece of data "is immediate and as easy as entering a few words into a search menu," says Wall. "Instant access to information lets us make better decisions in the field, and that results in faster cars on the race track," he adds.

The enhanced information access made possible by Teamcenter addresses many critical concerns facing Hendrick Motorsports (and all NASCAR racing organizations) today. One concern involves managing the vast amounts of test and performance data acquired in the development of new cars and engines. Test data on its own is useful, and Teamcenter brings the much-needed ability to quickly locate specific data. But test data is most valuable when it can be matched up with serialized, as-built and as-tested product (race car and engine) configurations. With Teamcenter, Hendrick Motorsports now has this critical link. "By leveraging Teamcenter's serialization of as-built product structures, we can correlate test data to specific vehicle and engine configurations," says Wall. "That associativity between performance and configurations, which Teamcenter makes available immediately, lets us quickly find the optimum vehicle configuration for any race situation."

Combined with wireless communications, this now means that Hendrick Motorsports can optimize vehicle configurations even when the teams are away at the track. Engineers use wireless notepad PCs at the track to query the Teamcenter database. The notepad transmits information to the satellite link the team has set up on site. The satellite sends the request to Teamcenter back at headquarters and the requested information is returned immediately. In this way, Hendrick Motorsports fine-tunes vehicles for specific races to an extent that wasn't possible previously.

Managing many configurations
Another critical area that Teamcenter addresses is the growing number of product configurations that Hendrick Motorsports must create in response to the demands of its market – the NASCAR racing circuit. "As NASCAR adds races at new facilities, that drives us to create new vehicle configurations so we can be competitive at the new tracks," explains Wall. Teamcenter helps speed the creation of new vehicle configurations by allowing Hendrick Motorsports to work from generic representations of the vehicle and engine, altering them to the specific requirements of a new racing situation. "Teamcenter's parameterized product structure lets us rapidly generate any possible configuration we might need," Wall adds. "This ability to make rapid configuration changes matches the pace of how we need to do business."

A third area where Teamcenter is poised to play a critical role is in the area of problem reporting. When a race team experiences the failure of a part, a material or a design, it needs a way to capture that information and to determine whether it may mean that there are other failures waiting to happen on other vehicles. "We need to find trends," says Wall. "And we need to be able to do that quickly and before they become disasters." With Teamcenter, Hendrick Motorsports can tie failure information to the as-built product structure so it is immediately evident if there are other places where these failures might cause problems. The vendor management capabilities of Teamcenter provide additional ability to mitigate risk by managing vendor services and qualifications.

Strong throughout the lifecycle
Historically, product data management (PDM) systems have limited their scope to managing data in the design arena. Hendrick Motorsports' PLM solution, Teamcenter, goes beyond that, on both the front and back ends of the product lifecycle, to manage a much broader scope of information. At the front end of the lifecycle, Teamcenter can incorporate

requirements data, such as new rules handed down by NASCAR. Ultimately, this may permit a requirements-driven design process. On the back end of the product lifecycle, Teamcenter offers the unique capability of incorporating serialized, as-built, configuration data. This is vital to Hendrick Motorsports, which is as much a manufacturer as a racing organization. "We are really an automotive remanufacturing facility and we have to maintain all of the assemblies we put together," says Wall. "Having the ability to push the product configuration out into as-built as a serialized entity will give us more control through the entire product lifecycle, both for the vehicles we race as well as the engines we lease to other teams."

Teamcenter also provides Hendrick Motorsports with the necessary level of access security for this large organization that shares data among different race teams and suppliers. As Wall explains, "We have to pay attention to who can see what information, and Teamcenter's security model helps us maintain confidentiality from area to area, but also permits collaboration with the appropriate data."

Solutions/Services

NX
www.siemens.com/nx

Teamcenter
www.siemens.com/teamcenter

Customer's primary business

Hendrick Motorsports fields four NASCAR Sprint Cup Series teams and supplies engines to other NASCAR organizations.
www.hendrickmotorsports.com

Customer location

Charlotte, North Carolina
United States

"Everything we do in engineering is about getting a competitive advantage. When we can use Teamcenter to make a better decision at the track, that translates into a competitive advantage."

Jim Wall
Engineering Group Manager
Hendrick Motorsports

Not stopping now

Future goals involve facilitating collaboration to an even greater extent. One way to do this is to extend the use of the NX products to all of Hendrick Motorsports. Each team maintains an engineering team (four Sprint Cup teams), and the chassis shop and engine shop both have significant staff. All of these are now using a common database for their 3D design data. One initiative is to extend the availability to 1) interact with the other data types (race data, test data, etc.), 2) allow for nonengineering groups to visualize and leverage this data, and 3) enhance the access model to the point where the crew chiefs and teams can access any data anywhere.

Another way this will happen is by using the visualization capabilities of Teamcenter to combine data from many different CAD systems into one model. Currently, when Hendrick Motorsports receives CAD data in a different format from its own, from a supplier for example, it is difficult to validate that design in the context of the larger assembly. Teamcenter permits a neutral representation of heterogeneous

CAD data through the use of JT™ data format files, making it possible to edit, analyze and validate heterogeneous CAD design structures. Support for the JT format will also enhance collaboration by allowing Hendrick Motorsports to send 3D representations to people who are not CAD users.

Hendrick Motorsports will also use Teamcenter to control workflows, which should greatly speed the process of implementing rule changes. "Sometimes, within a week we have to have a new part designed, built, tested and put in place before the next race," says McKenzie. "Having Teamcenter manage the engineering review cycle could save us half a day or more in getting that done." The enhanced information access and collaboration made possible by Teamcenter, combined with advanced NX design and manufacturing solutions, enable Hendrick Motorsports to once again pull ahead of its NASCAR competitors.