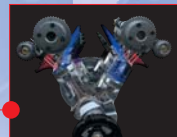




Interactive Taurus cutaway



Ford's new EcoBoost engine

By Bernadette Hearne

## Ford Powertrain leverages CATIA globally

Ford Motor Company has an impressive history of automotive excellence. Today, armed with the power of CATIA for virtual design, Ford Global Powertrain is developing the next generation of durable, fuel-efficient engines and transmissions for drivers worldwide.

Increasing globalization of the world automobile market means more companies are vying for consumers' business. To be successful, automakers must introduce more products that exceed consumers' expectations and grab their attention while continually reducing costs.

One solution increasingly helpful to the industry's success is CATIA, a key enabler of product creation. Ford Motor Company launched its use of CATIA in 2003 for Body-in-White (BIW) development, followed by Ford's interiors, chassis and electrical groups. Ford's Global Powertrain Organization (PTO), including the engine, transmission and driveline development groups, is the latest major Ford organization to make the switch.

2009 Ford F-150 being assembled



### EMPOWERING GLOBAL COMMUNICATION

Ford Motor Company operates in 200 markets across six continents, so the ability to easily share design information, processes and tools on a global scale is critical. The Powertrain organization alone works with 42 manufacturing plants, four design and engineering centers, and six prototype facilities in 14 countries.

In the past year, the Powertrain organization has launched 20 major programs; overall it supports more than 120 programs, including engines and transmissions. To successfully migrate many of its existing global powertrain programs while designing new programs with a significantly streamlined team, major efficiency improvements are paramount. Using CATIA worldwide supports Ford's focus on improving time-to-market, further increasing product quality and reducing product development cost.

Dassault Systèmes (DS) consultants helped Ford get off to a fast start with assistance in developing methods and improved processes. Advanced training was developed based on proven best practices, coupled with Ford-specific content. "Best practices have been a big asset in helping

us develop our template strategy and customize the training," said Jeff Bautz, PTO 6-Sigma Deployment Director/Design Manager, Large Gas & Diesel Engine Engineering.

### A BIG CHANGE WITH NO PRODUCTIVITY LOSS

More than 95% of the pilot projects for transmission assembly have been modeled and released for production. In all, six programs in the Transmission and Driveline organization have migrated more than 80% of all activity to CATIA V5. Five programs in the Engine organization have migrated as much as 40% of their activity to CATIA V5.

When you give the right tools to a strong team such as ours, there's no limit to what they can accomplish.

"Today, at the one-year point, productivity is already higher and we are positioned for further gains by taking advantage of advanced features," said Lisa Greene, Transmission and Driveline Engineering CAD/CAE Manager. "With such a major change we would have expected significant delays, but the initial project was completed in the same time that would have been required with our previous, heavily customized tools."

### MASTER SKELETONS IMPROVE REUSABILITY

The Powertrain organization has used advanced solution features to achieve improvements in its design and engineering methods. For example, to promote robustness and reusable products, Ford Powertrain staff defined master skeletons that allow many related parts to be updated with a single change entry.

"Templates have helped us reduce the design time for the cylinder head and valvetrain by up to 11 days for each iteration, and we often have 20 iterations," Bautz said. "This makes it possible to optimize the design to a higher quality level. Preliminary estimates are that we can cut three to four weeks off the time required to concept and design an engine."

Ford Powertrain engineers also are using CATIA templates to increase quality by making the design of hard-to-model parts consistent. For example, gears and splines for transmissions were previously modeled manually, a time-consuming and error-prone approach that could require dies to be corrected at substantial expense after tooling was complete.

Ford PTO designers can now enter intelligent rules-based information that defines the gear or spline, such as the pitch diameter and number of teeth. The template automatically generates the design, saving an average of two hours for

Companies that adopt the latest technology are the ones that will rise to the top in this extremely competitive environment.

each of the 18 gears in a typical transmission and reducing the potential for error.

"Ford's integrated template strategy is a top-down philosophy to drive modeling standards, incorporate design engineering rules and increase reusability to drive higher quality and reduce time," said Sassan Khoubiyari, Powertrain C3P-NG Methods and Deployment Lead, Ford Global PD Digital Innovation.

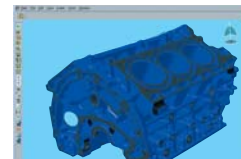
The Powertrain technical staff is now developing templates and deploying advanced modeling practices for all future powertrain programs.

### FAST START IS JUST THE BEGINNING

Ford has made a fast start, but the Powertrain teams see numerous opportunities to build upon the benefits and extend them to new areas. "We are continuing to explore opportunities to increase the integration between CAD, CAE, and engineering disciplines to improve concurrent engineering," Khoubiyari said. "We are looking to take days and months from our development process by exploiting this advanced technology." For example, Ford is starting to integrate design rules into CATIA. One application is to establish intelligent protection zones that cannot be violated

by parts installed before the engine and transmission, but can be violated by parts installed after that point. Protection zones are also used to identify and protect areas subject to roll during acceleration and deceleration, so these zones can be kept free of parts.

"It's the technology solution plus the employee knowledge and can-do attitude that brings results," Bautz concludes. "When you give the right tools to a strong team such as ours, there's no limit to what they can accomplish!"



Engine cylinder head

For more information:  
www.ford.com  
www.3ds.com/solutions/  
automotive/overview