

Automotive and transportation

AFCC

Automotive center of excellence for fuel cells uses baselining functionality in Teamcenter to reduce volume of engineering change orders

Product

Teamcenter

Business challenges

Migrate business processes from existing PLM applications to Teamcenter

Integrate third-party CAD application with Teamcenter

Generate appropriate BOM for different departments

Adopt process-based technologies of Teamcenter to effectively manage business

Establish a failure reporting analysis corrective action system to improve quality

Keys to success

Support of senior management for PLM strategy

Use of Siemens PLM Software's value delivery methodology

Support, passion and focus of AFCC PLM team

Adopt enterprise-level PLM as the corporate information system

Siemens PLM Software solution enables AFCC to enhance productivity by facilitating knowledge re-use

Finding an alternative

Established in 2008, Automotive Fuel Cell Cooperation Corporation (AFCC) is a Canadian-based joint venture of Daimler AG (Daimler) and Ford Motor Company (Ford) that is the center of excellence for the development of hydrogen fuel cell stacks for automotive applications.

The origins of AFCC were in the Fuel Cell Alliance, which was formed in 1997 between Daimler, Ford and Ballard Power

systems, Inc. to jointly advance the commercialization of automotive fuel cell technology. Following a successful 10-year alliance, Ballard sold part of its automotive fuel cell assets to Daimler and Ford in 2008, and the transaction was finalized in 2012.

When AFCC was spun off from Ballard Power Systems, Agile® software was being used for product lifecycle management (PLM) solution and Pro/INTRALINK® software to manage computer-aided design (CAD) data.

A group was formed to evaluate AFCC's future PLM requirements. The major



Results

Reduced the volume of engineering changes by 30 percent when using baselining

Achieved superior collaboration with parent company Daimler AG

Reduced costs and increased productivity with knowledge re-use

Improved process efficiencies through extensive use of work flows

Increased cross-functional collaborations with CAD integration

Achieved accurate transfer of information to Daimler using JT



The front of the Mercedes-Benz B-Class F-Cell contains the electric motor, transmission, auxiliary systems (like air conditioning) and the radiator. The hydrogen fuel cell module is positioned under the front seat. The orange power cables run from the fuel cell module to the silver-colored DC/AC inverter, which provides power to the electric motor. The three black tanks hold sufficient hydrogen for 400 kilometers of driving.

outcome of the group's efforts was that Siemens PLM Software's Teamcenter® software was selected for PLM because it had the most up-to-date and complete solution and it would integrate better with the different versions of Teamcenter software that were already in use at both of AFCC's parent companies.

Using Teamcenter enabled AFCC to significantly improve the integration between its CAD and PLM systems, upgrade its ability to visualize complex 3D models, enhance its configuration management capabilities and generate bills of materials (BOMs) for downstream users in manufacturing, purchasing and production.

Enhancing CAD integration

"One of the big drivers was that Teamcenter provided a superior CAD integration solution," says Ricardo Moreno, who leads PLM operations for AFCC. "This

resulted in the elimination of manual synchronization of two independent data silos.

"That was the motivation for adopting Teamcenter. It provides a single platform for sharing and collaboration, eliminating different data silos.

"We were a smaller company so we needed to be more efficient. With Teamcenter, we were able to run an enterprise PLM system complete with full CAD integration. Prior to having this integration, the only way that you could get a picture of where things stood during design changes was by going to the CAD designer and viewing the 3D models at the Pro/INTRALINK workstation. In addition, manually synchronizing the BOMs of two systems wasted a lot of time, which is no longer the case with Teamcenter."

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PLM Administrator
Automotive Fuel Cell Cooperation

Providing configuration management across the lifecycle

Another key factor behind AFCC's decision to license Teamcenter was its capability to create specific workflows. With this capability, AFCC was able to develop several workflows to support, among other business processes, a failure reporting, analysis and corrective action system (FRACAS). To support the FRACAS process, AFCC also uses Teamcenter Service Lifecycle Management as the as-built manager to capture serialization information from the manufacturing process.

Workflows are used extensively at AFCC. For example, the company uses the FRACAS process to provide a permanent record of as-built assemblies; track incidents and nonconformance; make assessments and decisions on product or component incidents; keep detailed records of failure investigations and conduct incident investigation and resolution utilizing the Eight Disciplines Problem Solving (8D) method.

Picturing a better way

Having high-level visualization capabilities is critical for AFCC, and the JT™ data format in Teamcenter has proved to be invaluable. JT is the only ISO-certified, lightweight product visualization format that enables users to leverage the benefits of open collaboration across the extended enterprise, a technology that makes it possible to view and share information throughout the product lifecycle. With JT, AFCC has the ability to leverage the complex 3D model created using CREO® software and re-purpose it in a re-usable format for downstream consumption.

"With JT, we could interrogate a part, use it in a PowerPoint and share it with partners," says Moreno. "JT puts less of a burden on engineering as downstream users are empowered to interrogate product data in real time and make decisions without the need for an expensive CAD seat or access to a designer or engineer."

Furthermore, the JT format has been used by AFCC to provide accurate BOM information to Daimler for full engineering verification and signoff. The 3D information and metadata are extracted from Teamcenter and processed by Daimler quality checking tools and then imported into Daimler's system. This has allowed AFCC to continue using a different CAD system than Daimler, resulting in significant cost savings.

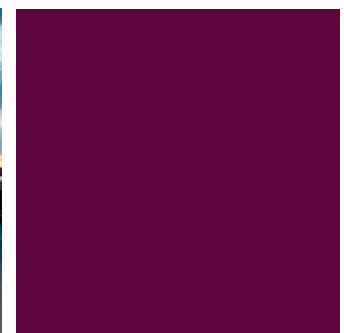
Empowering the extended enterprise

Teamcenter has always been treated as the enterprise solution at AFCC. Every employee has Teamcenter loaded on their desktop and secure access to all of the information stored in the database. AFCC made the decision to provide authoring capabilities to most employees, which helped promote Teamcenter as the single source for all product information. All employees leverage Teamcenter for their automated business processes, from simple purchase request routing to complex enterprise change management processes, further establishing it as the company's information backbone.

AFCC adopted the change management module in Teamcenter and configured their change management workflows to suit internal engineering and business requirements. In early 2013, baselining functionality was offered to allow the release and communication of incremental versions of the design prior to full release. The availability of baselining and other

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Cooperation



business process improvements quickly paid off as the company found that the need to fully release data for external communication and discussion purposes was eliminated, thus saving a significant amount of time.

“Improvements to the change management process allowed us to identify bottlenecks and offered version baselining as the process to capture engineering changes for collaboration with external partners,” says Moreno. “As a result, it attracts more users and improves our workflow from one task to another.”

Envisioning the future

Since the initial implementation of Teamcenter in 2009, AFCC has continued to expand its use of the technology. In the beginning, the integration of requirements management based on the system definition being received from Daimler was seen as a critical application, as were the integrated schedule management capabilities.

AFCC required a standalone manufacturing BOM (mBOM), enabling it to take advantage of the multi-structure management capabilities of Teamcenter. This capability has enabled AFCC to leverage its design BOM for use downstream and synchronize the information with its manufacturing planning BOM.

AFCC has also put the Audit Manager capability of Teamcenter to good use, enabling the company to monitor dataset utilization by tracking activities against them. This allows AFCC to examine activities that could present security concerns. The Audit Manager can also be used to show consistent execution of processes to third parties and external auditors for certifications.

It also enables AFCC to check workflow efficiency by tracking metrics associated with each of the key activities. The data generated using the Audit Manager can also be fed into a Teamcenter Reporting and Analytics application to create reports that show the time spent at various stages of the process in order to support continuous improvement initiatives.

Schedule Manager is currently being tested for a planned rollout company-wide. It will be used to plan and monitor the organization’s projects. Having uniform schedules in a single location with the ability to nest schedules from the various engineering disciplines into a master program schedule with common milestones should be a significant improvement over the current unconnected method.

Partnering at all levels

Siemens PLM Software used its value delivery methodology (VDM) during the

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Solutions/Services

Teamcenter
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Customer's primary business

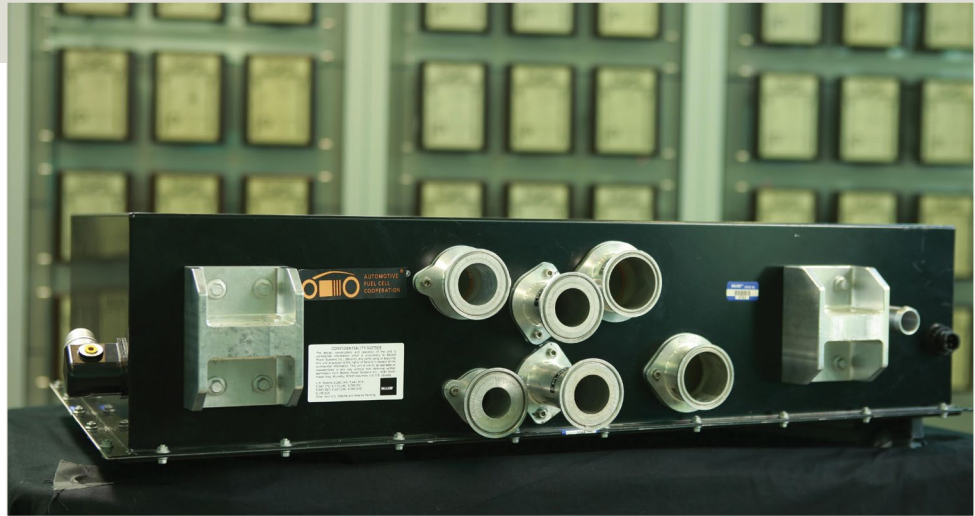
Established in 2008, AFCC Automotive Fuel Cell Cooperation Corporation is a Burnaby, British Columbia-based joint venture of Daimler AG and Ford Motor Company to develop hydrogen fuel cell stacks for automotive applications. Together, they have more than 280 fuel cell vehicles on the road.
www.afcc-auto.com

Customer location

Burnaby, British Columbia
Canada

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The rear view of AFCC's hydrogen fuel cell module. This module contains the fuel cell stack that powered the Mercedes-Benz B-Class F-Cell. The nozzles are for coolant in/out, hydrogen in/out and air in/water out. When the fuel cell stack consumes hydrogen, it produces heat, electricity and pure water. The water leaves the stack in the form of steam (at 70 degrees Celsius).

multi-phase implementation to help ensure that AFCC's business objectives were met at each stage of deployment. The methodology combines project management, technical delivery, consultancy and solution architecture, and is structured to allow iterative and flexible project delivery while maintaining milestones between phases, emphasizing the re-use of templates, best practices and a strong governance model.

Additionally, Siemens PLM Software and AFCC executives have come together in management review board (MRB) meetings to assess the business objectives and understand how the Siemens PLM Software technology roadmap can be leveraged to bring value to the company.

"Early on, this close cooperation between AFCC and Siemens PLM Software was a big factor in our ability to significantly streamline and enhance our processes," says Moreno.

Siemens Industry Software

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