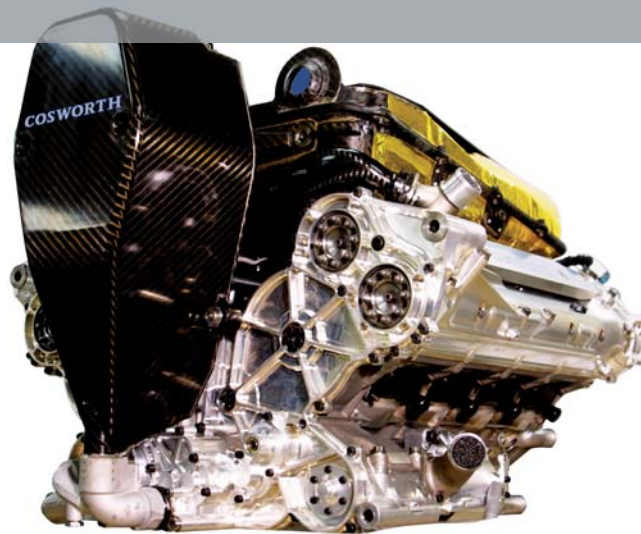


SAP integrates NX into Sophisticated Engineering

by Robert Preston, PLM Solutions Ltd



Cosworth is a leading provider of high performance technologies to a diverse range of customers in the aerospace, defence, marine, automotive and energy generation markets. The group's activities in the world of Formula 1 are well documented with Cosworth engines delivering 176 grand prix victories to date. Cosworth's diversification into adjacent markets has been driven by the group's ability to transfer its technologies and expertise to deliver cost effective performance solutions for a wide range of customers.

One of the secrets of Cosworth's success lies with its exemplary engineering design personnel and the processes they employ. From the rapidly changing world of Formula 1 to the stringent controls of aerospace it is the quality of information produced by the engineering departments that will determine the success of a project.

CAD / PDM

In the late 1990s Cosworth chose Unigraphics – today NX – as their preferred CAD solution and it wasn't long before the traditional drawing boards were replaced with

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CAD seats throughout the company. With the new CAD system came the requirement for a unified change management process and as Cosworth moved into the new millennium a very simple in-house engineering change / PDM system was born. Known internally as the Engineering Information System (EIS) this system was designed and implemented around the specific requirements of the engineering departments and, whilst light on functionality, was very popular with the users.

It soon became clear, however, that the EIS did not manage the increasing volume of CAD data effectively and the integration with Cosworth's aging ERP system (ManMan) was virtually non-existent. By combining the search for a suitable ERP replacement with an EIS replacement Cosworth was in the enviable position of being able to look at both the engineering design and change management processes in conjunction with those of manufacturing and logistics.

Complete SAP Solution

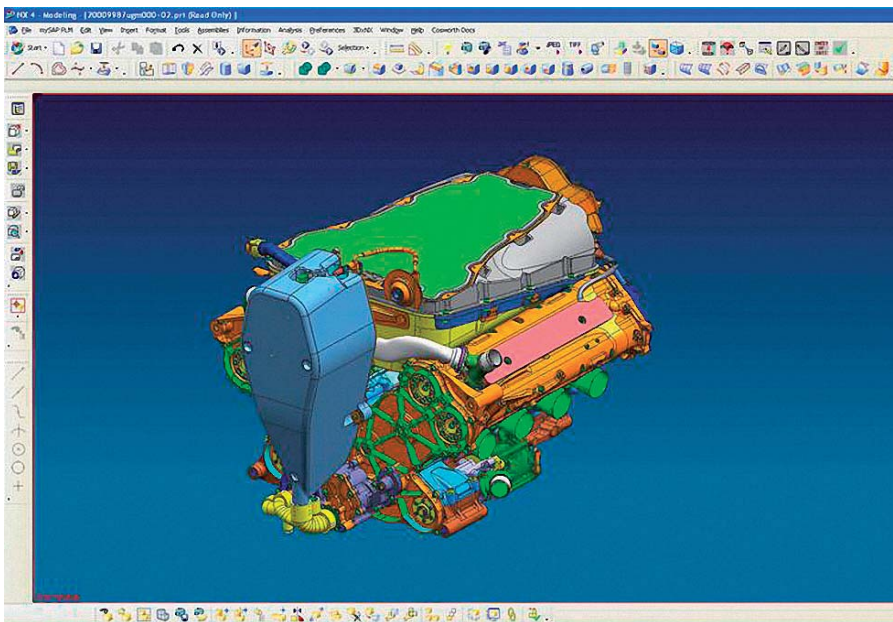
With experience of maintaining multiple IT systems, Cosworth was acutely aware of the problems and costs associated with running ERP and PDM separately. As a result, it was easy to see that purchasing these systems separately and then trying to integrate them would prove to be, not only expensive, but also, very difficult to achieve a satisfactory solution. By choosing SAP and the SAP PLM Integration for NX, developed for SAP by DSC Software AG, Cosworth was able to implement a complete business solution covering ERP and PDM with: no impact on the CAD system, no complex integration issues to solve and at a cost effective price.

CAD Design Process Optimization

Whilst it had been recognised that the EIS was lacking in many areas, the engineering departments' CAD processes were well defined and strictly adhered to. The EIS managed CAD data by automatically moving files from an open access file structure to a read only file structure at a specific point in the change management process. This successfully controlled access to released data but it destroyed the object links in assembly models making it increasingly difficult to maintain an accurate assembly model higher up through

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the structure. Consequently top level engine assembly models were virtually never maintained. In addition the process for releasing material and Bill of Material (BoM) master data was completely independent of the CAD system. This stemmed from the philosophy of the CAD system being an electronic version of the old 2D drawing despite the obvious 3D capabilities that were being used throughout engineering.



Cosworth's powerful engine getting developed in NX

Not only would the engineer be required to model each component in Unigraphics but he/she would also be required to independently generate material numbers in EIS and also to describe the BoM structure in free text on the Engineering Change document. Upon release the BoM administrator would then manually create the BoM from scratch in the ERP system.

The major benefit of the SAP PLM Integration for NX solution with its User Interface Engineering Control Center – ECTR – was in its handling of assembly models and the integration of these into SAP Master Data.

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ECTR's use of SAP Status Networks gave significantly better control of un-released and released data without destroying any of the object links in the assembly models. This gave engineers the ability to generate a complete, top level, engine assembly model safe in the knowledge that it would continue to be maintained accurately regardless of changes made within its complex structure.

Also, any assembly model can very quickly and easily be viewed as a released-to-production view, or in the latest, un-released, development view, or even any state between these two extremes (provided the change management process has been adhered to).

In addition the status network gives engineers the ability to pass un-released files from person to person for editing. Prior to the SAP solution the system administrator had to change the file owner before this could be done. For non CAD users the automatic generation of JT files for models and CGM files for drawings was an added benefit which enabled them to view both model and drawing files in SAP at any point in the design process.

Scalability

With a sister company (Cosworth LLC) based in Torrance, California, Cosworth had always struggled with the transfer of large CAD files between the two plants but this problem was completely solved with the SAP PLM solution. Content servers were installed in both locations and both servers were also configured to cache data. An overnight job was created to cache any changes between the two servers leaving only data that was actually being updated in real time unique to the individual plant.

SAP Master Data Maintenance

This superior control of the CAD data then opened further benefits that are only possible due to the integration provided by ECTR. The engineer generates SAP material masters from within the CAD system for each of the model files as required.

Success Story

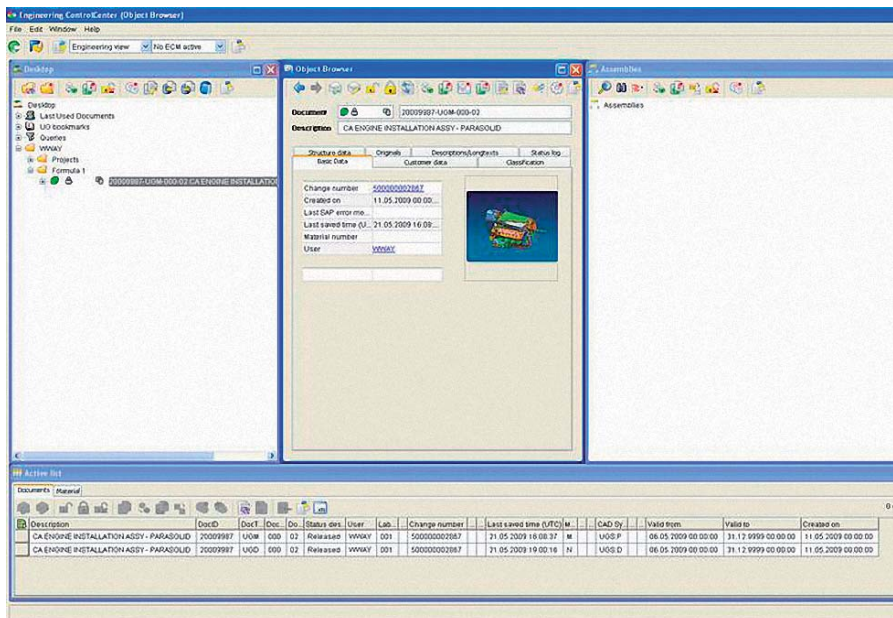
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Once all the necessary material masters have been created the BoM can be generated directly from the assembly model. This process not only saved a huge amount of time, for both the engineer and the BoM Administrator but it also ensures that there are no errors in the production BoM – the engineer will now get exactly what he has designed.

Engineering Change Management

Another significant benefit of ECTR is the handling of engineering change management functions. The configuration of engineering change management in SAP has been utilised at Cosworth to provide a comprehensive checking procedure for all departments affected by design changes. In the past the EIS was able to provide a mechanism for engineers to describe the requirements of a change and to get these requirements approved by management but it relied upon good practice throughout the business to execute the change.



A significant benefit of ECTR: easy-going engineering change management

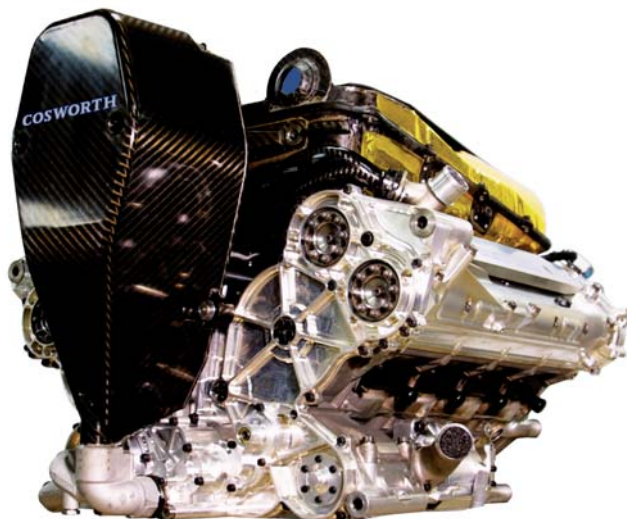


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Today's SAP change management process not only provides this same mechanism but also goes one step further in that it provides: a trigger for users to execute the change, the ability to add comments to the change and the option to confirm that the change has been completed.

By associating a 'Valid From' date to the change number and then using this change number when updating master data such as document, material, BoM and route the change will only be made effective across all master data when the 'Valid From' date is reached. This date can also be changed as required on the change master thereby updating all objects affected by it.

It is this functionality that is put to such good use in ECTR to enable the engineer to concentrate on a particular change number or date, navigating to the change directly from the CAD system and using the change number to identify documents affected by it.



Ready for action: high performance race technologies for champions

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Implementation Process

The solution was implemented with the help of the implementation partner DSC Software AG. The first task was knowledge transfer from DSC to Cosworth. This process was duly completed with a DSC representative on site in Northampton.

Once the knowledge transfer was complete the next task was to map out the desired Cosworth process by combining the know how from the two organisations. With this process clearly defined it was then possible to configure the SAP system to support the process and begin the task of testing the solution in the QAS environment.

The Cosworth SAP implementation was split up into three simulations but it was clear after the first simulation that only minor tweaks would be required before 'Go Live' and the team were then able to concentrate on the significant task of data migration.

Data Migration

With in excess of 10 years worth of legacy data to consider it was clear that the data migration task was not trivial. Added to the size of the task was the knowledge that the assembly models were largely incomplete and any object links within them would in all probability no longer be accurate.

With the help of DSC Software AG however this seemingly impossible task was quickly broken down into manageable chunks. The first task was to identify the most important assembly models. At the time this was relatively easy to do, the current products and their rebuild kits were all that was required. This generated a list of approximately 20 top level assembly models that would be required on day 1 after 'Go Live'.

Using DSC's ++MSIT toolkit Cosworth's SAP implementation team were able to embark on a data cleansing process that took each of these 20 top level assembly models and analysed all the object links within them.

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This generated a list of files that would be required to make up the assemblies. By combining this list with the list of latest versions the ++MSIT toolkit was able to update the object links to reflect the latest released version of each assembly model.

Once this process had been repeated from every level in all 20 model file structures the ++MSIT toolkit was then used once more to extend the document information as required and finally to migrate all the data into the appropriate SAP data vault. After migration the original files were archived to tape and removed from the old file structure. The process proved to be very reliable and, for small assemblies, very quick to execute.

Workflow

Having proved the basic process to be sound and to support the business in its diversification programme, future enhancements are aimed at introducing workflow to push information out to users in preference to the current model where users will only get information by pulling it out of the system. Work-to lists will be supported by notifications containing hyperlinks and approval steps, that involve status checks only, will be automated.

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