

Expanding the positive impact of CFD software

Doug Kolak reports on the need for engineering knowledge to be captured in an accessible format and shared across organisations irrespective of their geographical location.

Economic pressures have led to increasing globalisation with engineers, analysts and designers working in different locations around the world (reflecting local economic pressures and skill availability). For example, the availability of qualified engineers in the East along with the shrinking manufacturing base in the West. This can often lead to information being stored in silos, a major barrier to knowledge sharing which is key to minimising repetitive testing.

Internationally, the trend of an ageing engineering workforce with years of valuable experience means that knowledge attrition is a real concern. This knowledge needs to be captured in an accessible format and shared across organisations irrespective of their geographical location or position in the development cycle.

To stay abreast of the CAE software market and also industry pressures, Flowmaster seeks continual feedback from customers and thought leaders in order to remain at the forefront of both technology and best practise. Openness and interoperability are two of the key drivers in this marketplace. Companies are looking to develop integrated CAE modelling and simulation environments as part of a multi-disciplinary simulation initiative and therefore increasingly look for products that are developed in this way.

Flowmaster considered how its computational fluid dynamics (CFD) software could facilitate greater sharing of data and knowledge to overcome the challenges facing fluid engineers. Software that encompass the following solutions would offer a real advantage to engineers, analysts and designers wherever they are working.

1. Increase the re-use of knowledge – where previous IP has been conceived re-use will decrease costs and development times;
2. Assist Simulation driven design – moving away from simulation validated design, seeking to decrease development times; and
3. Create a knowledge bank – to capitalise on the disparate knowledge held, impacting positively on future development.

Launched earlier this year, the Flowmaster V7 Software Development Kit (SDK) provides customers with a suite of tools to enable Customisation, Extension, Automation and Integration of Flowmaster V7 within product development and product lifecycle processes. This allows customers to integrate their CAE systems and gives them the opportunity to take a multi-disciplinary approach to these processes. These tools are broken down into:

- Technology: (Script Editors (Macros, Scripts and Plug-ins); APIs (.NET and COM); XML Schemas.
- Documentation – Guides for implementation along with Code; Analytical Models; Scripting Controllers; Automation Macros.
- Training.

Data Management

Data has to be collected from many different suppliers along with departments within BAE SYSTEMS. Once acquired, some data required translation to 'modelling units'.

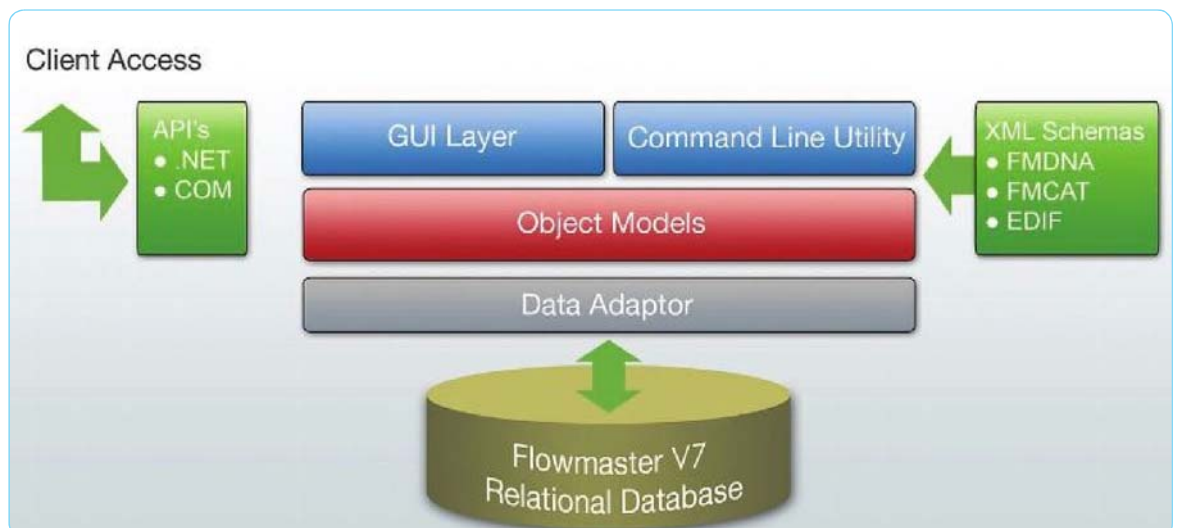


Fig. 1. Openness and interoperability are CAE key drivers.

The data obtained had to be held securely under proper configuration control. This not only allowed the model users to determine the 'build state' but also ensured that changes made by suppliers could be incorporated. It also indicates whether the data are: specification values, from calculation or measured from test.

The data must be transferred accurately and quickly to the analysis in a method that avoids the possibility of transcription errors.

Integration with complex database

The customer integrated Flowmaster into a complex database to provide the users with an integrated modelling environment tailored directly to their requirements. The database facility provides the ability to store and maintain all the data to aerospace configuration control standards. The database design eliminates data duplication. Finally, a 'wizard' was developed that transfers data from the database to Flowmaster eliminating the possibilities of data misuse and transcription errors.

Identifying system failures

The UK's Ministry of Defence (MoD) was experiencing multiple pump and pipe work failures within the sea water fire mains on two vessels. These failures were attributed to various causes: very high cost of maintenance on pumps; frequent mechanical seal and motor bearing failures; inability to meet system design requirements.

Various small targeted initiatives to try and improve system performance were carried out, however it was recognised by the Marine Auxiliary Systems Integrated Project Team that a more joined up, system wide approach was required to address the root cause of the problems.

Designed to mimic current onboard system management software, a custom interface was developed in Microsoft Excel and fully integrated with Flowmaster, enabling service engineers to run simulations and view results through a familiar software environment.

The integration of Babcock Marine's user interface enabled engineers to validate the system designs in Flowmaster quickly and easily. To add clarity to the results, pressure readings were automatically extracted from the Flowmaster model at the actual positions of the onboard remote pressure indication. These readings were superimposed onto the model diagrammatic to give direct correlation with the readings visible on the onboard control programs.

The future

Companies will continue to seek greater integration and customisation of all CAE tools and only by providing openness and interoperability will vendors be able to satisfy the market demands.

By taking a system wide, integrated approach customised for their specific users, customers will see real solutions to the industry challenges. ■

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