

Project Results

Virtual design speeds product engineering

3D test platform cuts time and cost in multi-disciplinary development environment

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Many disciplines are now involved in industrial product design, making it necessary to operate at a higher level to review activities and catch integration problems early. The ITEA 2 3D-TESTBENCH project has developed a virtual environment linking multiple engineering tools for collaboration in design analysis and validation of complex products. It provides a multi-disciplinary 3D display solution based on integrated automated workflows and knowledge-based engineering tools to enable virtual prototyping and testing – reducing design times and costs markedly.

Until relatively recently, only a few people were involved in developing and building a new product. Now many more people are drawn in because complexity has increased and more disciplines – technical and non technical – have become part of the design and manufacturing phases.

3D-TESTBENCH has developed a test platform allowing all participants to visualise and validate a complete development or part of a development.

This involved a virtual design environment consisting of multiple engineering design tools to take collaboration and design analysis to a new level and even further to improve the validation processes of complex products.

As a result, the whole team can come together in one place to review the design on a 3D display with input from multiple desktop or laptop computers, moving from one block to another in the development cycle. And this approach could be extended to enable collaboration between remote teams enabling them to have the same views of the project.

MULTI-DISCIPLINARY DEVELOPMENT

Integration of the multi-disciplinary development process focused on:

1. The need for a collaborative engineering environment with high-end visualisation technology and workflow automation software to make it smart; and
2. The growing importance of knowledge-based engineering to take software-based modelling and simulation to a new level.

3D-TESTBENCH (ITEA 2 ~ 06043)

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Partners

Barco
Delft University of Technology
Fokker ELMO
LMS International
Vrije Universiteit Brussel

Countries involved

Belgium
The Netherlands

Project start

October 2007

Project end

December 2010

Contact

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Project Results

The project integrated mainly existing technologies – but with new twists. Innovations included: integration of the engineering work flow; development of desktop-sharing technologies; creation of a domain-specific language to automate aircraft wiring harness design; formalisation of design processes for knowledge-based engineering; and more ontology-based integration for future enhancements.

A major benefit is the use of computer resources to predict and provide a virtual experience of a product without the need to build it. 3D-TESTBENCH used knowledge-based engineering to eliminate the need for expensive prototyping with real hardware. The result is achieved faster and cheaper in a collaborative environment with all the disciplines in one room.

Less tangible advantages include:

- Simple workflow management with a session structure as easy as using a Lego building block system;
- Automatic reporting of development/review for project leader; and
- A high speed and network-efficient desktop sharing system which meets industry expectations – such not having to switch plugs when viewing a series of presentations from different computers.

REAL INDUSTRIAL BENEFITS

Use cases demonstrated the benefits in a real industrial environment. For example, Fokker Elmo has been able to automate

the pin assignment for electrical connectors in an aircraft – a process which had to be done manually before. Savings of 2,300 hours of engineering labour resulted per aircraft programme. And savings of up to 1,600 hours of engineering labour per aircraft programme have resulted from automating wiring harness design.

Overall, the project was very successful with a series of building blocks already being commercialised. Use of knowledge-based engineering in applications development is already providing savings of over 20% compared with traditional automation. And this will increase when the domain-specific language is extended.

Barco's XDS desktop-sharing solutions make it possible to bring different sources together on one big screen. No special new software is required – the system just shows what is already on the PC. XDS systems are already being delivered to car manufacturers and the oil and gas industry. Barco is intending to establish engineering design rooms internally using this approach.

NOESIS Solutions, a LMS spin-off, is also already marketing its OPTIMUS workflow management software and allowing the federation of many engineering disciplines to effectively support engineering collaboration. And the knowledge-based engineering solutions developed by TU Delft have led to a spin-off – KE-Works – which is supplying implementations to Fokker Elmo.

Major project outcomes

DISSEMINATION

- 11 publications, including 1 joint consortium paper
- 1 presentation at the NAFEMS World Congress 2011
- 2 extended live demonstrations at Fokker Elmo
- 2 prototype presentations at the ITEA 2 Co-summit in 2009 & 2010

EXPLOITATION

- 3 new products (Barco: XDS, LMS: OPTIMUS, KE-Works: AWARD)
- 1 new service

SPIN-OFFS

- KE-Works: Spin-off of the chair Design of Aircraft and Rotorcraft at the Aerospace faculty of the Delft University of Technology. It supports valorisation of KBE technologies in industry and specialises in the full-scale implementation of KBE applications

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■ ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services. As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

■ ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

■ ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.



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