

Bombardier Exceeding Customer Expectations with IC.IDO

BOMBARDIER
the evolution of mobility



Challenge

When Bombardier won a high profile contract to supply 47 INNOVIA METRO 300 rotary two-car trains for a metro line in Saudi Arabia, it knew that expectations were high – Riyadh's stated ambition is to have the best metro system in the world when it opens in 2018. However, the situation was also highly competitive, as two leading competitors had also been awarded contracts to supply exactly the same design of train for other lines within the City. Not only that, but the schedule imposed on the three firms was identical. With a total contract value of \$385 million and the potential for future business, the Bombardier team had to prove its capacity to deliver on time and to a high standard. It was understood that, in order to ensure a competitive edge, Bombardier must exceed expectations. To do this, Bombardier decided to prove its capability through the use of ESI's Virtual Reality (VR) technology.

Benefits

- Fostering trust early in a major contract, getting buy-in from key decision makers
- Proving Bombardier is technologically ahead of the curve
- Saving time and money, as design changes are made virtually
- Creating an aesthetically pleasant, fully functional 1:1 scale VR model using pre-existing CAD data
- Superb PR from the event, with five television crews attending, giving prestigious media exposure in the region

"The virtual visit of our train powered by ESI's IC.IDO modules was from a customer relationship and design management standpoints a fully satisfactory and innovative method. It allowed us to validate complex design aspects in a very user friendly fashion saving time and ultimately cost for the project and our customer. ESI not only provided the tools but the on-site support that allowed us to setup this customer design event within a very short timeline."

Christophe Tilan

Project Manager

Rolling Stock for the Riyadh metro project

Background

Bombardier is a long time user of ESI's IC.IDO Virtual Reality software. Data flows seamlessly from the Company's CATIA V5 CAD system via its product lifecycle management system into IC.IDO to generate virtual 3D models. "We can view the developed vehicle on high resolution 'powerwalls' – and even touch it", says Helmut Dietz, Head of Digital Manufacturing at Bombardier Transportation.

Bombardier has discovered that IC.IDO virtual prototypes and manufacturing methodology streamline the product lifecycle. "This way, development and installation steps can be accelerated, optimized or done away with entirely", explains Dietz. In addition, VR enables engineers, as well as managers, to make more precise, faster decisions in joint reviews carried out in real-time and in different locations around the globe.

It was this understanding of how VR with IC.IDO had already transformed ways of working within engineering at



Bombardier that led the team to decide to extend its use to aid communication with the customer about a train that did not yet physically exist.

"Internally, we all understood how VR helped us with validating designs, manufacturability, accessibility, ergonomics, even maintenance", explains Christophe Tilan, Project Manager Rolling Stock for the Riyadh Metro project. *"We thought, if it helps us communicate internally, it'll help us communicate with our customers too. We were right."*

The Bombardier team decided to take its VR model to Saudi Arabia, so that all the key stakeholders, including the Governor of the province, members of the Royal Family, and Government Ministers could appreciate the train in all its subtlety.

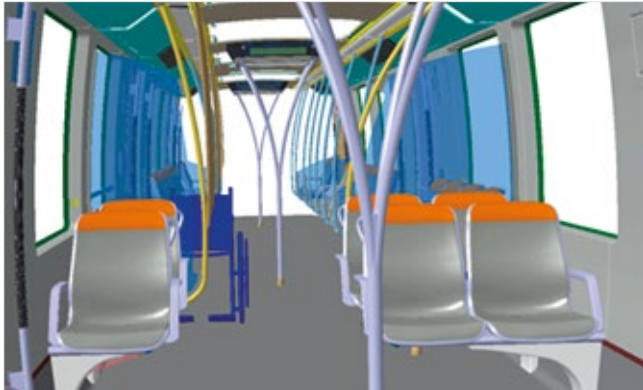


Fig.1: Simulated and rendered views in IC.IDO of the Riyadh metro vehicle

The virtual engineering models used internally by Bombardier are scrupulously accurate, but lack textural and lighting effects. In order to make the model of the virtual train more realistic, Bombardier asked ESI to add these effects. In addition to the aesthetics, the team also wanted the audience in Saudi Arabia to be able to interrogate the model thoroughly in real-time, so doors and storage compartments were made to open and different viewpoints could be achieved. The beauty of the VR is that it is possible to explore things that can't usually be seen, like the cabling system underneath the virtual train.

Shipping a 4m x 3m powerwall from Germany and assembling it in Riyadh was no mean feat. *"We trusted ESI to deliver this project for us",* says Tilan, *"They knew the stakes were high and they did not disappoint."*



Fig.2: Simulated and rendered views in IC.IDO of the Riyadh metro vehicle

A scant 15 minutes was all that was scheduled for the demonstration of the virtual model, but the stakeholders were so engaged in the exploration that it stretched to double the allotted time. The Governor had the tracked master glasses, while the ESI operator was controlling movement on the train following the presenter's commentary. The 20-strong audience, who all donned 3D glasses, were able to make requests. Bombardier also provided a tablet 360° virtual visit tool which had been loaded with six pre-defined spots on the virtual train, complete with design book renderings and 360° movement using the tablets accelerometers.

The Governor spotted an immediate change that needed to be made to improve flow within the train. *"Being able to make an early design change like this undoubtedly saved time*



Fig.3: Demonstration of the virtual model

and money", explains Tilan. *"The feedback we received was overwhelmingly positive. We succeeded in our goal of exceeding our customer's expectations. As a result of this experience, we have decided to roll-out VR sessions with our customers as standard for all new contracts in the future."*



virtual reality | ground transportation



About Bombardier

As the world's leading manufacturer of both planes and trains, Bombardier built an extensive and diverse portfolio of winning mobility solutions. Everywhere people travel by land and in the air, a Bombardier product is ready to transport them. From category-defining business jets and commercial aircraft designed for the challenges of today, to sleek high speed trains and public transit that's smarter than ever. But it's not just our products and services that make us a global leader. The most important success factor is our employees, all 70,900 of them. Together we're focused on making mobility more efficient, sustainable and inviting than ever before. We call it The Evolution of Mobility. Bombardier is headquartered in Montréal, Canada. Our shares are traded on the Toronto Stock Exchange (BBD) and we are listed on the Dow Jones Sustainability North America Index. In the fiscal year ended December 31, 2015, we posted revenues of \$18.2 billion.

About ESI GROUP

ESI is a pioneer and world-leading provider in Virtual Prototyping that takes into account the physics of materials.

ESI boasts a unique know-how in Virtual Product Engineering, based on an integrated suite of coherent, industry-oriented applications. Addressing manufacturing industries, Virtual Product Engineering aims to replace physical prototypes by realistically simulating a product's behavior during testing, to fine-tune fabrication and assembly processes in accordance with desired product performance, and to evaluate the impact of product use under normal or accidental conditions.

ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping. These solutions are delivered using the latest technologies, including immersive Virtual Reality, to bring products to life in 3D; helping customers make the right decisions throughout product development. The company employs about 1000 high-level specialists worldwide covering more than 40 countries. ESI Group is listed in compartment C of NYSE Euronext Paris.

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