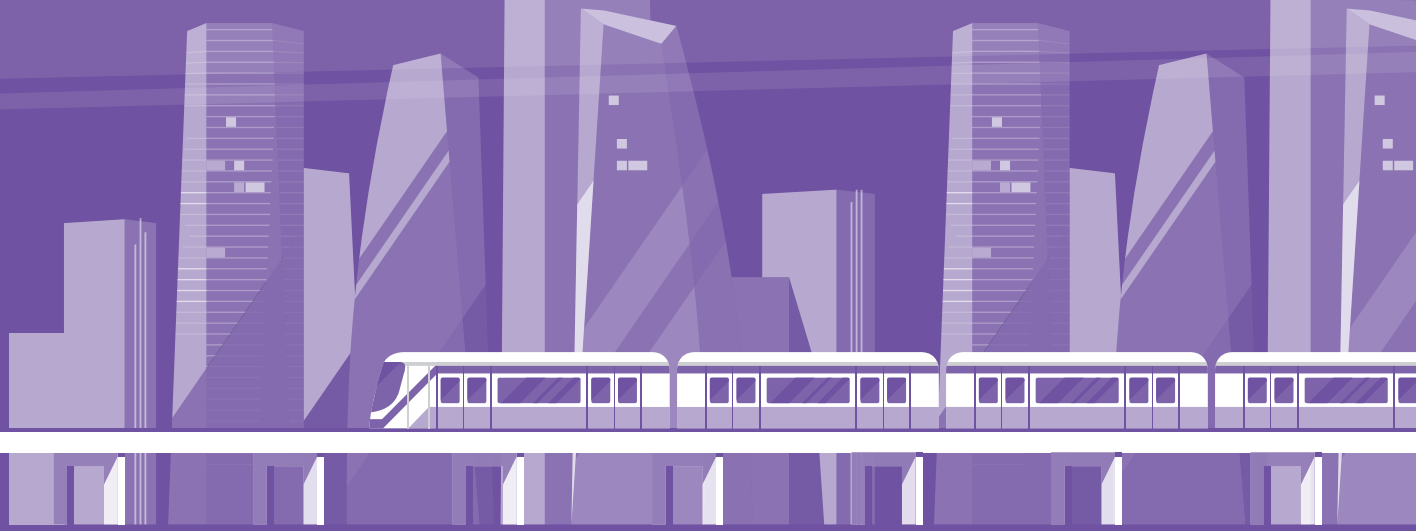


CYIENT

**PARTNERING WITH
BOMBARDIER
TRANSPORTATION TO
SUCCESSFULLY DELIVER
THE ELIZABETH LINE
PROJECT**



Overview

In early 2014, Bombardier Transportation, a global leader in rail technology and a pioneer in rolling stock product development, was awarded the contract for the provision of new trains, a depot, and maintenance services for the flagship London Crossrail project by Transport for London (TfL). Crossrail project was the largest project in Europe at this time, and would eventually be named Elizabeth line in honour of the Queen Elizabeth II.

As part of the contract, Bombardier was required to deliver 65 nine-car trains, with the first train sets entering service as early as 2017.

This was not only a large contract for Bombardier but also a technically challenging one—given that Bombardier in parallel had embarked on a path-breaking project of building a standardised AVENTRA platform, on which Crossrail would be based. The standardisation of its product family and development of platforms would not only enhance Bombardier's competitiveness in the projects to come, but also cut down the train design time significantly. However, its parallel development with Crossrail, called for meticulous planning and a strong engineering competence.

Challenges

Cyient has been Bombardier's trusted engineering partner since 2003, forming a formidable relationship built around the shared values and passion for engineering. This partnership had in the past made significant contributions to major projects including the Delhi Metro and Queensland New Generation Rolling Stock. However, a project of the magnitude and engineering complexity of Crossrail was unprecedented.

The challenge was to ensure that the rolling stock design was delivered on time and at an optimal cost—a critical mandate to establish Bombardier's commitment to the project schedule without compromising profitability. As a trusted business partner, Cyient was up for the challenge, fully comprehending the significance of the project to Bombardier as well as to the end-customers—the commuters of London.

Our contribution

Cyient contributed extensively in the train design phase, working as an extended arm of Bombardier. Cyient's engineering contribution was primarily in the following areas:

- Physical integration and installation for the car body, external fitting and piping, complete interiors, and bogie
- Electrical wiring, designing, and computing wire harnesses and preparing production documentation for the supplier to manufacture the harnesses
- Technical documentation



Significant engineering contributions were also made in the areas of:

- Sub-system engineering
- Component level testing for SIL-0, SIL-1, and SIL-2 requirements
- System integration testing for SIL-0 requirements of the train control management system
- Documentation development including test specifications, test reports, and verification and validation plans

In order to ensure the train design is ready as per schedule, Bombardier and Cyient devised some key operating principles:

- The concept of a 5-day/20-day plan was developed. This involved creation of a day-wise plan for a 25 day period, using the principles of the critical path method analysis, which helped Bombardier and Cyient accurately estimate and optimise resource utilisation.
- A multi-location execution model was established with about 200 Cyient engineers working in tandem across Derby, UK, and Hyderabad, India, complementing Bombardier's engineering team. Cyient's team in Derby worked in close collaboration with Bombardier's engineering team located alongside, with the team in Hyderabad providing strong support and helping leverage the time zone difference. In essence, Bombardier and Cyient engineers combined worked 24/7 to ensure the design phase is delivered as per schedule.

The first trains were introduced into passenger service in June 2017 and continue to operate during off-peak services, part of the fleet that runs on the TfL Rail Services between Liverpool Street and Shenfield. The trains running on the Liverpool Street to Shenfield route are 160 metres long and made up of seven carriages, but will later be extended to nine carriages and the full length of 200 metres to carry up to 1,500 people.

When the Elizabeth line fully opens in 2019, it will increase central London's rail capacity by 10 percent, carrying over half a million passengers per day, and the Bombardier-Cyient partnership can consider it to be a significant milestone in its journey together.

BUSINESS BENEFITS

Bombardier unveiled the first trainset for Crossrail in July 2016, delivering the project on schedule—a significant accomplishment given that the rail industry is marred by delivery delays. Bombardier had achieved a significant engineering feat in doing so and Cyient takes pride in contributing to about one-fourth (25%) of the total engineering effort that went into it.

The engineering collaboration between Bombardier and Cyient not only led to the successful delivery of the Crossrail project, but also set the precedence for all rolling stock projects to come.



About Cyient

Cyient (Estd: 1991, NSE: CYIENT) provides engineering, manufacturing, geospatial, networks, and operations management services to global industry leaders. We leverage the power of digital technology and advanced analytics capabilities, along with domain knowledge and technical expertise, to solve complex business problems. As a Design, Build, and Maintain partner, we take solution ownership across the value chain to help our clients focus on their core, innovate, and stay ahead of the curve.

Relationships lie at the heart of how we work. With more than 15,000 employees in 22 countries, we partner with clients to operate as part of their extended team, in ways that best suit their organization's culture and requirements. Our industry focus spans aerospace and defense, medical, telecommunications, rail transportation, semiconductor, utilities, industrial, energy and natural resources.

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