

Customer

Alstom Transport

Location

Dutch Railways

Date of delivery

In series 1996 - 2005 – 2009

Summary

- Co-design between Strukton Rolling Stock and the customer for five carriage types
- Design and delivery of four types of test systems for five different carriage types
- Delivery of various control and power supply panels
- Delivery of 873 cabling sets
- Assembly and test activities on 178 extended VIRM trains on site (873 carriages)
- Conversion of 290 IRM carriages

New construction of VIRM trains

Over the years, the Dutch Railways have placed orders for various part-series of this type of train with rail vehicle producer Bombardier Transportation. The basic design of the IRM double-decker originates from the beginning of the 1990s. During each follow-up assignment, various modernisations were carried out on the extended VIRM trains. The total VIRM fleet now consists of 178 trains with 873 carriages.

Strukton Rolling Stock was commissioned by Alstom Transport to engineer and deliver prefabricated bundles of cables, along with the installation work and testing of the carriages on site. The assignment was subsequently expanded to include the delivery of various control and power supply panels. Throughout the engineering process, Strukton Rolling Stock was closely involved in integrating the different subsystems into the carriages.

An engine-driven VIRM train consists of four to five carriages and is a complex body of safety systems and numerous subsystems divided across different variations of carriage types mBvk1, ABv34, ABv5, ABv6, mBv7 and mBvk2. In addition to the switch panels, kilometres of cabling are needed to control and supply these systems with power.



Co-design

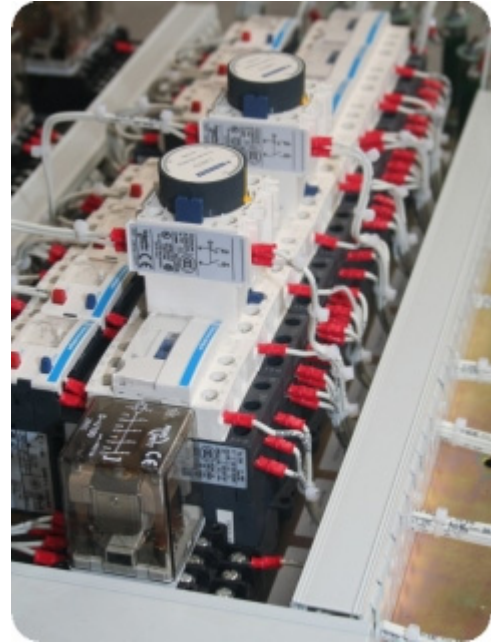
The prefabricated bundles of cables were delivered to the production site in as complete a form as possible. Strukton Rolling Stock and the customer coordinated all the design details with one another during the design phase. The aim was to create optimal solutions.

Logistics

Bombardier operates a production line with fixed scheduled activities taking place at each working position. In order to optimise throughput time, deliveries for each carriage were made two weeks prior to commencement of the activities at each position.

Flexibility

Based on sound change management, Strukton Rolling Stock succeeded in making sure the trains were delivered in the same configuration, even after implementing customer design changes during end product construction.



Swift delivery

Strukton Rolling Stock signed the contract for the last follow-up series of 51 VIRM4 trains (200 carriages) in January 2007. After modifying the design somewhat, Strukton Rolling Stock began producing the cabling and panels in September 2007.

- Started E assembly on site in January 2008
- Started testing on site in March 2008
- Delivery of first train in May 2008 (throughput time for each carriage of 5 days)
- Delivery of last train in June 2009 (throughput time for each carriage of 2.5 days)

Critical chain planning

The bottleneck in the production process arose during the test phase for the carriage cabling. By using automated test systems, Strukton Rolling Stock reduced the original throughput time of conventional testing from 15 days to 7 days for IRM and – after further optimisation – to 5 days for the last VIRM4 assignment.



Further details

The schedule was especially critical in view of the limited amount of time available for engineering and the short throughput time for end product construction. The respective parties had to comply with the Master Production Schedule, coordinating weekly progress meetings with the customer. During the project phase with the shortest throughput time, Strukton Rolling Stock delivered a complete train each week.

Given the nature of the project, the respective parties cooperated closely in order to deliver the carriages according to schedule.