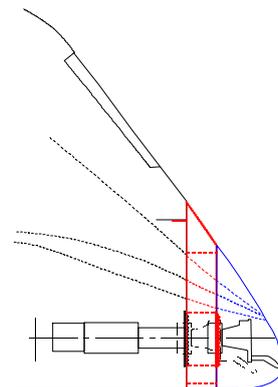
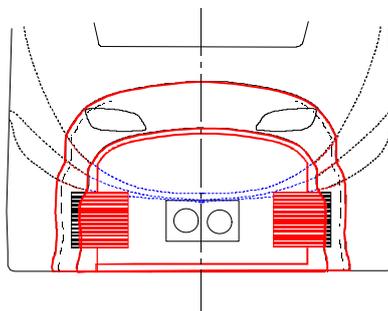


The challenge

Stockholm's airport train, the Arlanda Express, is operated by A-Train since 1999. The vehicles were designed and built by Alstom specifically for this operation.

Already at the design reviews A-Train raised their concern about the GRP¹ cab section and specifically the nose cone. However, due to project time constraints, the trains were delivered and put into operation with the original nose-cone design.



Operational experience proved that a re-design was needed. This modification was included as one of the major items in a delivery settlement agreement between A-Train and Alstom. It was recognized that this modification of an existing design would be difficult.

Transrail was entrusted with the task to manage this re-design on behalf of A-Train.

The solution

As a first activity a specification for this difficult re-design was set up. Key issues concerned strength and performance at collisions with objects in the track, aesthetic design, handling by train and maintenance staff, train-to-train crashworthiness etc.

Various alternative solutions were developed by Alstom, but also on behalf of A-Train in order to find a solution which would fulfill the requirements as far as possible. Compromises were needed. An aesthetic design by Idesign, a partner of Transrail, was agreed. It involved a 250mm extension of the nose-cone section, which was all that could be provided in order to install a deformation zone without negative influence on the aesthetics of the front of the train.

Still, the engineering of the deformation zone was complicated. A Swedish firm, Engineering Design, was engaged by Transrail to make dynamic calculations for modeling how the nose cone would behave during collisions. These initial studies were then taken over by Alstom who completed the design work based on extensive and advanced dynamic FEM-modeling. Utilisation of traditional methods were not possible.

Finally the complete design was agreed and manufacturing started. During the first test installation there proved to be major problems with the tolerances of both the existing structures and the new components. This involved further design and re-working until an aesthetically acceptable installation could be made.

The new nose cone operates as expected and the Arlanda Express trains have got a slightly different appearance.

¹ Glas-fiber reinforced plastic

Year: 2002-2004

Contact: Per Leander, Phone +46-8-404 09 61, E-mail: per.leander@transrail.se

Transrail Sweden AB: Allén 6A, S-172 66 SUNDBYBERG, Sweden, Phone +46-8-404 09 90, Fax +46-8-404 09 97, E-mail transrail@transrail.se, Website: www.transrail.se