

## CASE STUDY

ACQUISITION SUPPORT / SL COMMUTER TRAINS



# SYSTECON OPTIMIZES THE MAINTENANCE OF SL'S COMMUTER TRAINS.

On August 13, 2005, the first new X60 commuter train was presented with pomp and circumstance at Stockholm Central Station. In total, SL (Stockholm Transport) has acquired 71 new trains that will give the commuters a totally new traveling experience. Air conditioning and significantly reduced noise levels provide increased comfort, and safety and availability have also improved considerably.

Systecon has been engaged in this project to assist SL with software and services in order to achieve an optimal balance between performance and cost. The purpose has been to ensure that the vehicles meet the high performance requirements during initialization and operation. Systecon's engagement has primarily been dedicated to providing project support on reliability and maintenance issues, which includes the verification of the guaranteed performance parameters, as well as with the implementation of a maintenance program and resource allocation.

### The transfer of information plays a central role

Ole Robertsson is project coordinator at SL, and he is currently working with the new commuter trains. For him there is no doubt about what is most important in an acquisition with a complex set of demands.

– Clarity is important. You cannot expect that the supplier should know every detail of your operation. It is necessary to give a crystal clear picture of what you expect to get.

The information base for reliability analysis and maintenance planning is very extensive in this type of project. At the same time it is important that the exchange of information between the involved parties functions as smoothly as possible. Systecon therefore recommended that all information should be prepared and transferred in a way that it can be used for multiple purposes, such as reliability analysis, documentation and maintenance systems, as well as the basis for verification and follow-up. This recommendation, in turn, has

resulted in a restructuring and standardization of all the information that is generated.

**System evaluation and resource allocation**

One of Systecon’s most important assignments was to evaluate the supplier Alstom’s suggested maintenance concept for the vehicles. In order to analyze the reality the commuter trains would face, Systecon used two applications from the in-house developed ILS-toolbox, OPUS10 and SIMLOX.

In SIMLOX, a model was created to simulate the availability of the vehicles. The model describes the operational availability in relation to the scheduled timetable, as a function of resources, reliability, and the maintenance plan, see figure below. With this method it was possible to analyze how well the new trains would meet SL’s needs. Furthermore, it was also possible to analyze the various reasons for loss in traffic volume.

**Definition of the maintenance concept**

Alstom is a new supplier to SL, which complicated the acquisition. Pär Sandin, project manager, at Systecon explains:

– It took a while to arrive at the same project vision. Alstom suggested a maintenance plan composed of large packages of maintenance

tasks, which would require long uninterrupted maintenance periods. This solution was incompatible with SL’s demands on high vehicle utilization.

for spare components at different locations in the organization. Various replacement and repair strategies were tested, and finally the components could be allocated based on the

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Systecon together with SL developed a new maintenance concept that was better suited for the high availability demands. This resulted in an efficiency gain corresponding to 1.5–2 complete vehicles. The concept describes the overall maintenance strategy, which defines rules for when maintenance activities should be performed, as well as guidelines for the packaging and restructuring of the maintenance tasks.

**Procurement of strategic components**

Another area that had to be clarified was the procurement of strategic high cost components, i.e. expensive components that:

- have an expected low consumption, but very long delivery times, or
- are included as replacement parts in preventive maintenance activities.

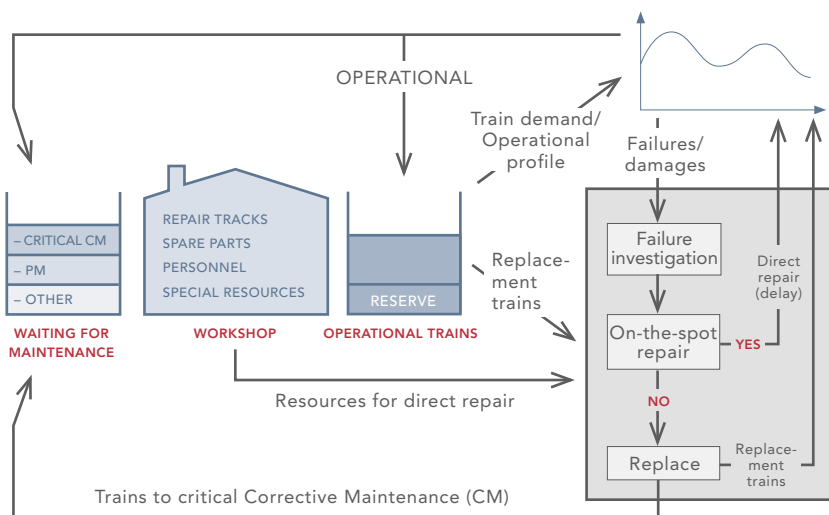
Systecon used OPUS10 to compute the need

criteria “maximum availability per invested amount of capital”.

**Valuable experiences facilitate the acquisition**

In most organization, large acquisitions are uncommon. Ole Robertsson therefore believes that one should not hesitate to consult external experts.

– It is difficult to internally build a sufficiently large knowledge bank on these issues. Systecon has proven models and long experience from working with these types of projects. The software tools are easy to use, and provide a powerful decision support that helps us utilize our resources in the most efficient way. They have never disappointed me during all the years we have been working together.



- SYSTECON’S ENGAGEMENT IN BRIEF**
- Evaluation of the vehicles’ reliability and maintenance
  - Transfer of information
  - Valuation model of the system availability
  - Definition of the maintenance concept
  - Verification of the guaranteed performance parameters and Life Support Cost
  - Design and implementation of a maintenance plan
  - Allocation of maintenance resources
  - Allocation of spares

A model was developed in the software tool SIMLOX, where fleet availability could be simulated based on e.g. time tables, maintenance plans and reliability.

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Systecon is an independent, employee-owned consultant firm that offers world leading experience in ILS. We help our clients to increase reliability, achieve more efficient resource utilization, and take control of the support costs of large complex systems.

For almost four decades, Systecon has been working with technically advanced projects within both the military and the civil sector. We are especially proud that the majority of our clients choose to work with us again. Among them are: Boeing, Bombardier, British Aerospace, Ericsson, FMV, Lockheed-Martin, SAAB, SAS, SL, SPP, Statoil, Tetrapak, Vattenfall and Volvo Cars.

Besides Sweden (Stockholm, Gothenburg, Malmö), Systecon is also present in the UK market through the partly owned subsidiary, Systecon UK. Our international network is continuously expanding and includes partners in, among other countries, Norway, Germany, Italy, Greece, Turkey, USA, Australia, Singapore, China, South Korea, Taiwan and South Africa.