
Collaborative life-cycle management for 10 years:

Unique maintenance support concept to ensure efficient train traffic

Mipro and the Finnish Transport Agency (FTA) created their collaborative life-cycle management concept to meet the challenges of modern interlocking technology and to ensure efficient train traffic in all situations. At that time, in 2003, the maintenance support contract entered into was unique. The signalling maintenance was conducted as in-house production within the Finnish State Railways until 1995, when the roles of infrastructure manager and railway undertaking in charge of the traffic operation were separated. After the separation, the infrastructure manager (now FTA) took the responsibility for outsourced maintenance and gradually started its competitive bidding.

“Our maintenance support contract with Mipro is older than the current Finnish Transport Agency but it still serves our strategic objectives excellently,” says Mr Aki Härkönen, Head of Control and Safety Systems at FTA. “The contract has enabled an optimal resource management and created a framework for expert co-operation.”

Modern interlocking technology challenged the maintenance

The collaborative maintenance support concept between Mipro and FTA dates back to the comprehensive railway modernisation project of the 2000s. The predecessor of the FTA, the Finnish Rail Administration (RHK), which was established in 1995 as the rail infrastructure manager, decided to increase the safety and automation level of the regional lines and integrate them into the railway network that was equipped with Automatic Train Protection (ATP) and remote control. Mipro won the international bidding by which RHK sought a new, cost-effective interlocking system solution that would meet all safety regulations.

Mipro had started to develop its new interlocking system concept at the end of the 90s. It proved to be very suitable to automate regional track sections. The interlocking system allowed the rail network to be built a track section at a time in a manageable way. The system could also be easily integrated into the existing track equipment. Furthermore, it could be used to connect to interlocking systems of various suppliers and from various decades, thus meeting the requirements of the Finnish railways that were equipped with a variety of different interlocking systems.

Mipro’s interlocking system was based on the latest technology and computer systems which were used to replace relay-based interlocking systems. Head of Control and Safety Systems at FTA, Mr Aki Härkönen, says that Mipro’s interlocking system deliveries in the 2000s challenged the knowledge and know-how of the maintenance contractors. “To manage programmable logic and computer systems requires special supplier-specific knowledge that is difficult to teach to the maintenance organisation on the field in a sufficiently in-depth manner. In addition, complex failure cases that require special system-specific knowledge appear so rarely that maintenance engineers don’t get the opportunity to deal with them routinely.”

Co-operation to guarantee the development of operations

The maintenance support concept was created to solve the maintenance problems of the new traffic management systems. The concept resulted from the comprehension that the infrastructure owner needs the support of the original system supplier to be able to patch the knowledge deficit of basic maintenance and life-cycle management. The support is required during the entire technical and economic life-cycle of the systems. "To realise this fact was a breakthrough which enabled a maintenance and user support service contract to be entered into with Mipro," says Mr Härkönen, who has been strongly involved in the development of the life-cycle management concept.

According to Härkönen, the maintenance support service has enabled optimal resource management: "We have been able to provide the maintenance staff with a sufficient basic knowledge, and at the same time ensure that we recover from difficult special situations with the help of the system supplier and their related in-depth knowledge. The maintenance support contract provides the framework within which the infrastructure owner, maintenance contractors and system supplier can continuously develop their operations and fully comprehend essential matters."

Foreseeing and recognising development needs

The core of the maintenance support service is round-the-clock telephone support and efficient remote connections, remote diagnostics and remote control tools supporting the phone service. Thanks to these tools, Mipro's on-duty maintenance staff is always available without delay. There is a real-time connection from the control room at Mipro to all traffic control systems the company has delivered, and the person on duty has the same view available as the dispatchers.

Other important support service modes are the regular reviews of the systems, and follow-up and development meetings related to life-cycle management. Härkönen says that life-cycle management follow-up and development meetings have constituted a forum where FTA, Mipro and maintenance contractors have been able to process their experiences, development needs and problems in a constructive manner and by foreseeing and planning upcoming events. "The reporting generated by the life-cycle management reviews has produced in-depth and analysed documentation that has helped the parties identify development needs. Thanks to predictive life-cycle management we are able to take actions in time when the equipment is aging, as even the best industry computer does not reach a lifetime of forty years as relays do."

Maintenance support services according to needs

"Within a few years, the maintenance support services have been extended and developed according to needs received from the customer and obtained from the environment," says Mr **Aki Luostarinen**, Head of Life-cycle Management Services and creator and developer of the life-cycle management concept at Mipro.

In the current form, the maintenance support services also include the return and replacement service of spare parts, software maintenance, and documentation management. For document management, customers have a web-based document portal at their disposal. This provides access to documents continuously, when a net connection is available. The maintenance support services also include

registering of on-duty contacts; collection and storage of log information from all systems; and the upkeep of systems' upgrade path and future needs.

The number of contacts has increased steadily over the years, which indicates that the services are needed and people have learned to use them. Mr Luostarinen estimates that the importance of the maintenance support services will grow further in the future.

“Due to the fact that basic maintenance is put up for competitive bidding, the employees of the maintenance contractors are more frequently moving from one company and area to another. Technology is also changing continuously, and its importance grows. In practice, it is not possible that people get deeply enough acquainted with the function and technology of the systems, which means that maintenance support is needed - especially in special situations. A tendency is also visible in basic maintenance that resources smaller than previously used now take care of larger entities; this naturally increases the need for support acquired from outside an organisation itself.”

Trains must be kept moving

Approximately 1300 events are registered yearly in the follow-up system of the maintenance support services, or 20 – 30 events every week. Over half of the contacts come from train operating dispatchers; another large group is maintenance staff. “Many people are probably surprised by how many different parties use Mipro’s maintenance support services,” says Mr Luostarinen. In addition to dispatchers and maintenance contractors, users include telecommunication operators, interlocking system managers, and accident inquiry commissions.

The support services are based on the principle that the contacts and their related problems are solved immediately by providing advice or correcting the failure via the remote connection. If the problem is not urgent it will be resolved in the next upgrade. If necessary, Mipro’s support person is immediately sent to the location to clear up the problem.

Winter blizzards are challenging situations both for basic maintenance constructors and for on-duty support personnel at Mipro. “To localise the failure as soon as possible and get the trains moving again calls for understanding, patience and experience,” says Mr Luostarinen. “Understanding and experience are required in all service situations, because we are not merely dealing with technology, but above all with service and working together with different people.”

It is worth-while calling the maintenance support services and first clearing up the reason behind the failure. “If it is possible to correct the failure through the remote connection, time and money are saved and nobody needs to race to the site – which may be hundreds of kilometres away,” stresses Luostarinen. Härkönen agrees: **“The maintenance and user support concept has been developed to serve our customers. It helps shorten the duration of railway interlocking system failures and thus enhances the punctuality of train traffic.”**

Pictures:

Junakuvia Lieksasta_Pasi 102-0222/ Ilmala 2010: IMG 9306, IMG-9069 / Kuvia Ilmalasta Mikpolis: 7481 / 7503



Figure 1 The collaborative maintenance support concept between Mipro and the Finnish Transport Agency dates back to the comprehensive railway modernisation project of the 2000s. The predecessor of the FTA, the Finnish Rail Administration (RHK) decided to integrate all Finnish lines into the railway network that was equipped with Automatic Train Protection (ATP) and remote control.



Figure 2: Mipro's interlocking system deliveries in the 2000s challenged the knowledge and know-how of the maintenance contractors.



Figure 3 The maintenance support contract provides the framework within which the infrastructure owner, maintenance contractors and system supplier can continuously develop their operations and fully comprehend essential matters.



Figure 4