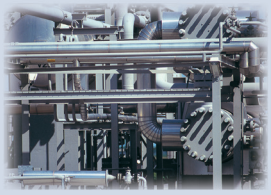




NOVOTEK

Rail network control and monitoring system uses Proficy™ HMI/SCADA iFIX®

Results

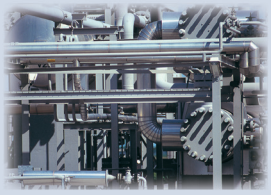
- System meets Safety Integrity Level (SIL) 3
- Centralized control provides operators with a clear view of the network
- Easy interfacing with existing track and train protection systems
- An event database allows analysis of past events and alarms for planning and maintenance
- Labor and cost saving solution

Mipro Oy is a leading Finnish supplier of safetyrelated automation systems and remotely controlled applications using computers and PLCs. Using its expertise across a broad range of industries, Mipro has developed the technology to provide automated train control systems for low-volume rail networks. The system is currently being used by the Finnish Rail Administration (RHK).

Easily interfaced with existing infrastructure, the systems were developed in conjunction with customers and end-users to provide a costeffective solution to fill a gap between manuallyoperated control systems and largescale, highvolume interlocking systems. Mipro chose GE Fanuc's Proficy HMI/SCADA iFIX control and monitoring software, supplied by local GE Fanuc distributor, Novotek, after an evaluation of a number of similar products. Called MiSO Train Control System (TCS), it has been developed by Mipro in close cooperation with RHK, Oy VR-Rata Ab and telecom operators. RHK operates under the Ministry of Transport and

Communications and is responsible for managing, maintaining and developing the rail network, and for rail safety in Finland. VR-Rata offers nationwide services for maintaining and constructing railway infrastructure, control and safety systems. Using technologies proven in other industries, TCS meets Safety Integrity Level (SIL) 3 according to IEC 61508.

Objectoriented approach the challenge was to develop a system that could be installed alongside existing systems to provide an economicallyviable centralized computer control system instead of manually operated systems and wayside equipment. TCS is capable of interfacing with existing track points, interlocking systems, signalling, track circuits, and train detection and ATP (automatic train protection) equipment. The TCS design philosophy uses an object-oriented approach, dividing a total project into smaller parts that can be defined, programmed and tested separately. This is applied to the complete system, from I/O connectors through to the visual graphics on the operator's control terminal. The control and interlocking functions may be located in a single TCS unit: in more complex and geographicallydispersed systems, functions and collections of objects will work on separate physical interlocking units. The total system may contain several parallel interlocking subsystems as well as several hierarchical layers. The interlocking and system data is transferred via a communication system across the TCS network. Each PLC may carry out several functions. For example, for a small station the PLC will provide the functions of levelcrossing control, local track interlocking, remote operation and support for a local operator terminal if required.


NOVOTEK

Centralized control

Control of a complete network can be centralized in a control room containing multiple screen PC operator terminals running Proficy HMI/SCADA iFIX which has enabled the development of customized screens. In the system run by RHK, 60 terminals are linked to the network hich uses 25 servers. The servers are configured to offer fully redundant "hot-standby" services for the user terminals. The terminals are located in four major locations across the 2000 km rail network of the total 6000 km national network. Central Train Control (CTC) provides each operator with a clear graphic display of the network, showing the network status, signalling and train positions, and direction of movement. Operations are based on standard mouse pointing techniques. Dynamic elements on the display include track modules, signals and track points. Each screen object contains information about the current status of the object and its environment. By clicking on one of the elements the operator is able to drill down by selecting items from pop-up menus. Unauthorized access is prevented by the use of IDs and passwords.

Alarm handling and event logging TCS maintains a database of communication diagnostics from the communication subsystems. Any loss of communication causes immediate interlocking on each subsystem involved. Alarms are displayed on the operator terminal and printed locally. TCS captures, in an event database, every operator action, the movements of trains, and the actions of interlocking and signalling systems. This is also transferred to an archive periodically, if required. The database can be interrogated to look at past events for analysis and for planning maintenance, for example.

Connectivity

The TCS system is mainly used on existing track. It has been designed with very flexible connectivity so as to maximize the existing infrastructure. For example, the communication network will interface with most existing telecommunication systems that exist by the side of railroads, from simple duplex lines up to modern TCP/IP networks. Therefore, operator terminals may be connected on a train operator's intranet to form a multioperator environment or to conduct train operations from a remote location if required. This network availability may be particularly useful for maintenance personnel to access event and alarm information. 24V DC PLC I/O circuits are connected to relay-based systems via safety approved relays. Universal Wayside Signal Interfaces (UWSI), controlled by the TCS, may be configured to interface with several types of signal unit and ATP equipment: Universal Point Machine Interface (UPMI) offers similar interface functionality for railway points. MiSO AXLE (Axle counting system) is a configurable detection system for notifying the rail vacancy. The system is based on well-proven sensor devices and approved Safety PLC components. Two or more AXLE Counting Points and the Counting Equipment form the Controlled Track Section. The track section may be a line or shorter track section as the system is able to handle safety critical transmissions using a variety of communication media. The system consists of a double-wheel sensor setup mounted to the rail. A junction box connects the sensor leads to the sensor cables near the sensor assembly. A geographically wide or complex track system is formed by connecting two or more Counting Equipment devices to a network.