

Industry: Transportation

Transports Publics de la Région Lausannoise (tl) SA

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“The simplicity and flexibility of Wonderware makes it a user-friendly solution par excellence”

Laurent Arn,
Director, Mauerhofer & Zuber

Wonderware and Mauerhofer & Zuber join forces for the safety of Lausanne’s M1 Tramway

by Wonderware Switzerland

Goals:

- Relocate and consolidate traffic management;
- Revamp the entire remote control system in order to improve traffic visibility;
- Archive all of the events needed for maintenance and scenario reconstruction.

Challenges:

- Implementing a new system without disturbing current line operation;
- Meeting the safety requirements of the ‘Office Fédéral des Transports’ (OFT – Swiss Federal Transportation Office);
- Tailoring graphic representations to the customer’s wishes.

Wonderware Solution:

- ActiveFactory software;
- InTouch HMI;
- Wonderware System Platform.

Results:

- Successful implementation without traffic (very dense) interruption/disruption;
- 7.8 km of M1 line fully monitored with one ergonomic, advanced application;
- Real time and historical access to all types of information (alarms—safety—traffic).

Lausanne, Switzerland – The Mauerhofer & Zuber Company Entreprises Electriques SA (MZ) is based in Renens (VD) and has a subsidiary in Martigny (VS). It conducts most of its business in Romandie, Switzerland, but operates throughout the rest of Switzerland and internationally as well.

MZ was established in 1905 and has deep roots in the region’s economic base. In 2000, it was bought by the Atel Installations Techniques Corporation, providing it the advantage of the flexibility and responsiveness of a small business combined with the stability of a large company. MZ’s primary fields of business are: railway safety systems, Road traffic monitoring, overhead electric lines and low, medium, and high tension cables optical telecom and fibers, electrical grids and electrical engine inspection. MZ can study, build, and maintain systems in all of the fields listed above. In addition, MZ designs, develops, and manufactures its own line of products for road traffic management and railway safety systems. The company has 150 employees who have a high-level of training and motivation. More than one third of its employees work in the research department. In addition to offering the best services at the best price, MZ is committed to quality and sustainability, as proven by its internationally recognized ISO 9001 certificate (quality), ISO 14001 certificate (environmental management), and OHSAS 18001 certificate (health and safety in the workplace).

The TSOL - Tramway du Sud-Ouest Lausannois, (Lausanne Southwest Tramway), which was renamed M1 in 2000, began running on June 2, 1991.

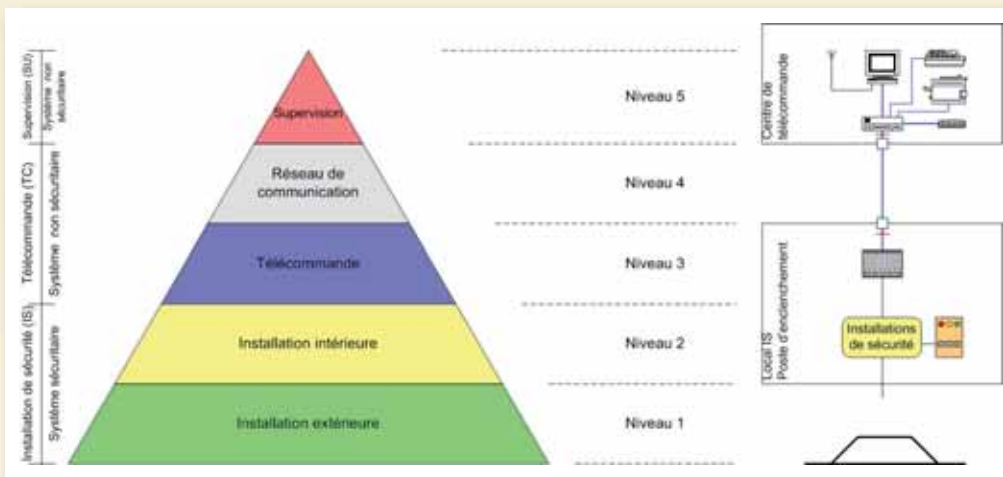


Figure 1: The different levels of the remote control system’s architecture.

It connects the center of Lausanne [Switzerland] with major universities and Renens. The total cost of operation (infrastructure, equipment, station, rolling stock) rose to 192M CHF (Swiss francs). The Canton of Vaud invested 47%, the [Swiss] Confederation 30%, municipalities 11%, the TSOL Corporation invested 7% and TL (Transports Lausannois – Lausanne Public Transportation Company) invested 5%.

M1 is a light, single-track above-ground system that serves as the backbone of public transportation in southwest Lausanne, Switzerland. In addition to 95% exclusive right-of-way, the 1984 preliminary design study shows that the line provides service to 33,000 inhabitants and 32,000 jobs, not including universities. The route is 7.8 km long and has fifteen stations. It is connected to the rest of the public transportation network by four connecting stations: Flon, Bourdonnette, the EPFL (Swiss Federal Institute of Technology) station, and Renens, which is the only direct connection between the M1 and Swiss Federal Railways (CFF).

The Lausanne Southwest tramway currently transports 10 million travelers per year with 17 electric railcars and more than 300 trains per day. One train runs in each direction every five minutes during rush hour.

A Delicate Move

Because of transportation growth and the construction of M2, the Lausanne public

transportation company (TL) decided to consolidate traffic management into one location at their headquarters in Perrelet.

The M1 control desk was located at the TSOL station and therefore had to be moved. This task was entrusted to MZ which specializes in engineering and railway safety, and designed the current



Industrial, redundant equipment, which increases network availability;

- Secure servers for hosting the remote control application and a server that records events and alarms;
- High-availability monitoring stations with two PCs and four screens.

Another advantage of the system developed by MZ is that it allows to make subsequent changes to the IT infrastructure by adding hardware, without having to modify any of the software.

Servers and Their Software

system. The MZ remote control system was initiated in 2004 and built between 2006 -2008. It was first installed and tested in Ecublens, then transferred to Perrelet.

The system has two control stations that each covers the entire line. Only one person is needed for monitoring and handling special events or breakdowns, as well as conducting a series of system tests, for switches in particular, before the first trains begin to run in the morning.

MZ Remote Control System

The MZ remote control system meets the need that railways have for a cost-effective remote control and SCADA system based on open-ended, high-performance technology.

Normally, safety systems are operated manually through control boxes or desks. The MZ remote control system replaces these manual systems without affecting the level of safety guaranteed by the interlocking signal boxes. It has only one software program (Wonderware System Platform), regardless of the type and size of the system to be installed.

The system includes the following components:

- Siemens S7 type programmable logic controllers for the interface with the interlocking signal box;
- An Ethernet / TCP-IP communications system.

For security reasons, the servers are installed in two different locations in the Perrelet station.

The following software solutions are installed on these servers:

- Wonderware System Platform, a complete software solution for automation applications and industrial information systems. It marks the beginning of a new era for operating and updating current industrial applications more effectively and provides the best methods for designing and implementing new technical systems;
- AlarmDBlogger, a data acquisition software engine that can retrieve alarms and events generated by the system and store them on a history server;
- Wonderware Historian, a software program based on the Microsoft SQL Server which stores all data from the infrastructure managed by the Wonderware System Platform software. Customized reports can then be created through Microsoft SQL Server Reporting Services;
- Wonderware Industrial Application Server 3.0. This software is the remote control source program. Its application is stored in an SQL database and protected by a password. It can run the operating modules for the object-oriented application;
- The traffic management centers are installed in the central control station. They are equipped with a Windows XP Pro operating system, Wonderware InTouch 10.0 supervisory control software, and the Wonderware Industrial Applications Server 3.0 software platform.



Figure 2: The M1 Tramway at EPFL station.

Operating Principle

The SCADA system makes it possible to send commands through the communications network and programmable logic controllers to the safety system, which will in turn accept or refuse the command. The SCADA system shows the status of the safety system in real time. This provides repetition status. The role of servers is as follows:

- The primary server hosts the remote control application
- The secondary server hosts the same application as the first. If the primary server malfunctions, the secondary server takes control of the system.
- The third server hosts the SQL database that records all of the system's alarms and events.

The function and graphic objects library created by Mauerhofer & Zuber is absolutely vital to the

development of future applications. With the reference library (switches, signals, safety, etc.), designing a new application consists of logically organizing objects, modifying them, and bringing them into production.

This object-oriented software capability has enabled Mauerhofer & Zuber to deploy the Metro M1 stations in just a few days, rather than the several weeks needed with the software used by MZ in the past.

Remote Control and System Monitoring

Remote control and system monitoring ensure that the entire system is working properly. In case of breakdown or failure, the remote control system becomes inoperable and the interlocking signal box stops responding to commands from the remote control systems. In addition, statuses are invalid and the block diagrams display a system default.

System alarms and events are recorded in a 2005 SQL database server (Wonderware Historian) with different levels of severity being assigned to the items. Alarms are acknowledged via a mechanism and cannot be deleted from the database. Users can manage alarms, look up alarm and event history, and print reports from the management center.

Moreover, the system includes features for managing user rights: access rights are managed by user name while tasks on the system are recorded with the computer's name.

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