



Invensys Rail and Oslo Metro: Successful in Partnership

Oslo Metro is a unique mass transit system - the first of its kind in Scandinavia. It has been in service since 1898, and consists of 105 stations over six lines that run across the city centre. Annual ridership exceeds 73 million and its 84.2km of track covers some of the most challenging suburban terrain in the world.

Invensys Rail has worked with Oslo Metro since 1994, beginning our relationship with a contract to upgrade signalling and centralised traffic control systems.

We knew from the start it would be an interesting and challenging project. Geographically, Oslo presents challenges including gradients of up to 5.9% and continuous steep curves. Furthermore, its widespread, 860,000-strong population are heavy metro users, with ridership increasing dramatically during the skiing season.

Western lines upgrade

Our initial contract covered the provision of modern signalling and centralised traffic control with automatic route setting on the Røa line from Majorstuen through Røa to Østerås.

Until 1993 the two halves of the network were operated separately with most trains turning back at Stortinget, the station serving the parliament building in the city centre. After the upgrading of the Sognsvann line at that time, the first through services ran between Sognsvann and the Eastern side of the city, stimulating significant growth in ridership.

As a result of this success, Oslo Metro committed itself to the upgrading of the remaining Western lines in order to permit full through, or pendulum, running across the city. This second phase of modernisation started early in 1995 with the closure of the Røa line for rebuilding.

New and extended stations were built to take six car trains, level crossings were removed, catenary replaced with third rail, and a signalling system was installed by WRSL.

Holmenkollen line upgrade

Having made cross-city mass transit possible, our next challenge lay in upgrading the Holmenkollen line. This line's peak usage is in March when 50,000 people travel daily between Majorstuen and Holmenkollen. For the duration of the Holmenkollen Ski Festival, three and four car trains run non-stop from Majorstuen, demanding much tighter headways. So to enhance efficiency new signalling was commissioned in May 1998.

Ringbane

In 2001 Invensys Rail was awarded the signalling and train control contract for Oslo Metro's brand new T-Bane Ring line. The line's opening marked a significant development in the railway's history: for the first time passengers could travel a complete ring line around central Oslo. With headways approaching 90 seconds this application requires both the high availability provided by the WESTRACE interlockings, and the highly capable management algorithms provided by our



Control Centre design. Invensys Rail is currently extending the area of WESTRACE control along the recently refurbished KolsasBanen which should eventually run from Sorbyhaugen to the western suburb of Kolsås.

Complete city-wide control

This control comes under our contract to update and expand control centre systems. Initially designed to control the Røa and Sognsvann lines, and extended to cover the Holmenkollen line, the computerised Control Centre system supplied by Invensys Rail has been gradually extended and now controls the full network.

The Control Centre features eight back projector screens, giving an overview of the Western Network. The overview of the Eastern Network is via the existing hard panel. Centralised control and indication is achieved via a number of networked operator workstations based on PCs and running a Windows™ operating system. They use WESTCAD display technology, communicating with the WESTRACE and Ebilock interlockings via a mix of copper and fibre-optic cables. The system monitors and controls Eastern network relay interlockings.

The technical details: why WESTRACE?

WESTRACE is an advanced microprocessor-based, safety critical system. For Oslo Sporveier it provides distributed intelligence, remote diagnostics facilities and inbuilt route setting strategies to enable continued operation even if communications links are lost.

Oslo Metro chose Invensys Rail based on price and the flexibility of the WESTRACE signalling and train control system. WESTRACE enables inexpensive future expansion

potential. The ATC system used is based on our 75Hz AC track circuits featuring overlaid speed codes, with code switching being carried out by the WESTRACE safety processor. Invensys Rail air-cooled surface mounted impedance bonds style WH3 provide the traction return paths at track circuit boundaries.

The flexibility of the WESTRACE system is demonstrated by the ease with which the interlockings have been interfaced with the existing ATP system and Ebilock 850 interlockings at the Majorstuen junction area.

So has it been successful?

Modernisation of the Metro, pendulum (cross-city) operation and future extensions all contribute to making public transport more attractive. The results are already being seen - a healthy growth in ridership (nearly 10% in 2008) has been reported, a trend that we hope will continue with the aid of Invensys Rail products and expert support.



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