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AMBITION

Traffic Management & Control

What lessons can be learned from other rail implementations as Britain prepares to build HS2?

11th September 2014

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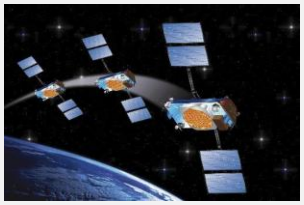
Agenda

- Thales overview
- Lessons learned from recent European implementations
  - Spanish High Speed Lines
  - Switzerland Lötschberg BaseTunnel
  - Lisbon Operational Control
  - Denmark Operational Transformation
- Summary

Thales - Global leaders

Training & Consultancy

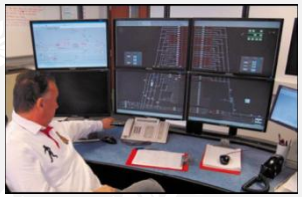


Payloads
for telecom satellites

Air Traffic Management

Sonars

Security for interbank
transactions



Integrated Communications
& Control

Rail signalling systems

In-flight entertainment
and connectivity

Military tactical
radiocommunications

Services

Avionics

Civil satellites

Surface radars

€14
billion
in revenues

65,000
employees
worldwide

Presence in
56
countries

WHEREVER SAFETY AND SECURITY ARE CRITICAL, THALES DELIVERS.
TOGETHER, WE INNOVATE WITH OUR CUSTOMERS TO BUILD SMARTER SOLUTIONS. EVERYWHERE.

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Spain - High Speed Lines

Overview

- Spanish Strategic Transport Plan follows EC Directives on Railway Liberalisation supported by access to EC funding to drive infrastructure ambitions
- 9 high speed lines, 2500 route km since 2000 – still growing.
- Thales primary supplier - trackside signalling & communications in collaboration with Siemens
- New advanced ERTMS/ETCS technology becoming available supported rail innovation
- Creation of single, expert team managed by Ministry of Development included ADIF, RENFE and CEDEX laboratory to drive the implementation

Challenges

- Ensure maximum supply chain competition and acquire technology interoperability
- Ensure availability of sufficient and competent expertise and skills with understanding of ETCS
- Ensure superior customer experience and quality of service
- Ensure all new versions of ERTMS/ETCS standards are internationally compatible for Portugal and France links, address high capacity commuter links requirements for Madrid and Barcelona operations

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Spain - High Speed Lines

Lessons learned

- All new lines, including cross-border, should be fitted with ERTMS Level 2 and Level 1 - and implemented simultaneously
- Maximise laboratory testing programme involving all suppliers for development of validation process, reducing track testing time and guaranteeing interoperability
- Encourage mobility of ERTMS/ETCS expertise/skills from other countries, generate in-depth ETCS system knowledge with Infrastructure Managers and Operators
- Importance of whole life cost approach. All new signalling contracts in Spain now include 20 year maintenance & technology refresh

Benefits delivered

- The largest ERTMS/ETCS system in Europe - 2500 route km and still growing
- Reduction of costs through open competition. Continued involvement of all major rolling stock and infrastructure suppliers
- CEDEX laboratory consolidated as first ERTMS reference laboratory in Europe
- Significant modal shift from air to rail e.g. the case of Madrid-Lerida-Barcelona route

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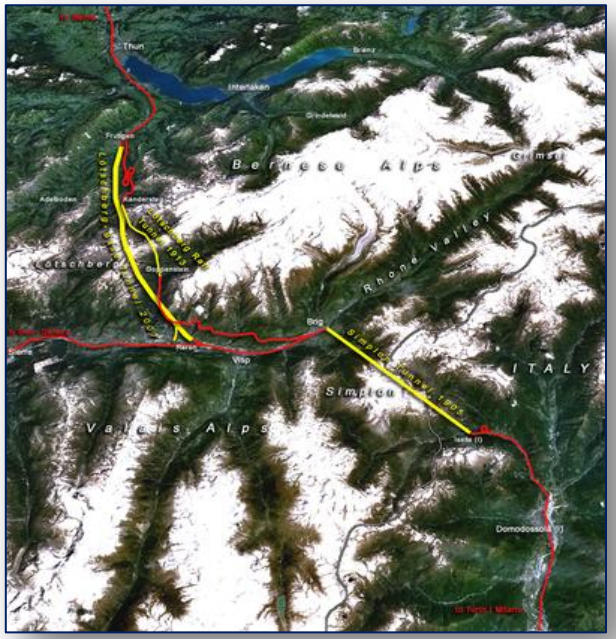
Lötschberg Base Tunnel

Overview

- The world's longest land tunnel, 36km long operating Level 2 ERTMS/ETCS with no fallback
- Thales selected to deliver ETCS level 2, command and control communications, and integrated Driver Advisory System
- Full commercial service Dec 2007 operating 110 tpd mix of passenger trains at up to 250km/h and freight trains at up to 160km/h
- Tunnels development encouraging modal shift from road to rail, introducing energy efficiency, addressing environmental concerns
- Lotschberg tunnel part of SBB National strategy to improve travelling times and to provide end to end interoperability for Corridor A



Challenges

- 'Y' shaped tunnel - western transit link via Basel - Bern - Brig - Domodossola onwards to Milan - very demanding geological conditions
- Supports dense, mixed service requirement - no train should come to a stand in the tunnels. Conflict avoidance high priority
- Any train more than 7 minutes late - routed via the old line or required to wait for the next available slot

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Lötschberg Base Tunnel

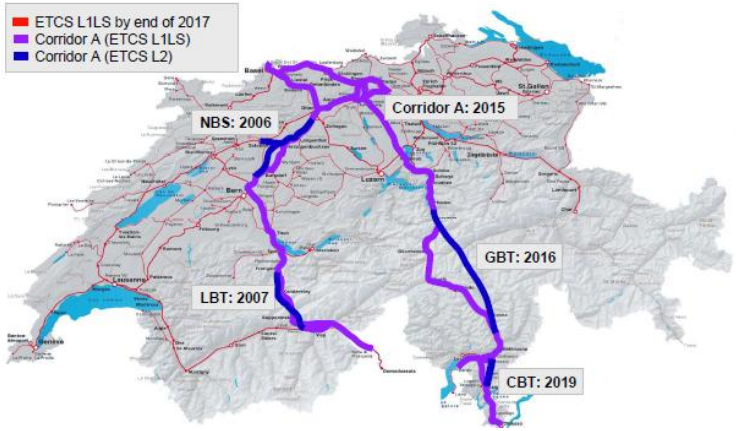
Lessons learned

- Integration and test of systems and interfaces in the integration & interoperability lab in Switzerland prior to deployment
- Traffic operators involved early to test the system to raise operational and technical competencies and awareness
- Close customer interaction provided transparent communications, cultivated trust and actively demonstrated response to customer needs
- Engagement of SME in development of traffic optimisation algorithmns

Benefits delivered

- Lotschberg operates at 80% of capacity and on particularly busy days at 100%. Passenger journey times reduced by 50%
- Lotschberg operational headway achieves values of 180 seconds at 250 km/h. Gotthard will operate @ 250km/h
- Replacement of obsolete ZUB/Signum legacy ATP systems
- Integration of Driver Advisory Speeds into the ETCS display for improved driver performance and reduced energy consumption and acquire reduced maintenance
- Improved Passenger experience

ERTMS Corridor A and Rest of Network



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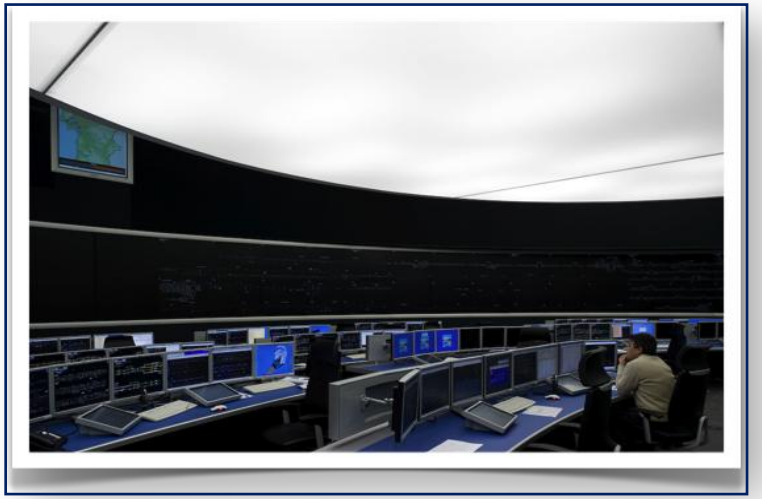
Lisbon Operational Control Centre

Overview

- Fully integrated command & control facility owned and operated by REFER Portuguese rail infrastructure manager
- Manages 70% of Portuguese rail traffic - controls 1770 trains/day, along 1250km of tracks, in more than 140 stations
- Provides operators the full scope of operational services including rail traffic regulation, passenger security CCTV, traction control & passenger information
- Thales selected as prime contractor to deliver fully integrated command & control facility including building, ergonomics, Traffic Management technology, Signalling & Communications



Challenges

- Centralise functions of 6 legacy CTCs, interfacing different subsystems, technologies and suppliers
- Phased migration to Lisbon OCC without service disruption
- Replace legacy telecoms and signalling control systems – installation of new ones - Train / traffic control, security, traction power management, passenger information, maintenance, operational communications, crisis management

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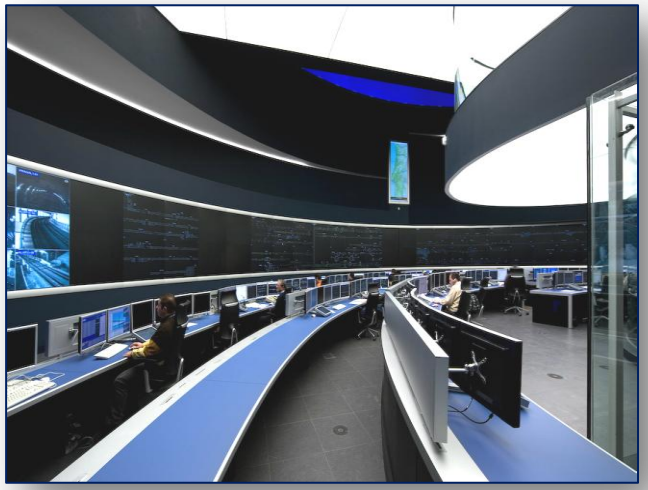
Lisbon Operational Control Centre

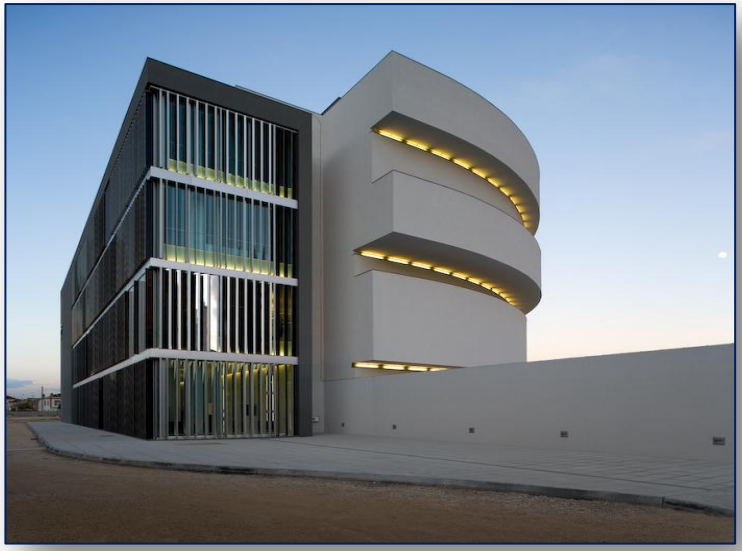


Lessons learned

- Effective turnkey model approach - allowed optimised global design, implementation and delivery
- Mixed conceptual design team with customer - requirements aligned with CONOPs and technical solution
- Project approach – organisational, technological and infrastructure, OCC delivered in line with customers operational concept
- Stable and empowered project management and technical authority - effective management and co-ordination of multiple disciplines

Benefits delivered

- Delivered on time and within budget
- Collaborative programme involving over 120 stakeholders
- Lisbon OCC seen as State-of-the-art Global Customer Show case attracting rail operators from
- REFER achieving 98.5% Punctuality against target of 98% (delay is defined as more than 3min behind time-table)
- Improved Passenger Satisfaction



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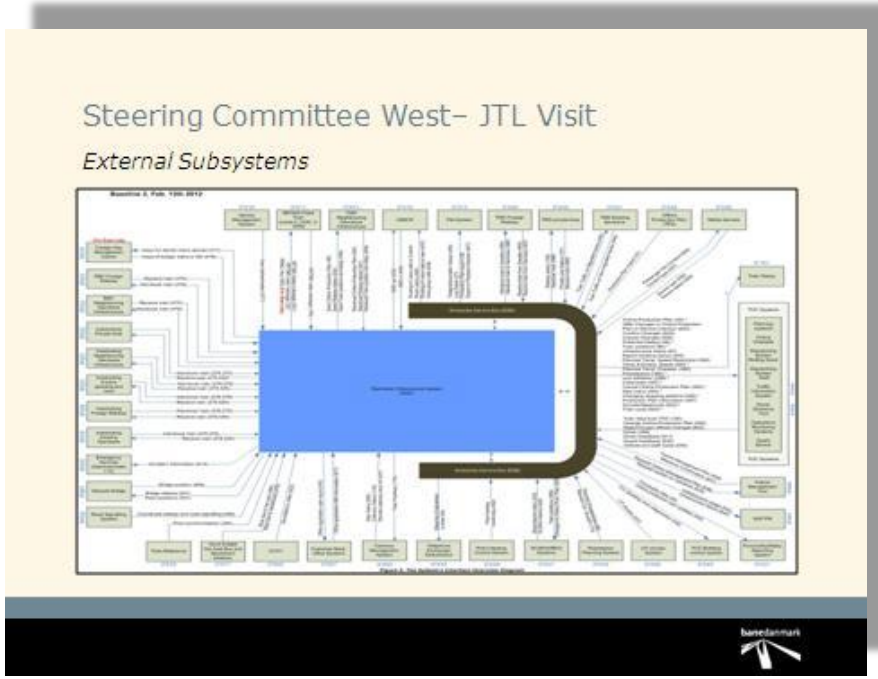
Banedanmark Operational Upgrade Programme

Overview

- Age of signalling infrastructure in Denmark resulting in 60% of train delays
- Decision taken by Banedanmark to completely replace all signalling infrastructure and control with ETCS L2 on a national basis
- Decision to engage two Suppliers to design, implement and support infrastructure
- Thales awarded Denmark West, Alstom East
- Approach will completely transform the existing operation of Banedanmark



Expected benefits

- Complete operational transformation with all functions better integrated.
- Enhanced punctuality. Reduced maintenance costs.
- Uniform safety level for whole network
- Optimised maintenance. Simpler and safer operational rules
- Total transformation of Banedanmark's 3240 track kms.
- Higher speeds, shorter travel times, greater punctuality for passengers

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Summary

Key Lessons

- Build relationships early and collaborate including SMEs
- Freeze specification and delivery requirement early enough to allow on-time delivery
- Undertake maximum testing/installation work off site - resolve technical concerns, support turnkey delivery
- Agree delivery & test programme with primary contractors and facilitate open communications
- Engender pride through a showcase approach
- Deploy a whole life costing approach

Don’t forget the passengers

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