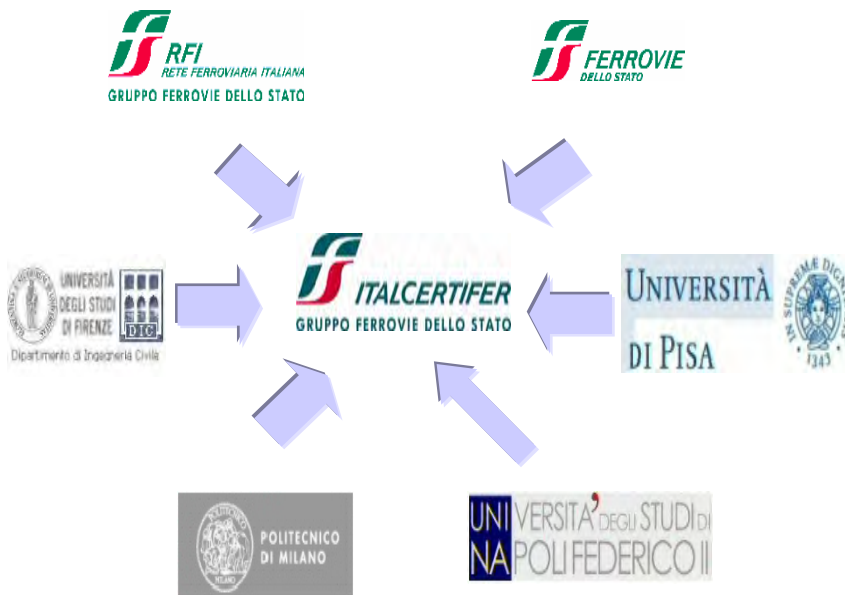




Bucharest, 5-6 Oct. 2010

Carlo Carganico
President & C.E.O.

About us



Joint effort among four leading Universities and the Italian Railway Group.

Established in 2001 within a strategy of integration for Certification, Research & Development.

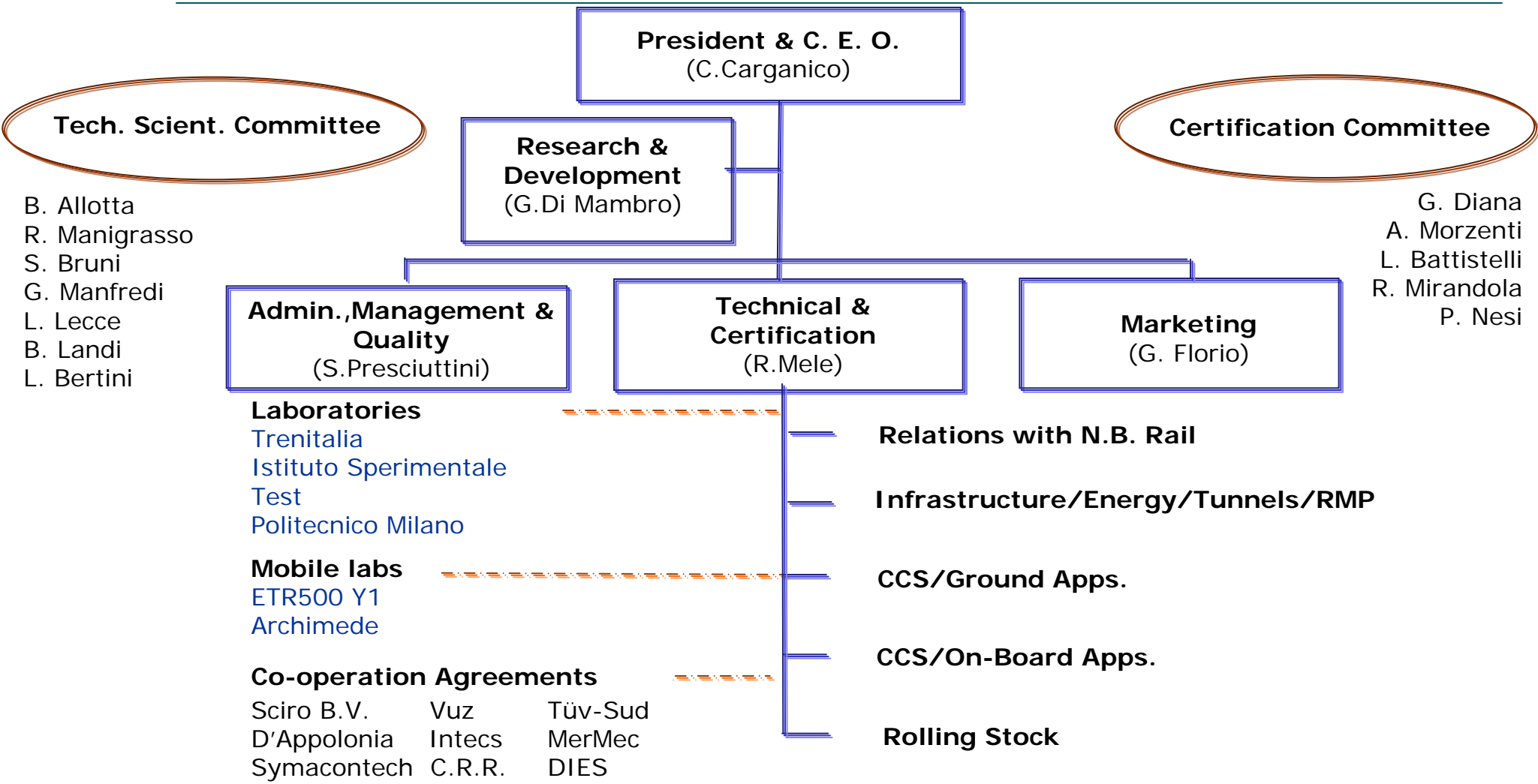
Appointed in 2007 Notified Body for EC Verification of components and subsystems to be used in High Speed and Conventional railway lines.

Appointed in 2009 Italian Independent Safety Assessor (Decree 153/08)

Our strong points

- Skilled people with outstanding experience in Research, Certification and Testing activities
- Availability of fix and mobile laboratories
- Easy access to the Italian infrastructure
- Availability of academic knowledge and experience in different fields (mechanics, electronics, informatics,...)
- Cooperation agreements with leading European Certifying Institutes

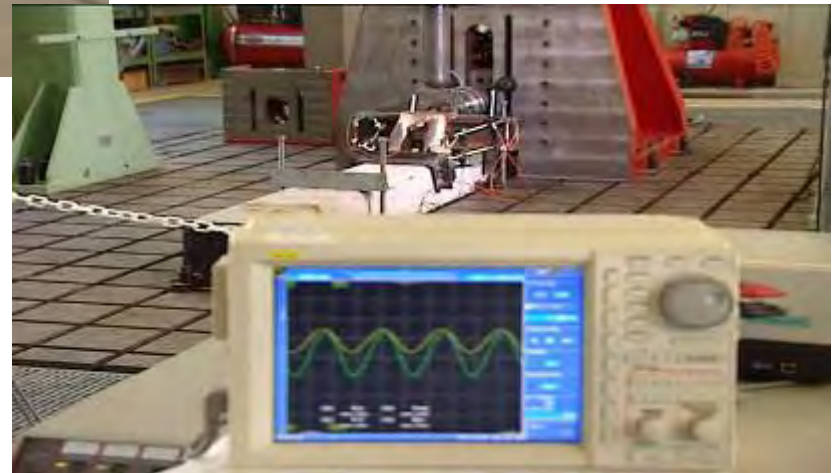
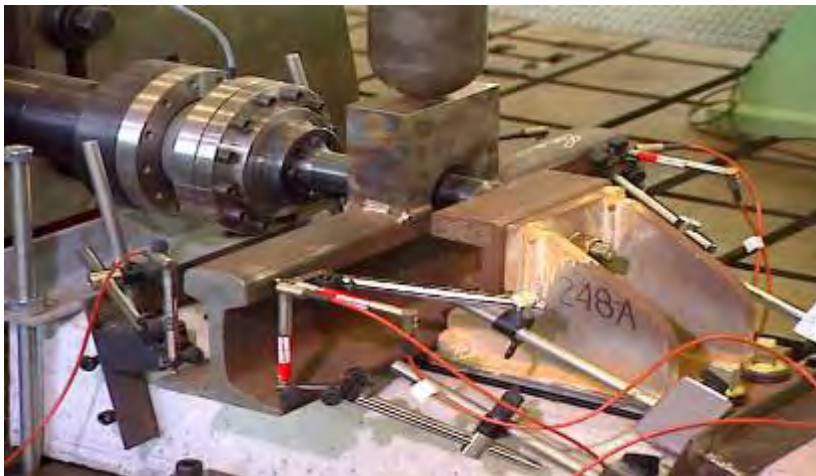
Italcertifer Organization



Laboratories: Istituto Sperimentale



Italy's most qualified reference point for railway tests and researches



Laboratories: the universities



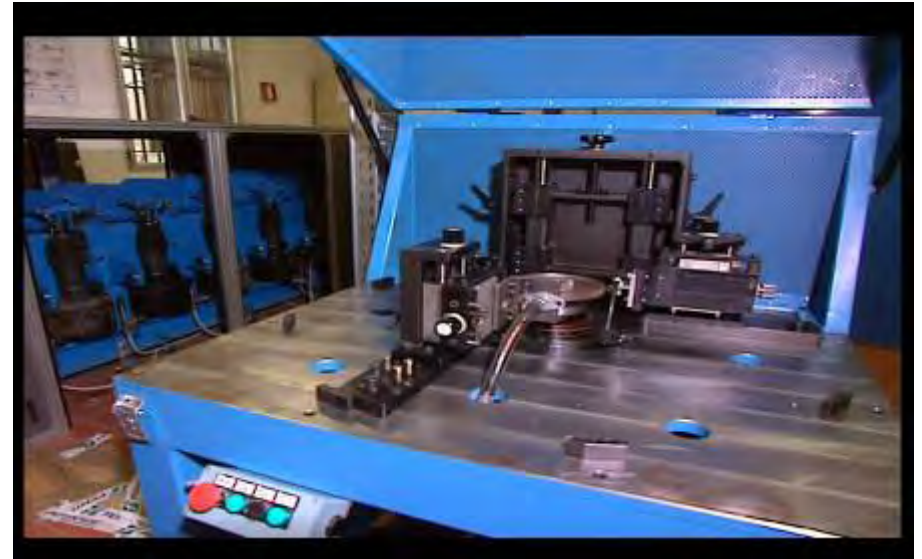
Politecnico of Milan. Wind Gallery.

Study on lateral wind effects on high speed trains.



Laboratories: Rolling Stock

In addition to the Universities and “Istituto Sperimentale” Laboratories, Italcertifer uses Trenitalia’s Rolling Stock Technologies Laboratories and Train Drive Simulator.



All the laboratories comply with National and European railway norms and are accredited by SINAL

Laboratories: on-board



The ETR500-Y1 is the first train-set able to perform measurements up to 350 km/h, qualified by Italcertifer to comply with the European Directive 22/2004 and norm 17025.

For the conventional lines Italcertifer uses the “Archimede” diagnostic train, built to run up to 200 km/h and capable to monitor 115 different parameters, covering the most critical aspects of the track verification.

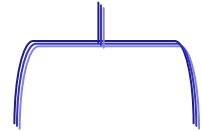


Main running activities – NoBo / I.S.A.

- ✓ EC Certification for the new interoperable High Speed lines.
- ✓ Independent Assessment for SCMT / SSC (national ATP)
- ✓ Independent Assessment for Electronic Interlocking
- ✓ OBTS Homologation for loco and train-sets of different suppliers
- ✓ Risk Analysis evaluation for safety in railway tunnels.
- ✓ Technical Advisory for the new Osannoro Test Facility.
- ✓ Wind effects analysis for high speed trains up to 300 km/h.
- ✓ Increased capacity evaluation on ultra-low profile freight trains
- ✓ Maintenance plans for rolling stock
- ✓ Assessment of Safety Management Systems

Main Clients

Infrastructure



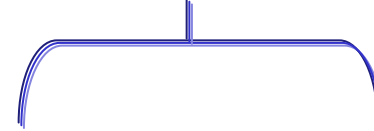
RFI
Pandrol
Unieco
CAVTOMI
CAVET
Iricav1
Pegaso

Rolling stock



Trenitalia	Hupac
Ansaldo Breda	Mecoser
Corifer	E-Carbon
Stadler	Ferrovie Nord
Donelli	SoGeTank
Plasser & Theurer	MecNaFer
Lucchini	SFI
Bombardier	ISAM
Siemens	DB Shenker rail
Alstom	Brescia Mobilità
Firema	Funkwerk
Mer-Mec	Contact
Pesa	Fer
Inrail	
Matisa	

Control Command



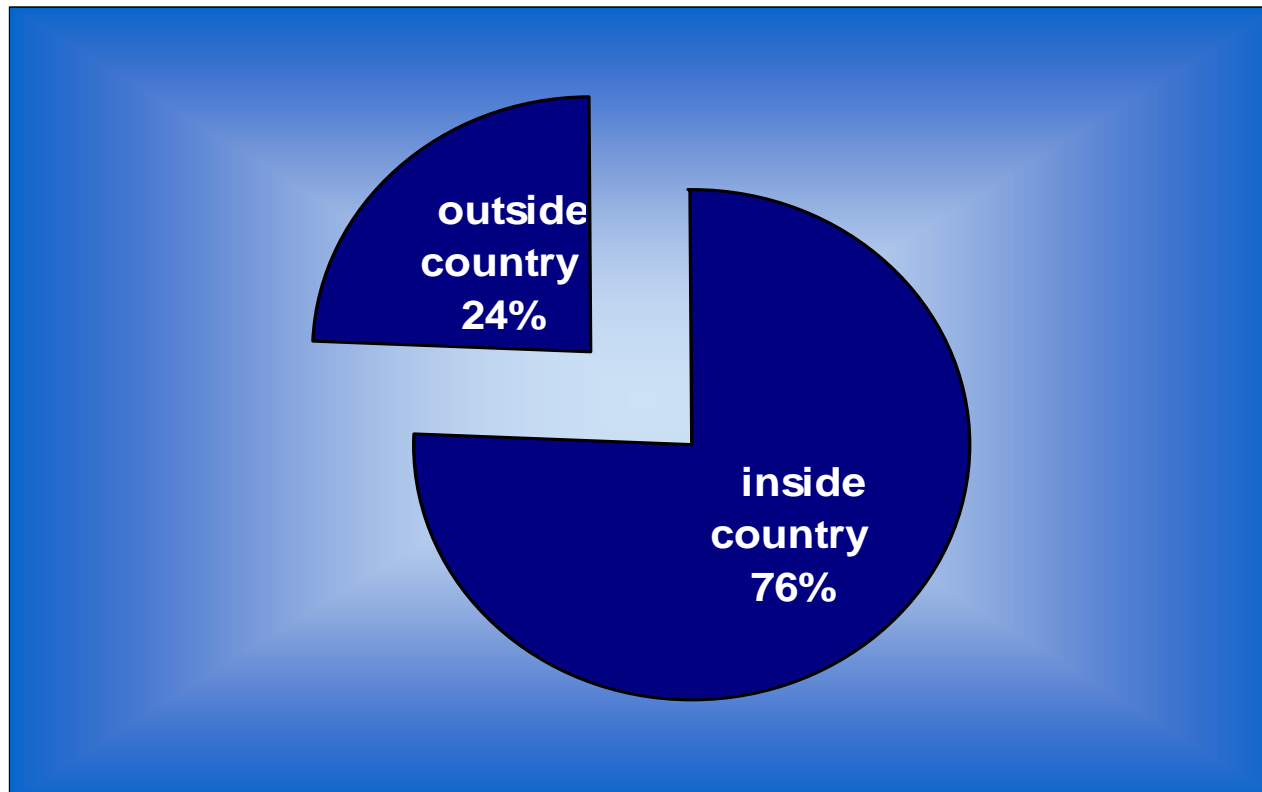
RFI	Siemens
Alstom	RTC
Ansaldo	Mitsui
Bombardier	Selex
Sirti	GTT
Tekfer	Fer
Casram Rail	Sangritana
G.E. Transportation	FSE
ECM	SITE
Selta/Site	Ferrovie del Gargano
Mer-Mec	Bonciani
Metrocampania	Weg Group
Circumvesuviana	Scheidt & Backmann
SNCF	ECM
SBB Cargo	ESIM
	Selta

Energy

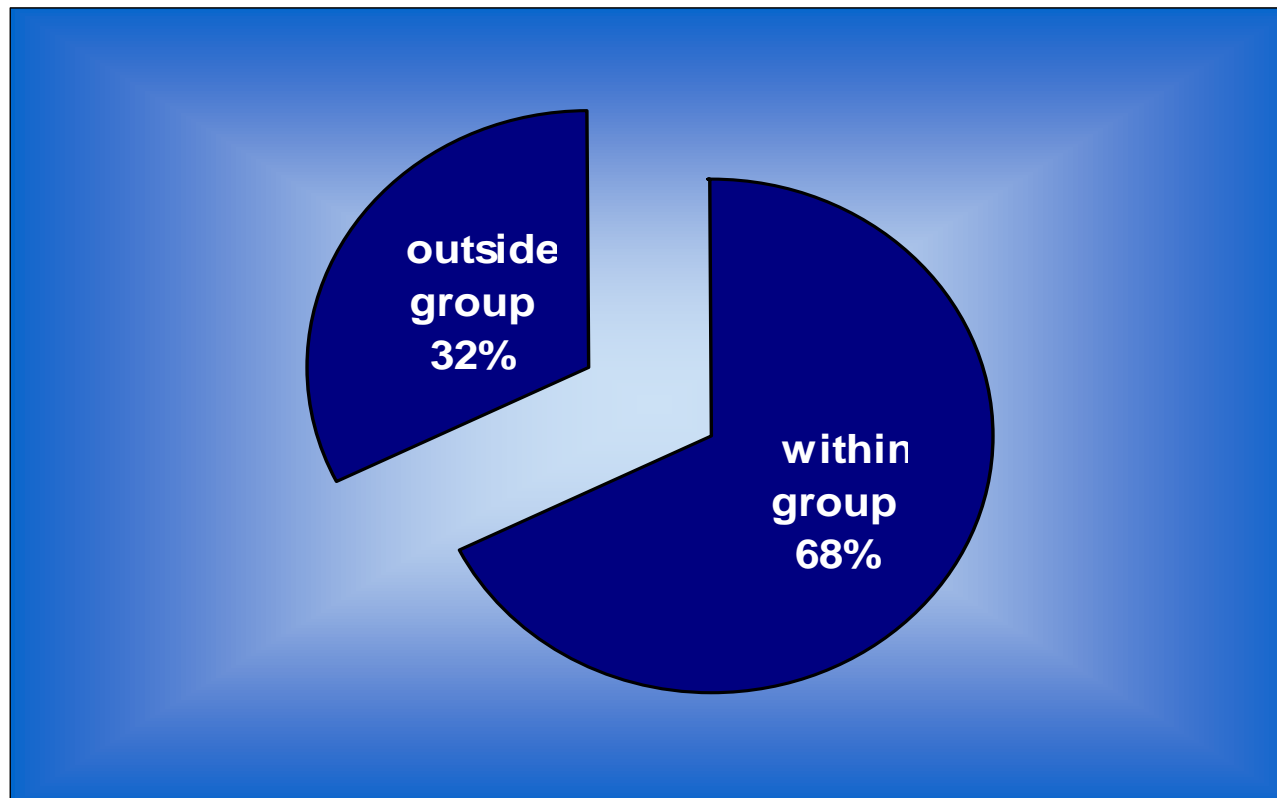


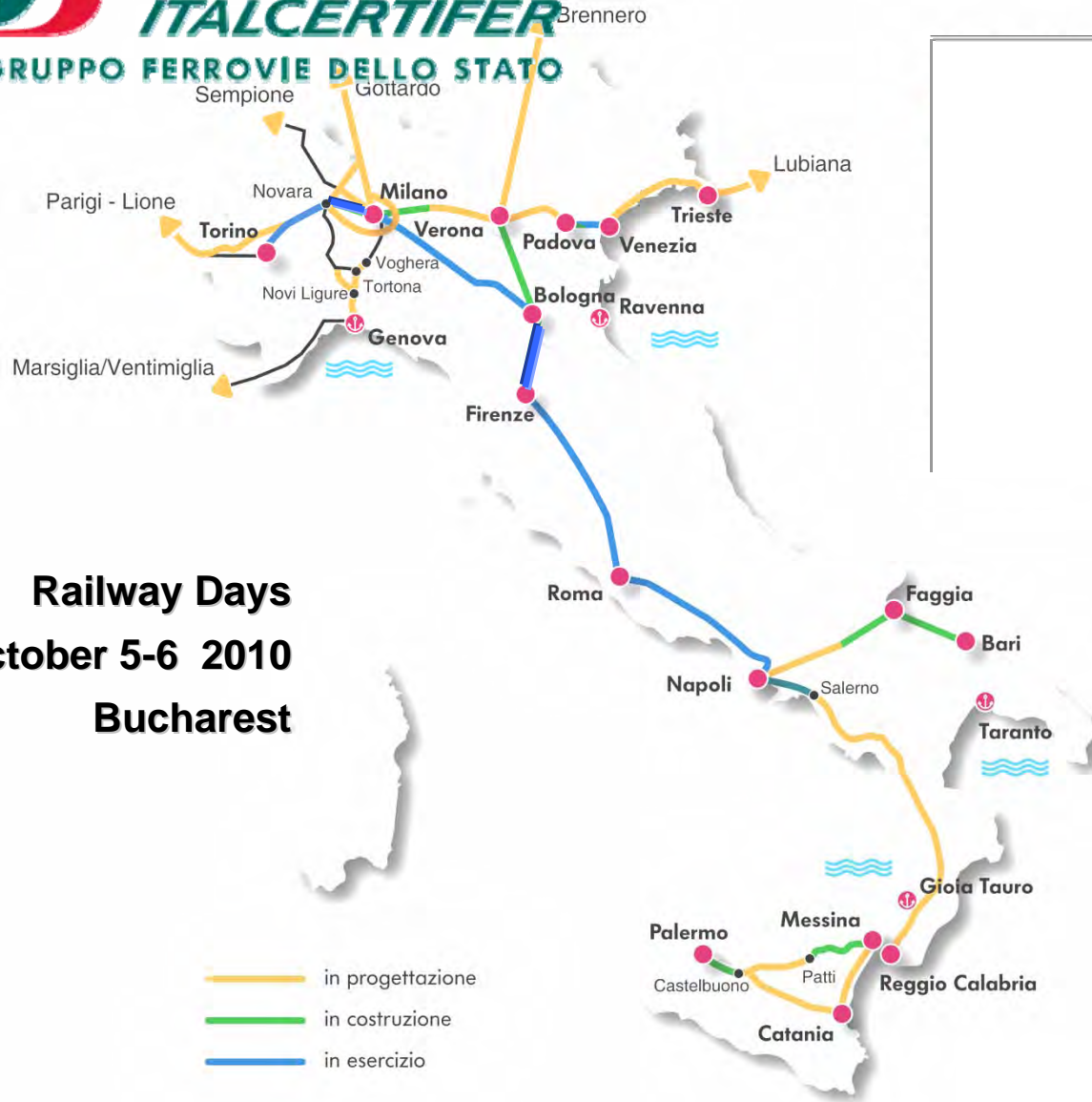
RFI
Morganite Italia
Schunk
Contact
Stemmann
Rina

Revenue share: world market



Revenue share: Italian market





Italian High Speed Network EC Verification of Subsystems INS, ENE, CCS (other TSI assessed: SRT, PRM)

**Railway Days
October 5-6 2010
Bucharest**

Summary of the presentation

- Description of the system under verification
 - Lines, station
 - Main features of the verified subsystems
- Elements evaluated
 - List of characteristics to be assessed from TSIs
- Module adopted for the verification
 - Description of the module adopted
- Verification issues and way to manage them
 - Some use cases

Definition of the system

- Four lines of the Italian High Speed Network
 - Milan - Bologna (in service since Dec. 2008)
 - Torino - Milan (in service since Nov. 2009)
 - Rome - Naples II step (in service since Dec. 2009)
 - Bologna - Florence (in service since Dec. 2009)
- One passenger station
 - Rho Pero station (on Novara – Milan line)
- Subsystems evaluated
 - Infrastructure (INS) – all lines
 - Energy (ENE) – all lines
 - Control/Command and Signaling (CCS) – all lines
- Other TSIs assessed
 - Safety in Railway Tunnels (SRT) – all lines
 - Persons with Reduced Mobility (PRM) - station

Characteristics of the line Milano-Bologna

- **Length: 182 km, from km 10+316 (Bologna) to km 192+240 (Milano)**
 - Open air length: 178,5 km - Tunnels length: 3,5 km
- **8 interconnections to the Conventional line (with change of the power supply system)**
 - Total length: about 28 km
- **Main Civil Works**
 - Fontanellato tunnel: 1,5 km - Somaglia tunnel: 1 km
 - Modena (Secchia river) viaduct: 7 km
 - Po River viaducts system: total length about 10 km
- **Railway Technologies**
 - ERTMS level 2 – SCMT (3 R.B.C. - interlocking system Ansaldo STS)
 - 25 KV AC – 50 Hz
 - Switches with "swing-nose crossing"

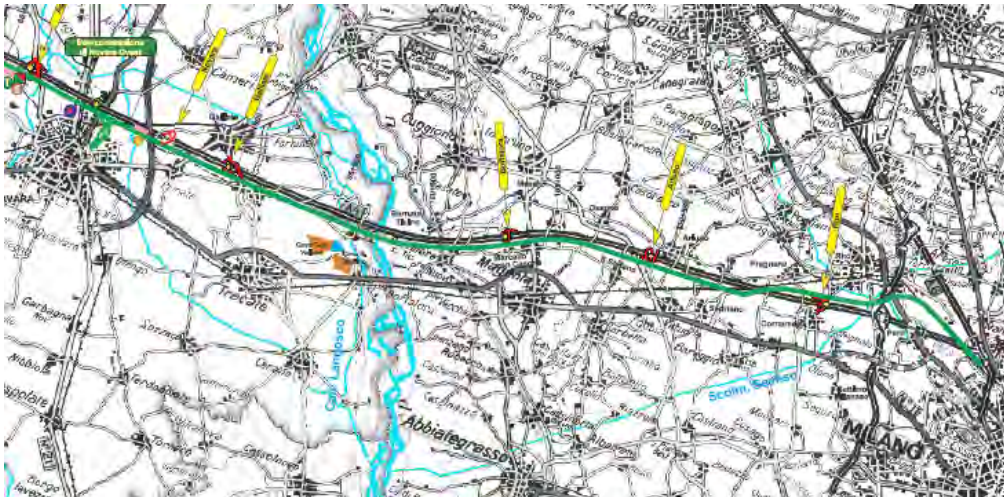


Characteristics of the line Bologna-Florence

- **Length: 78,5 km, from km 4+884 (Bologna) to km 83+366 (Florence)**
 - Open air length: 5,2 km - Tunnels length: 73,3 km (about 93% of the line)
- **Interconnections to the Conventional line (with change of the power supply system)**
 - 2 single track links and 1 double track link at the Bologna side
 - 1 double track connection at the Florence side
- **Main Civil Works**
 - Vaglia tunnel (close to Florence): about 18 km length
 - Firenzuola tunnel (near to San Pellegrino): about 15 km length
 - Raticosa, Monte Bibele, Pianora tunnels: about 10 km length each
- **Railway Technologies**
 - ERTMS level 2 – SCMT (2 R.B.C. Alstom – 1 interlocking system Alstom)
 - 25 KV AC – 50 Hz
 - Switches with “swing-nose crossing“



Characteristics of the line Novara-Milano



- **Rho Pero Station**
 - Close to the Exposition area
 - Platforms dedicated both to High Speed and Conventional line
- **Length: 38,3 km**
 - All extension in open air
- **Interconnections**
 - at the Milano Certosa station
 - at the Novara station
- **Main Civil Works**
 - Tunnels: from 100 to 400 m long
 - Viaducts: Ticino, Pregnana, Rho Certosa (from 1 to 2 km long)
- **Railway Technologies**
 - ERTMS level 2 - SCMT (2 R.B.C. - 8 interlocking systems Ansaldo on the entire line To-Mi)
 - 25 KV AC – 50 Hz
 - Switches with “swing-nose crossing“

Characteristics of the line Rome-Naples completion

- **Length: 19,3 km**
 - All extension in open air
- **Interconnections**
 - With conventional network to Naples (and change of power supply)
- **Main Civil Works**
 - Caivano 1 tunnel (800 m) and Caivano 2 tunnel (460 m)
 - Santa Chiara tunnel (1350 m)
 - Several viaducts for solving interferences with road traffic in the Naples area
- **Railway Technologies**
 - ERTMS level 2 - SCMT
 - 25 KV AC – 50 Hz
 - Switches with “swing-nose crossing“



Main features of the subsystems (1)

Energy Subsystem

- Power supply systems: 25 kV@50 Hz, 3kV dc;
- Electrical Substations 25 kV: each 40 km;
- Powerless sections: change of phase (PCF), change of system (POC)
- Applicable constituents:
 - catenary 25kV - Cu type - certified
 - catenary 3kV - not holding EC declaration
 - catenary 25kV - CuMg type - not holding EC declaration

Main features of the subsystems (2)

Infrastructure Subsystem

- Nominal track gauge: 1435 mm
- Infrastructure gauge: Gabarit C
- Nominal dist. between tracks middle: 5 m high speed
- Rails: UNI 60 mounted on 260-240 cm concrete sleepers
- Applicable constituents:
 - the rail - holding EC declaration
 - the rail fastening systems - not holding EC declaration
 - the track sleepers and bearers - not holding EC declaration
 - the switches and crossings - not holding EC declaration

Module adopted for the verification (1)

- Same module applied for the verification activities
 - Module SG - Unit Verification
- Stages for which the verification is extended
 - overall design
 - structure of the subsystem
 - final testing of the subsystem
 - validation under full operational condition
- Set of TSIs adopted by the NoBo
 - (2008/217/EC) Infrastructure - INS
 - (2008/284/CE) Energy - ENE
 - (2008/163/EC) Safety in Railway Tunnels – SRT
 - (2008/164/EC) Persons with Reduced Mobility - PRM

Module adopted for the verification (2)

- Reasons for the use of Module SG
 - Assessment was committed after subsystems construction
 - Impossibility to audit General Contractor's QMS
 - Complexity of the project with several Parties involved during the testing/validation phase
 - Need of direct involvement of NoBo during such a phase
 - Some critical parameters for satisfying “essential requirements” stated by EU Directives
 - Infrastructure: quality of track
 - Energy: quality of current collection, level of contact force
 - Need of advanced and well-assessed systems
 - Need of “Mobile Laboratories” such as the Advanced Diagnostics train-set ETR500Y1

Methodology applied

- Design Review
 - Examination of the design documentation in order to verify the compliance with the applicable characteristics stated by the TSIs
- Review of the Test/Validation Procedures
 - Analysis of the test specifications in order to check the coverage of the characteristics stated by the TSIs
- Review of the Test/Validation Reports
 - Analysis of the test results
 - On-site visits
 - Attendance to the testing activities

Reporting Structure

- Design Review Report
 - Contains evidence of the Design Review activity
- Test/Validation Procedures Review Report
 - Contains evidence of the review on the procedures
- Test/Validation Results Review Report
 - Contains evidence of the review on the results
- Technical file including among all the others
 - Infrastructure Register
- EC Declaration of Verification



Italian High Speed Network

EC Verification of Subsystem

CCS

Railway Days
Bucharest , October 5-6 , 2010

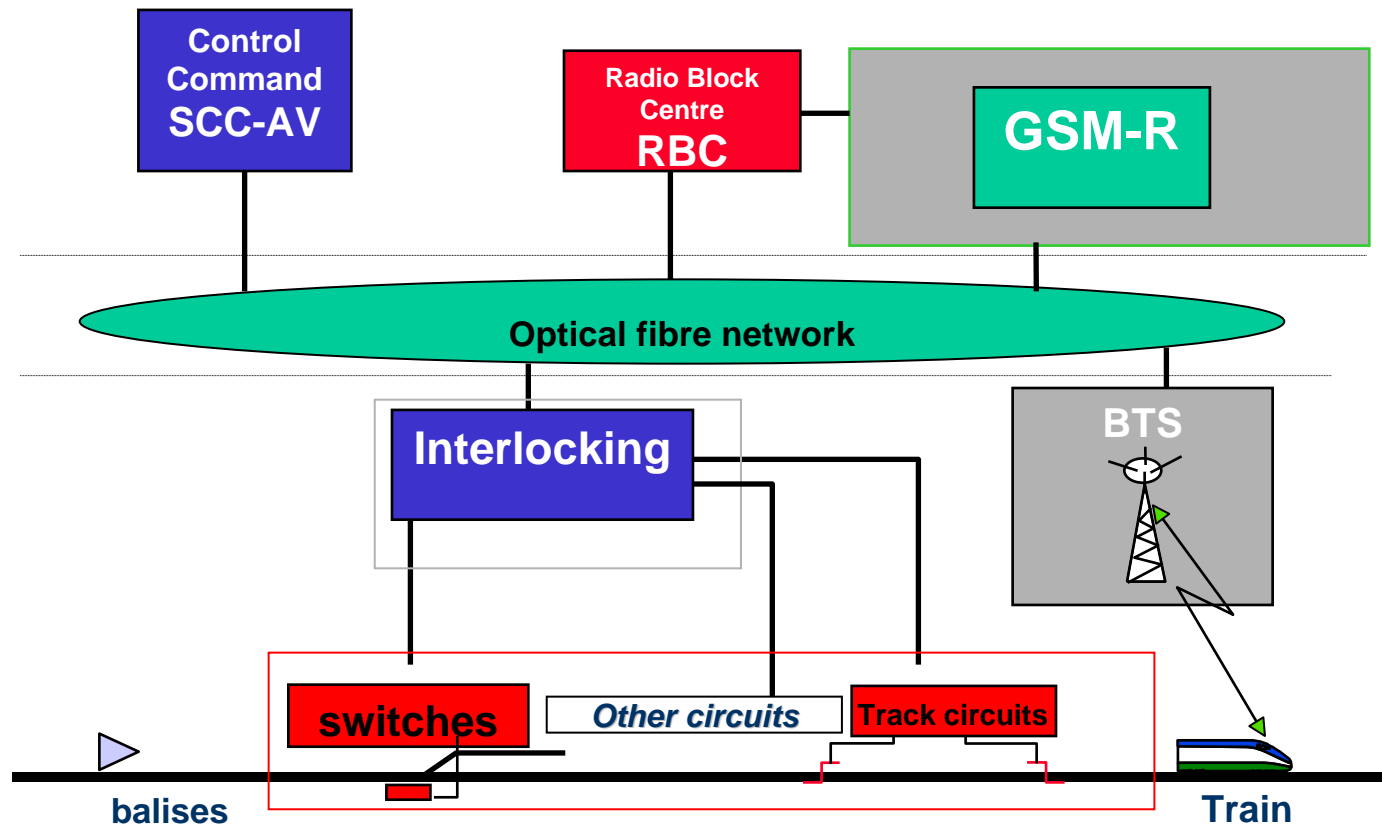


Definition of the system

- 3 lines of the Italian High Speed Network
 - Milan - Bologna (in service since Dec 2008)
 - Torino – Milan (in service since Nov 2009)
 - Bologna – Florence (in service since Dec 2009)
- Subsystems evaluated
 - Control Command (CCS)

HS line CCS Subsystem architecture

Technological system architecture



Italian HS Railway System – Technology suppliers

SIGNALLING

- Alstom Ferroviaria (AF)
- Ansaldo STS

CONTACT LINE & MAIN POWER SUPPLY

- Alstom Transport System (ATS)
- Balfour Betty Rail (BBR)

TELECOMMUNICATIONS

- Sirti

SSE AND REMOTE CONTROL

- Balfour Betty Rail (BBR)
- Ansaldo STS

CCS essential requirements (1)

- **Safety**
- **Technical compatibility**
- **Health**
- **Environment**
- **RAM**

CCS essential requirements (2)

Reference	Document Name	Current Version
ERA/ERTMS/003204	ERTMS/ETCS Functional Requirement Specification	5.0
UNISIG SUBSET-026	System Requirement Specification	2.3.0
UNISIG SUBSET-037	Euroradio FIS	2.3.0
UNISIG SUBSET-039	FIS for the RBC/RBC Handover	2.1.2
UNISIG SUBSET-040	Dimensioning and Engineering rules	2.0.0
UNISIG SUBSET-041	Performance Requirements for Interoperability	2.1.0
ERA SUBSET-108	Interoperability-related consolidation on TSI annex A documents	1.2.0
UNISIG SUBSET-054	Assignment of Values to ETCS variables	2.0.0
UNISIG SUBSET-091	Safety Requirements for the Technical Interoperability of ETCS in Levels 1 & 2	2.2.11
A11T6001 12	(MORANE) Radio Transmission FFFIS for EuroRadio	12
UNISIG SUBSET-092-1	ERTMS EuroRadio Conformance Requirements	2.2.5
UNISIG SUBSET-092-2	ERTMS EuroRadio Test cases Safety Layer	2.2.5
UNISIG SUBSET-097	Requirements for RBC-RBC Safe Communication Interface	1.1.0

Module adopted for the verification (1)

- Same module applied for the verification activities
 - Module SH2
- Set of TSIs adopted by the NoBo
 - STI AV SCC 2008-386 [2008/386/CE] (Bo-Fi, To-Mi)
 - STI AV SCC 2007-153 [2007/153/CE] (Mi-Bo)

Module adopted for the verification (2)

- Reasons for the use of Module SH2
 - Supplier and subcontractor have a quality system under control of the NOBO
 - Some critical parameters for satisfying “essential requirements” stated by EU Directives

CCS Documents volume (1)

Activities	To-Mi	Mi-Bo	Bo-Fi
Design Documentation "Corpus" (n° documents)	≈ 1.000	≈ 3.000	≈ 2.000
Design Examination (n° documents)	≈ 400	≈ 500	≈ 400
Quality Management System (n° Audits)	≈ 15	≈ 30	≈ 15
Dynamic Integration Run-Tests	≈ 100	≈ 500	≈ 300

Safety Characteristic and RAM parameter

The Assessment activities are carried out with respect to the CENELEC norms for the Railway field:

- **EN 50126:** whole process (life-cycle) for the Total Railway System
- **EN 50129:** defines activities and techniques to be used for the “Safety demonstration” of the electronic railway signaling systems; practically is the guide-line for the preparation of the “Safety case” that will be “Assessed”
- **EN 50128:** is a specific subset of EN 50129 for the software

Technical compatibility

SPECIFICA UNISIG SS076-5-2					Analisi ITCF			
Number of Feature/Test case	Test case	Tested Equipment	Tested Feature	Test Case of Feature	Based on Requirements	Applicabilità (si, no,?)		Note
311	Possibility to link balise groups with unknown identity and location (repositioning)	Trackside equipment	Possibility to link balise groups with unknown identity and location (repositioning)	Trackside generates and sends a message including packet 5 with announcement of repositioning balise group.	ERTMS/ETCS à CLASSI UNISIG SRS 2.2.2: Subset-026-3.4.4.2.2 Subset-026-3.4.4.2.2 Subset-026-3.8.5.2	No		Il test è relativo alla funzionalità repositioning, non implementata sulla tratta AV Bologna-Firenze
811	Transmission of MA together with track description data from in-fill device	Trackside equipment	Transmission of MA together with track description data from in-fill device	Trackside generates and sends a message including MA with associated track description via in-fill devices	ERTMS/ETCS à CLASSI UNISIG SRS 2.2.2: Subset-026-3.4.3.1.1 Subset-026-cp2-3.7.1.1-a Subset-026-cp2-3.7.1.1-b Subset-026-cp2-3.7.1.1-c Subset-026-cp2-3.7.1.1-d Subset-026-3.7.2.2 Subset-026-3.7.2.1 dot 1	No		Il test è relativo alla funzionalità INFILL, non implementata sulla tratta AV Bologna-Firenze
1011	Transmission of MA together with track description data from RBC	Trackside equipment	Transmission of MA together with track description data from RBC	INTENTIONALLY DELETED		No		Cancelato intenzionalmente
1111	MA Transmission after confirmation by the train of the reception of complete track description data	Trackside equipment	MA Transmission after confirmation by the train of the reception of complete track description data	INTENTIONALLY DELETED		No		Cancelato intenzionalmente
1211	Monitoring of priority channel	Trackside equipment	Monitoring of priority channel	Trackside generates and sends to the train an emergency message. Message is repeated until acknowledgement from the train is received.	ERTMS/ETCS à CLASSI UNISIG SRS 2.2.2: Subset-026-3.10.1.1 Subset-026-3.10.1.2 Subset-026-3.10.1.3 Subset-026-3.16.3.1.2 Subset-026-3.16.3.1.3 Subset-026-3.16.3.2.1 Subset-026-3.16.3.2.3 Subset-026-7.5.1.87: Variable MID_EM Subset-026-8.6.8	Si		"Manage_conditional_emergency_stop" Req_095
1212	Monitoring of priority channel	Trackside equipment	Monitoring of priority channel	Trackside generates and sends to the train an emergency message. Acknowledgement with changed value of MID_EM is received and trackside ignores it. Previously sent emergency message is repeated.	ERTMS/ETCS à CLASSI UNISIG SRS 2.2.2: Subset-026-3.10.1.1 Subset-026-3.10.1.2 Subset-026-3.10.1.3 Subset-026-3.16.3.1.2 Subset-026-3.16.3.1.3 Subset-026-3.16.3.2.1 Subset-026-3.16.3.2.3 Subset-026-7.5.1.87: Variable MID_EM Subset-026-8.6.8	Si		"Manage_conditional_emergency_stop" Req_095
2711	Sending default balise information in case of defect LEU.	Trackside equipment	Sending default balise information in case of defect LEU.	Verify that default information is possible to send (by trackside) in case of defect LEU.	ERTMS/ETCS à CLASSI UNISIG SRS 2.2.2: Subset-026-3.16.2.4.8 Subset-026-4.8.3.1.1 Default Balise Information Subset-026-4.8.4.2 Default Balise Information Subset-026-4.4.17.1.2 Subset-026-7.4.2.38 Subset-026-7.5.1.93: Variable MID_PACKET Subset-026-7.5.1.103: Variable Q_DIR Subset-026-7.5.1.49: Variable L_PACKET	Si		"Manage_storage_of_default_balise_telegrams" Req_025 Allocated to "GDPP" and "Balise & Encoders"
2915	Transmission of L2/L3 movement authority from RBC	Trackside equipment	Transmission of L2/L3 movement authority from RBC	The trackside generates and sends message 3: Movement Authority to a train when receiving message 132: MA request	ERTMS/ETCS à CLASSI UNISIG SRS 2.2.2: Subset-026-3.6.1.1(b) Subset-026-3.6.2.2.1 Subset-026-3.6.2.2.2(b) Subset-026-3.8.3.9 Subset-026-3.8.3.10 Subset-026-3.16.3.2.1 Subset-026-4.8.3.1.1 row 1	Si		"Process_level_2_3_movement_authority_packet" Req_076

Reporting Structure – Main Report

- **Evaluation of the quality management system of the supplier**
- **Result of the safety assessment activity (ISA)**
- **Result of the design examination – result of the V&V to cover all the requirements specified in the requirements matrix and other essential requirements**
- **Acquisition of the On Board System Report (compliant with subset 026 2.3.0)**
- **Summary of the results and the characteristic that are not implemented or not fully compliant**
- **Definition of the line constraints and the application conditions of the ERTMS-ETCS Trainborne**



Thanks for the attention