

Company Profile



Ansaldo STS

A Hitachi Group Company



Milan Line 5 Metro

Brescia Metro

“Connecting pieces of your world”

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245 stations in Unattended Metros
 250 Km of Unattended Metros
28 countries



Complete Transportation Solutions - Passengers and Freight

All around the world, Ansaldo STS supports its clients to create and develop more reliable and sustainable networks that ease urban mobility and solve the challenges of today's population and cities' rapid growth.

From passenger to freight transportation networks, from urban to intercity and cross-border high speed lines, Ansaldo STS designs and deploys cutting-edge technologies to meet operators' needs and optimize performance independently of traffic density and complexity.

Ansaldo STS has left its mark in the rail industry by implementing advanced technologies on major projects such as:

- ERTMS/ETCS solutions combined with High Speed Rail, Conventional lines or Heavy Haul technologies for safer and interoperable networks
- Satellite positioning technology for safer and more accurate rail traffic management
- Driverless solutions to improve operational efficiency and flexibility and reduce operation and maintenance costs
- CBTC signalling technology to increase performances and reduce headway through a real moving block
- Catenary free combined with tramway technology (TramWave®) to preserve the environment and historical city centers
- Broad Components portfolio, covering all aspects of signalling and systems solutions (such as Switch Machines, Signals, Level Crossings, Relays, etc.)

That's how Ansaldo STS moves the rail industry forward, that's how we connect pieces of your day to day life.

A leading international technology company which specializes in railway signalling and integrated transport systems for passenger and freight rail operations.

Ansaldo STS plans, designs, manufactures, installs and commissions signalling components, systems and integrated mobility solutions for the management and control of new and upgraded Railway, Transit and Freight lines worldwide and acts as a lead contractor and turnkey provider on major projects worldwide.

Ansaldo STS is listed on the Milan Stock Exchange.

Ansaldo STS's Key success factors:

- Advanced technology
- Innovative approach to highly complex projects
- International presence and global capability
- System interoperability and efficiency
- Compliance to safety and environmental standards
- Full system integration capabilities



Railway and Mass Transit

Ansaldo STS is a global leader in passenger rail systems, designing, building, operating and maintaining Railway and Mass Transit solutions that range from fully integrated turnkey solutions to traditional signalling systems.

These systems can include any of the technological subsystems that make up a transport system, including signalling, power supply, telecommunications, rolling stock and other technologies. Globally, Ansaldo STS supports clients with every type of signalling solution, from track circuits to Communications Based Train Control (CBTC) and from High Speed Railways to Driverless and Conventional Metro Systems.

Freight

Ansaldo STS has a history in the design and production of a full range of signalling solutions and components and provides operation and maintenance services for Heavy Haul and Freight customers around the world.

From the wayside, onboard and office products that comprise a Heavy Haul or Freight network, to complete turnkey systems, Ansaldo STS is a leader in freight rail solutions. Our advanced, modular and scalable planning and control systems have improved network safety, reliability and efficiency to new levels.

Key Data as of December 2015

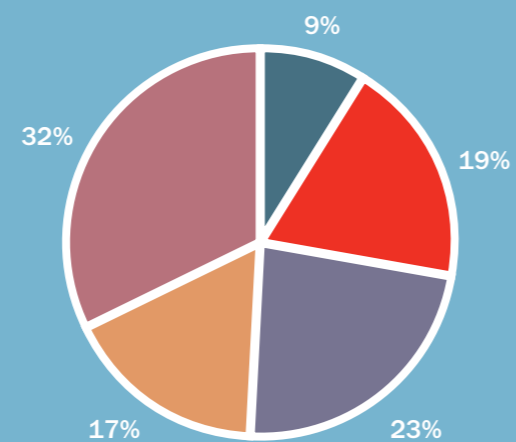
REVENUES MIn€ 1,383.8	NEW ORDERS MIn€ 1,336.0	BACKLOG MIn€ 6,410.4
OPERATING INCOME MIn€ 135.8	NET FINANCIAL POSITION (positive net cash) MIn€ (338.7)	HEADCOUNT (n.) 3,772



Order Backlog as of December 2015

- Italy
- Rest of Europe
- North Africa | Middle East
- Americas
- Asia Pacific | South Africa

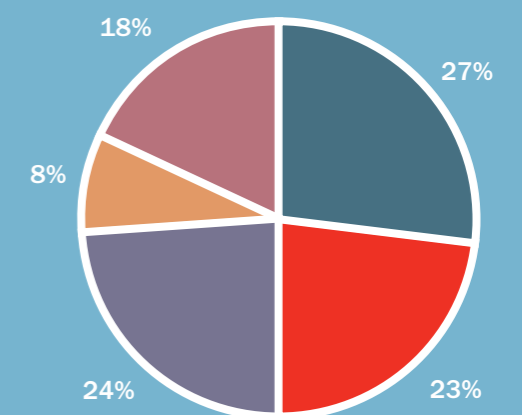
6,410 MIn€ by Geographic area



Revenue as of December 2015

- Italy
- Rest of Europe
- North Africa | Middle East
- Americas
- Asia Pacific | South Africa

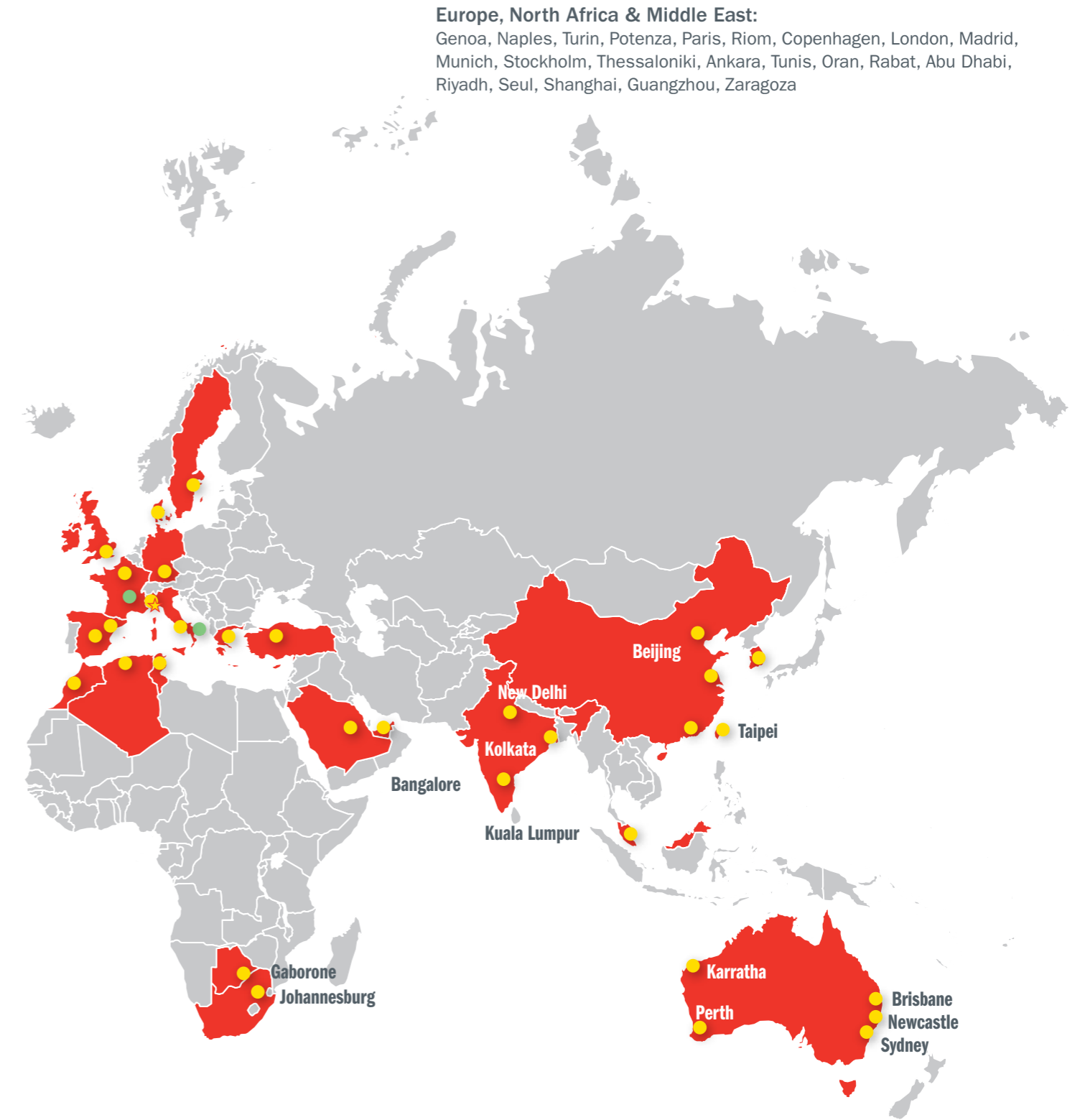
1,384 MIn€ by Geographic area



Worldwide Presence

(tot. 2015 headcount 3,772)

“Share the passion”

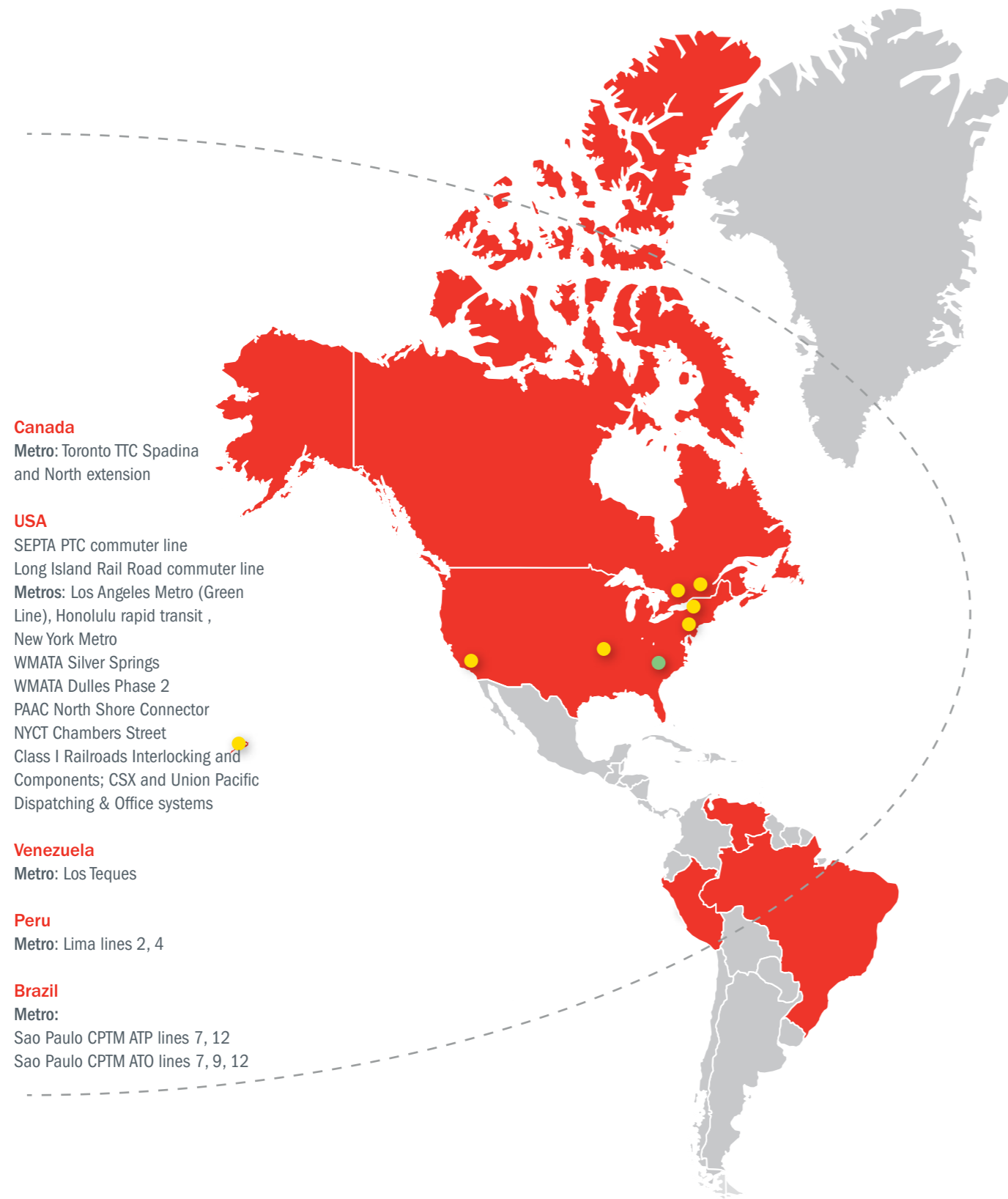


★ Global Headquarters

● Main Offices & Sales Representations

● Factories

Main References and Projects Worldwide

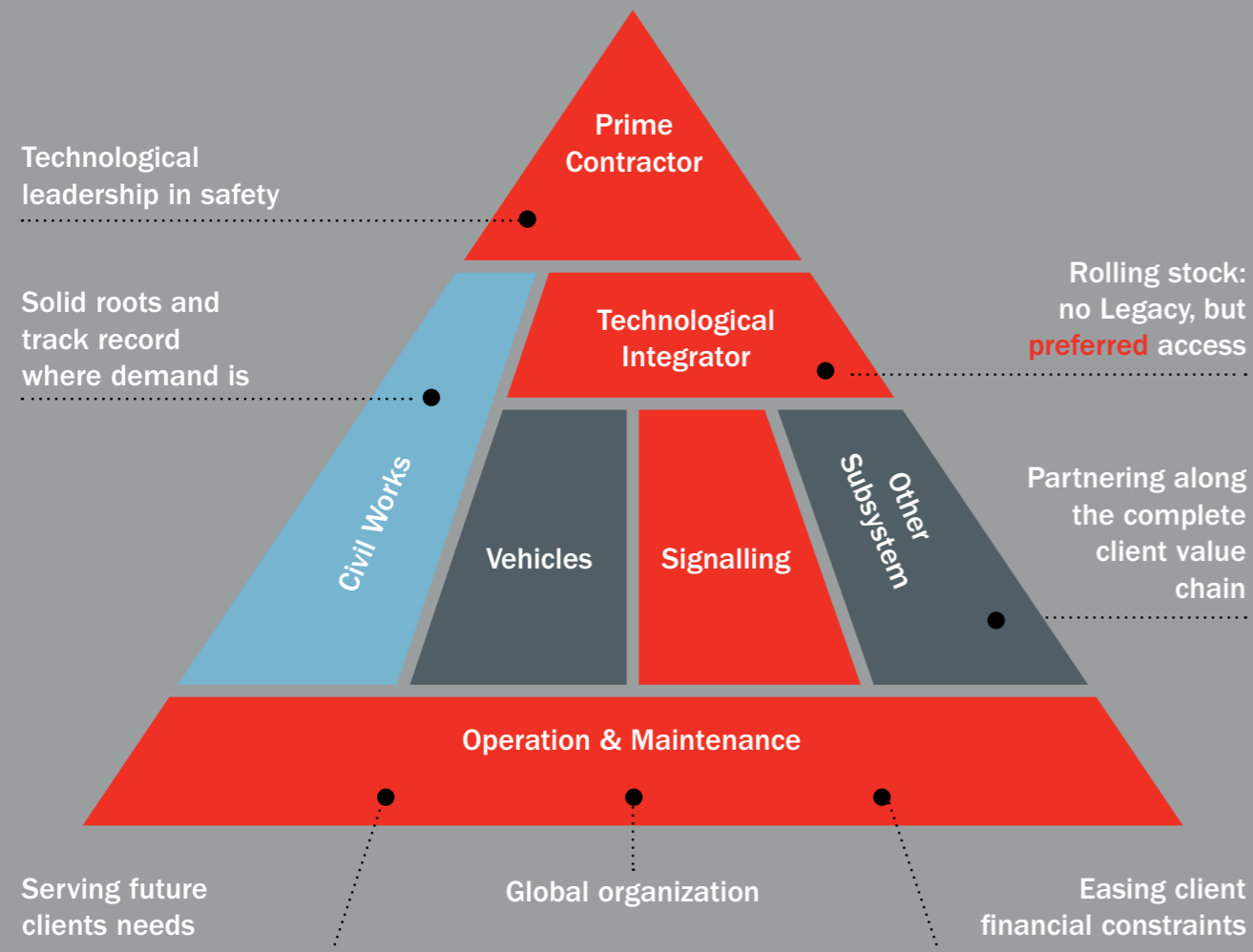


- Canada**
Metro: Toronto TTC Spadina and North extension
- USA**
SEPTA PTC commuter line
Long Island Rail Road commuter line
Metros: Los Angeles Metro (Green Line), Honolulu rapid transit, New York Metro
WMATA Silver Springs
WMATA Dulles Phase 2
PAAC North Shore Connector
NYCT Chambers Street
Class I Railroads Interlocking and Components; CSX and Union Pacific Dispatching & Office systems
- Venezuela**
Metro: Los Teques
- Peru**
Metro: Lima lines 2, 4
- Brazil**
Metro:
Sao Paulo CPTM ATP lines 7, 12
Sao Paulo CPTM ATO lines 7, 9, 12

“Ride the rail”

- UK**
High Speed One
Cambrian Line
- Germany**
Saarbrücken - Mannheim HSL, Berlin-Rostock HSL
Velaro (Onboard)
- Sweden**
Boden-Haparanda line
Metro: Stockholm Red line
- Denmark**
Metros: Copenhagen M1, M2, new City-Ring
- Italy**
High Speed network: Milan-Bologna, Rome-Milan, Milan-Naples, Florence-Bologna, Turin-Milan, Brescia-Treviglio
Metros: Rome L A, LC, Naples L1, L6, Milan L5, L4
Brescia, Genoa
Conventional Network: ATP rollout (SCMT); Turin-Padua Line
- France**
High Speed network including: Tours-Bordeaux (SEA), Le Mans-Rennes (BPL), Paris-Strasbourg (East Europe),
Metro Paris Line 3
- Greece**
Metro: Thessaloniki
- Spain**
Madrid-Lerida HSL
Figueras-Perpignan line - Madrid Attocha by-pass
La Robla-Pola de Lena HSL
- China**
Shijiazhuang-Taiyuan HSL
Zhengzhou-Xian HSL
Metros: Shenyang lines 1, 2, Chengdu lines 1, 2, Hangzhou line 1, Xian line 2, Zhengzhou line 1, Dalian lines 1, 2, Shanghai line 2
Tramway: Tramwave® phase 1
Zhuhai
- South Korea**
Seoul-Busan HSL, Osong-Gwangju (Honam) HSL, Rotem onboard program
Metro: Ui Shinseol LRT
- Taiwan**
Metro: Taipei Circular Line
- India**
TPWS Northern railway, TPWS Southern railway
Metros: Kolkata metro, Mumbai monorail, Navi Mumbai metro
- Malaysia**
Kuala Lumpur Monorail
- Australia**
Rio Tinto Iron Ore, AANCSA Alliance, ARTC Hunter Valley, Aurizon Synergy Alliance, Roy Hill Iron Ore, Butler turnkey railway signalling extension, PTA
- Turkey**
Gebze - Köseköy line
Mersin-Toprakkale e Boğazköprü - Yenice
Metro: Ankara lines 1,2,3,4
- Algeria**
Oued Tlilat-Tlemcen line
- Morocco**
Tangiers-Kenitra HSL
- Botswana**
Integrated Safeworking System (maintenance) Botswana Railways
- Libya**
Coastal line Ras Ajdir - Sirth e Al-Hisha-Sabha
- South Africa**
Viljoensdrift
- Saudi Arabia**
Metros: Riyadh Princess Noura Bint Abdulrahman metro, Riyadh metro line 3
- Abu Dhabi (UAE)**
Shan-Habshan-Ruwais

Competencies



As an expert in Railway, Mass Transit and Freight signalling and turnkey projects, Ansaldo STS manages all of the phases of the project, from the design to the manufacturing and installation, testing and commissioning and operations and maintenance, independently of network size and complexity.

Contractual Capabilities



Ansaldo STS's "full system approach" optimizes strategies, resources and investments and rationalizes technology types to provide state-of-the-art, viable and integrated transportation solutions within a municipality, region or country.

We act as lead contractor (or consortium partner) and system integrator for major projects around the world, under the following contractual schemes:

- Contracting for Design & Build
- Project Financing
- Public Private Partnerships (PPP)
- Build, Operate and Transfer (BOT)
- Design, Build, Operate and Maintain (DBOM).

Business Lines

Ansaldo STS delivers a full range of Railway & Mass Transit and Freight Solutions, such as...



Ansaldo STS is present in over 50% of all High Speed lines built around world (Japan excluded).



Ansaldo STS provides full-service capabilities to large railway networks.



Commuter rail, also called suburban rail, is a passenger rail transport service that primarily operates between a city center and the middle to outer suburbs beyond 15 km.



A complete portfolio of solutions where the driver runs the trains up to fully ATO systems, where only limited actions are required by the driver.



Ansaldo STS is a leader in the freight transportation market. In Australia, it provides innovative heavy-haul freight rail solutions for several of the country's key iron ore mining operations.



So far, Ansaldo STS has developed more than 250 km of driverless unattended metro lines, with more than 245 stations, 12 control and maintenance centers and 380 trains.



TramWave® is the innovative traction power supply system without overhead catenaries.



Tramway: a wide range of passenger capabilities and performance characteristics for urban mobility.



System Integration Activities

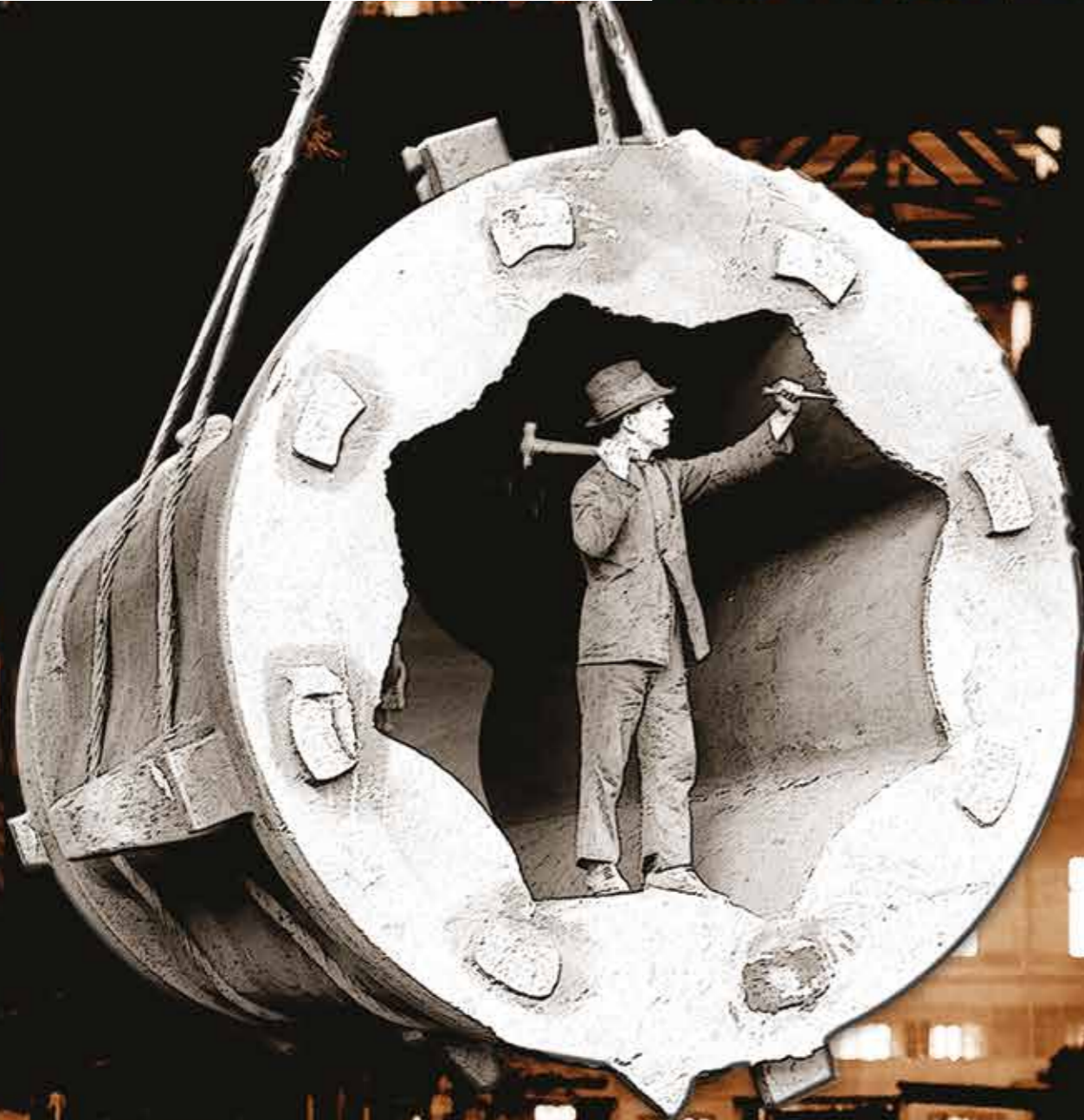
Ansaldo STS provides design, verification, manufacturing, installation, testing and commissioning, operation, maintenance and training of complete Automation and Safety related Control Systems and Equipment for Railways & Mass Transit and Freight:

- Interoperable signalling systems: ERTMS/ETCS (Railway)
- Communication Based Train Control: CBTC (Metro)
- Train control systems: ATC / ATP / ATO
- Computer Based Interlocking (CBI)
- Centralized Traffic Control (CTC)
- Wayside equipment & components
- Operation support systems
- Integrated Security systems.

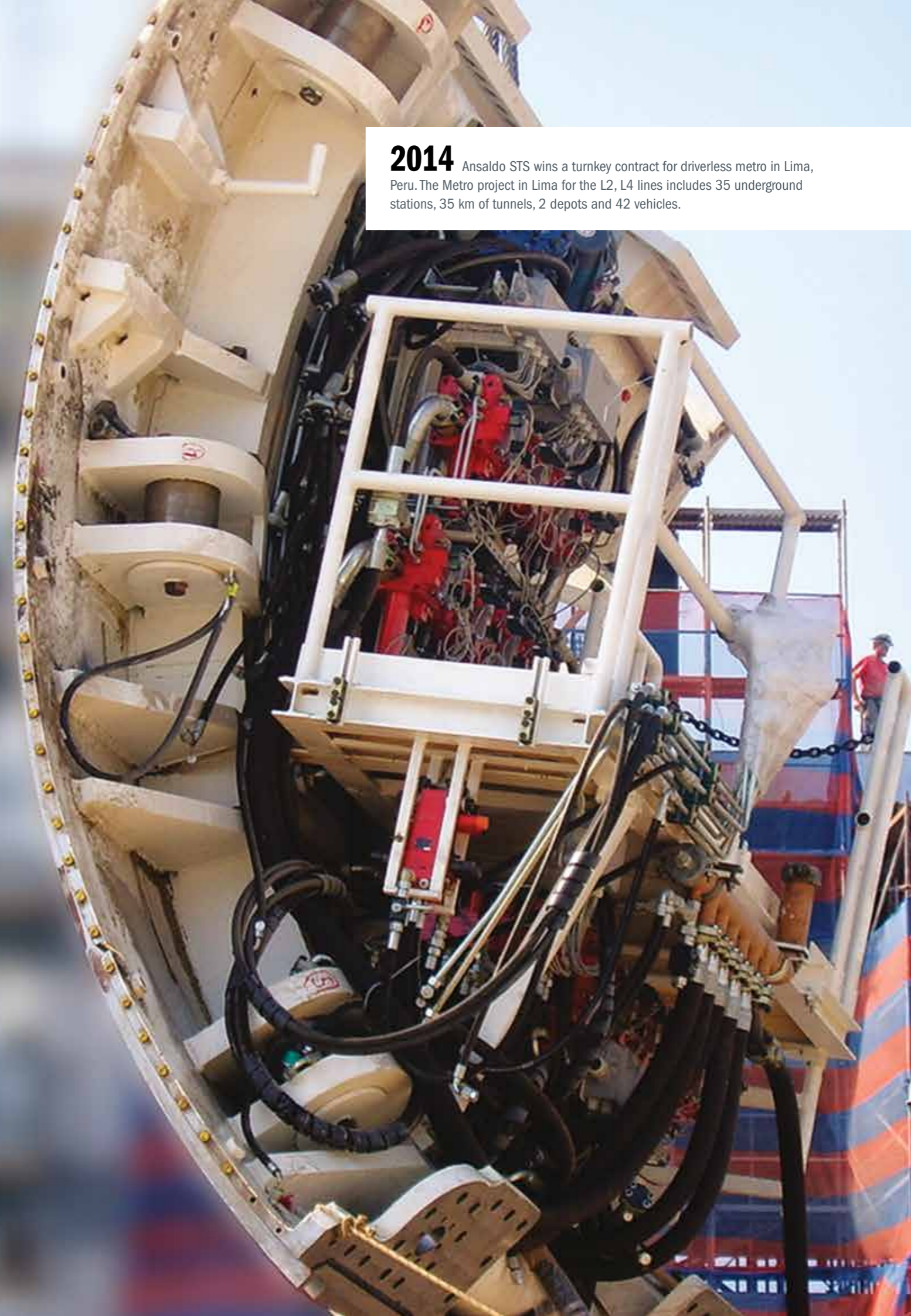
Ansaldo STS's activities encompass:

- System integration
- Traffic Management
- Train Control and Signalling Systems
- Telecommunications
- SCADA
- Power Supply
- Electrification
- Platform Screen Doors
- Fare Collection
- Depot Equipment
- Track Work
- Operations and Maintenance.

1853 Gio. Ansaldo & C. is founded in Genoa. At the time, Ansaldo was already a distinguished name in the Genoese industry. Ansaldo STS is today headquartered in one of the historical buildings owned by the Gio. Ansaldo & C.



2014 Ansaldo STS wins a turnkey contract for driverless metro in Lima, Peru. The Metro project in Lima for the L2, L4 lines includes 35 underground stations, 35 km of tunnels, 2 depots and 42 vehicles.





Metrocampania NordEst, control room

Turnkey Mass Transit Solutions

Mass Transit is focused on urban mobility, with stressed headway (down to 75 s) and high volumes of passengers per hour per direction on relatively short routes.



Conventional Metro

- Genoa Metro (Italy)
- Lima Metro (Peru)
- Naples Line 1 Metro (Italy)
- Naples Line 6 Metro (Italy)



Driverless Metro

- Copenhagen M1/M2 (Denmark)
- Brescia (Italy)
- Milan Line 5 (Italy)
- Rome Line C (Italy)
- Thessaloniki (Greece)
- Taipei Circular Line (Taiwan)
- Riyadh University PNU (Saudi Arabia)
- Copenhagen City Ring (Denmark)
- Honolulu (USA)
- Milan Line 4 (Italy)
- Riyadh Metro (Saudi Arabia)
- Lima Metro Lines 2, 4 (Peru)



Tramway (Including Catenary Free)

- Midland Line 1 LRT - Birmingham (UK)
- Metrolink Manchester (UK)
- Sassari LRT (Italy)
- Dublin Lines A, B, C (Ireland)
- Florence Lines 1, 2, 3 (Italy)
- Metro Campania Nord Est (Italy)
- Zuhai Catenary Free (China)



Brescia, control room


Turn Key Unattended Metro Around the World

	Track	Stations	Headway	Capacity	Trains	O&M
Copenhagen M1/M2	21 km double track double tunnel	22	min 90 s	12,000 (4p/m2)	34 3 cars per train (39m)	13 + 3 years In operation since 2002
Brescia	13.7 km double track single tunnel	17	min 90 s	17,000 (6p/m2)	21 3 cars per train (39m)	2 years of operation 7 years of mainten.
Thessaloniki	9.5 km double track double tunnel	13	min 90 s	21,000 (6p/m2)	18 4 cars per train (50m)	3 years of service assistance
Rome line C	25 km (+17) double track double tunnel	30 (+12)	min 120 s	36,000 (6p/m2)	30 (+13) 6 cars per train (108m)	Local existing Operator training
Milan line 5	12.6 km double track single tunnel	19	min 75 s	28,000 (6p/m2)	21 4 cars per train (50m)	27 years as member of the Concess.
Taipei (CBTC)	15.4 km double track viaduct	14	min 90 s	26,000 (6p/m2)	17 4 cars per train (70m)	Future system extension: 52 km, 56 stations, 64 trains
Riyadh Princess Noura Univ. Campus	11.3 km double track viaduct	14	min 90 s	4,400 (2.5p/m2)	22 2 cars per train (29m)	3 years
Copenhagen City-ring (CBTC)	17 km double track double tunnel	17	min 100 s	12,000 (4 p/m2)	28 3 cars per train (39m)	5 + 3 years
Honolulu	32 km double track viaduct	21	min 90 s	7,200 (3.2 p/m2)	20 4 cars per train (38.5m)	12 years
Milan Line 4 (CBTC)	15.2 km double track double tunnel	21	min 75 s	28,000 (6p/m2)	47 4 cars per train (50m)	25 years as member of the Concess.
Riyadh Line 3 (CBTC)	40.7 km double track double tunnel	22	min 90 s	18,000 (6p/m2)	47 2 cars per train (32m)	10 years option In operation in 2019
Lima Lines 2-4 (CBTC)	35 km double track single tunnel	35	min 80 s	Line 2 32,500 Line 4 15,500 (6p/m ²)	42 6 cars per train (108m)	30 years as member of the Concess.
Glasgow Subway (CBTC)	10.5 km twin subway lines	15	min 90 s		17 (39 m)	10 years

Driverless Unattended Metros main features

The Driverless Unattended metro assures high performance, both in terms of technology and transportation capacity. The following are the main features of Ansaldo STS driverless unattended metro solutions around the world (Copenhagen M1/M2 operated by Ansaldo STS since 2002, Milan line 5, Milan line 4, Brescia, Rome line C, Thessaloniki, Taipei, Riyadh, Copenhagen Cityringen M3/M4, Honolulu, Lima, etc.).





Ansaldo STS is an international leader with a global presence in signalling and in the implementation of integrated transport solutions for Railway, Mass Transit and Freight.

We design, manufacture and implement signalling systems for the management and control of freight and passenger traffic on mainline railways and metros.

We design, develop and plan the work needed to provide the latest technology for your railway or metro system.

Mass Transit Solutions

Ansaldo STS Mass Transit solution is focused on urban mobility, characterized by high traffic densities; peak hours on relatively short routes that need high level of security, availability, flexibility and reliability in order to provide regular passengers comfort and operational efficiency.



Conventional Metro

• Track Circuit based

- Milan Metro Lines 1, 2 (Italy)
- Rome Metro Lines A, B (Italy)
- Naples Metro Lines 6 (Italy)
- Paris RER A (France)
- Naples Metro Lines 1 (Italy)
- Seoul Lines 5, 7, 8 (South Korea)
- Dallas DART LRT (USA)
- Portland West Side Corridor LRT (USA)
- Shanghai Line 2 (China)
- Lisbon Line B (Portugal)
- Los Angeles Green Line (USA)
- Tanjin-Binhai (China)
- Charlotte South Corridor LRT (USA)
- Pittsburgh South West Corridor LRT (USA)
- Belo Horizonte Metro (Brazil)
- Shanghai Line 2 West Extension (China)
- Chicago Blue Line (USA)
- Genoa Line 1 (Italy)
- Sao Paulo Lines 7, 9 (Brazil)
- Shanghai Line 2 East Extension (China)
- Pittsburgh North Shore Corridor (USA)
- Washington DC Red Line & Blue Lines (USA)
- Los Angeles County Metropolitan Transportation Authority (LACMTA), "West Side Subway Extension" (USA)
- Massachusetts Bay Transportation Authority (MTBA) "PTC System" (USA)

• CBTC based

- Paris (France) Line 3 - (12 km)
- Shenyang (China) Line 1(29 km), Line 2 (25 km)

- Chengdu (China) Line 1 (15 km), Line 2 (41 km)
- Xi'an (China) Line 2 (26,6 km)
- Hangzhou (China) Line 1 (53,6 km), Line 2 (18,6 km)
- Zhengzhou (China) Line 1 (26,2 km)
- Ankara (Turkey) Lines M1 (32 km), M2 (18 km), M3 (8 km), M4 (5 km)
- Dalian Lines 1, 2 (China)
- Navi Mumbai (India)Metro (21 km)
- Stockholm (Sweden) Red Line (41 km)
- Southeastern Pennsylvania Transportation Authority (SEPTA) CBTC "Media Sharon Hill Lines" (29 km)
- Tianjin Line 5 (35 km)



Driverless Metro

• Track Circuit based

- Copenhagen Lines M1/M2 (Denmark)
- Riyadh University PNU (Saudi Arabia)
- Brescia (Italy)
- Milan Metro Line 5 (Italy)
- Rome Metro Line C (Italy)
- Ul-Shinseol (Korea)

• CBTC

- Taipei Circular Line (Taiwan)
- Copenhagen City Ring (Denmark)
- Milan Line 4 (Italy)
- Riyadh Metro (Saudi Arabia)
- Lima Metro Lines 2, 4 (Peru)
- Glasgow Subway (Scotland)

CBTC Solution for Mass Transit System

Today, CBTC is the technology that many urban transit systems around the world choose, because it allows the highest level of performance, reliability, flexibility and system capacity.

With a complete portfolio, including green-field and brown-field, STO and UTO, light and heavy rail, and both signalling and complete turnkey solutions, Ansaldo STS is a leading provider of CBTC technology with proven success worldwide, including:

Main conventional metro referring to CBTC technology

SHENYANG	LINE 1	29 km	LINE 2	25 km				
CHENGDU	LINE 1	15 km	LINE 2	41 km				
XIAN	LINE 2	26,6 km						
HANGZHOU	LINE 2	53,6 km						
ANKARA	LINE 1	32 km	LINE 2	18 km	LINE 3	8 km	LINE 4	5 km
INDIA	NAVI MUMBAI	21 km						
STOCKHOLM	RED LINE	41 km						
PARIS	LINE 3	12 km						

UTO metro referring to CBTC technology

TAIPEI	CIRCULAR LINE	15,4 km
COPENHAGEN	CITY RING	17 km
RIYADH	METRO LINE 3	40,7 km
MILAN	LINE 4	15,2 km
LIMA	LINE 2-4	35 km





Main Line and High Speed Solutions

Pioneer for advanced technologies:

For Decades, Ansaldo STS has been a worldwide Pioneer in the railway industry :

- In France as early as 1981 with the Paris-Lyon line (the first High Speed line in Europe),
- In Spain with the first HSL using ERTMS technology (Madrid-Lerida)
- In UK with the first HSL (High Speed One connecting Paris to London) and the first ERTMS line (Cambrian line)
- In Sweden with Haparandabanan (first ERTMS deployment in Sweden)
- In Morocco with the Tangier-Kenitra line (the first High Speed line and first application of the ERTMS technology in whole Africa)
- In Italy with the first ERTMS 2 applications on High Speed National network

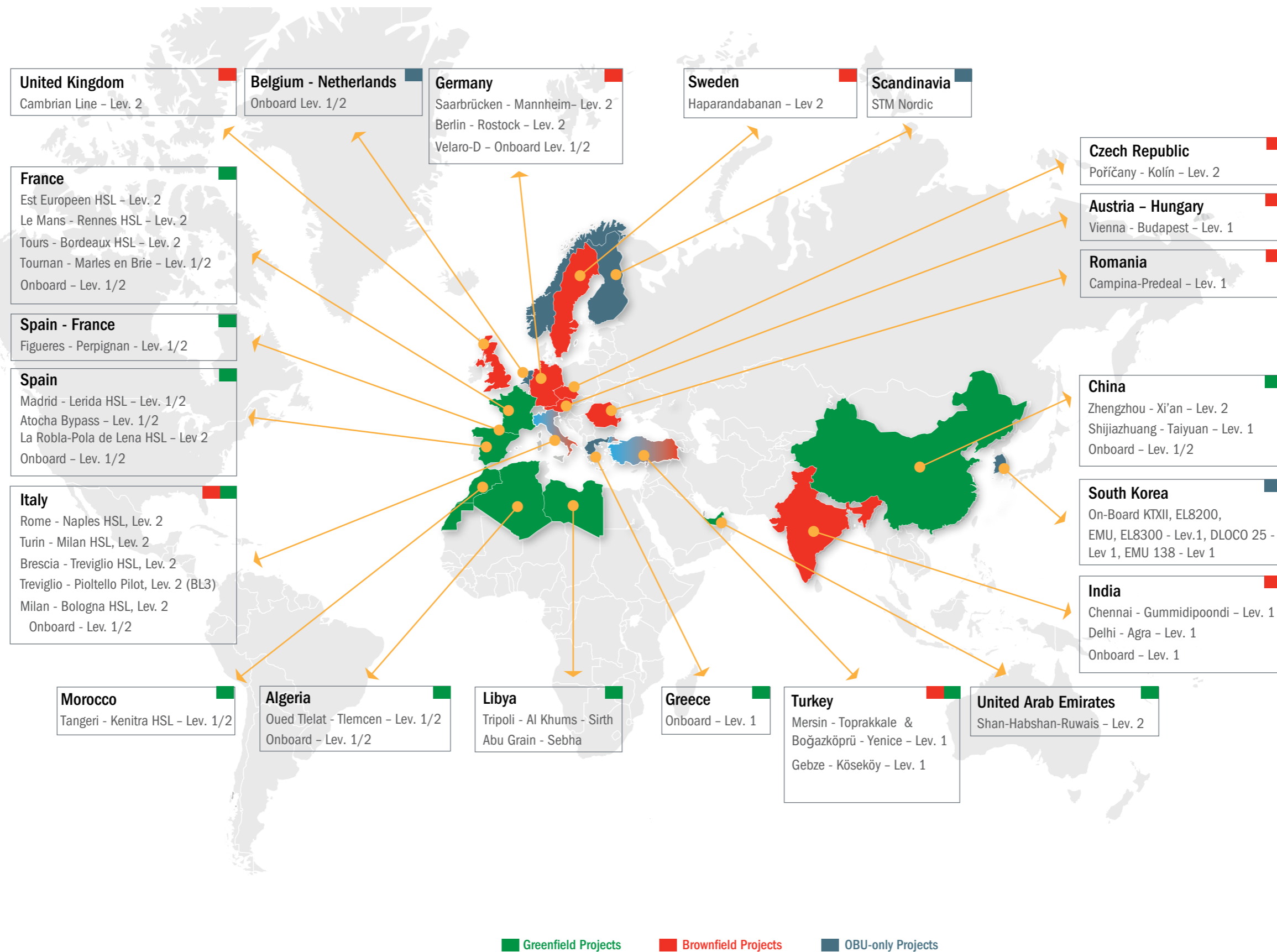
Technologies for Main Lines and High Speed Rails

- **TVM:** signalling system developed by Ansaldo STS in the early 80's tailored for the needs and specificities of the first High Speed Lines in France, China and South Korea.
- **ERTMS/ETCS L1 & L2:** standard signalling solutions combined with High Speed Rail, Conventional lines and Heavy Haul technologies for safer and interoperable networks. Ansaldo STS is among the 8 UNIFE members who developed the ERTMS project in close cooperation with the European Union, railway stakeholders and the GSM-R industry.



High Speed Line

ERTMS/ETCS L1/L2 Main References



Heavy Haul and Freight Networks



Ansaldo STS is the global partner for heavy haul mining and freight railways. Its advanced, modular and scalable planning and control systems have improved the network safety, reliability and efficiency to higher levels.

Benefits of Ansaldo STS's Heavy Haul and Freight System solution

The advanced signalling and telecommunications system developed by Ansaldo STS features satellite positioning, and sets a new benchmark for operational flexibility and upgradability for heavy haulage mining railways.

It's also:

- Based on Ansaldo STS's proven knowledge, products and experience
- Modular, scalable
- Enables cost-effective solutions that can be enhanced and expanded over time
- Allows option of simple migration to a fully automated system (including Driverless Automatic Train Operation)



Heavy Haul and Freight Australian mining Railways Projects

Ansaldo STS has been developing and delivering signalling and transportation solutions for heavy haul mining railway operations in Western Australia for more than 25 years and is currently delivering a number of turnkey solutions in the Pilbara region in the state's north west.

First automated Heavy Haul railway. Ansaldo STS's automated train management technology is enabling the automation of a 1,500 km remote heavy haulage iron ore rail network.

Ansaldo STS Freight Main References Australia

- Rio Tinto Iron Ore Framework Agreement – 1,500 km Signalling and Telecommunication: Radio-based Signalling with Automatic Driving – Wayside & Onboard
- Roy Hill Iron Ore Project – 350 km Signalling and Telecommunication: Radio-based Signalling with Satellite Localization – Wayside & Onboard
- Fortescue Metal Group Signalling and Telecommunications – 250 km Signalling (Interlocking) and Telecommunications
- Hamersley Iron Long Hancock Rail – 65 km Signalling (Interlocking, ATP), Telecommunications and Asset Protection
- Aurizon (formerly QR National) – Synergy Alliance to design and implement several Signalling projects (Interlocking) in Eastern Australia
- Pilbara Iron 7-Mile Yard – Design and implement Signalling systems (Interlocking)
- Australia Rail Track Corporation – AANCSA Alliance to design and implement several Signalling and Telecommunication projects (Interlocking, Train Control & Dispatching, TLC)
- Australia Rail Track Corporation / Lockheed Martin – 120 km Pilot Project, Design and Supply of Advanced Train Management System ATMS (Interlocking, Train Control, ATP, Satellite Localization) – Wayside & Onboard
- Robe River Iron Western Creek to Cape Lambert & Mesa A Projects – Signalling (Interlocking, Train Control, ATP, Asset Protection) and Telecommunications – Wayside & Onboard
- Brookfield (formerly WestNet Rail) Midwest Rail – Signalling Systems (Interlocking and Computer-Assisted Train Control) for several projects

- Newcastle Coal Infrastructure Group Port to Kooragang – Signalling Systems (Interlocking and Train Control)
- PTA (formerly Westrail) Koolyanobbing-Kalgoorlie – 190 km line Signalling Systems (Interlocking)

Ansaldo STS Freight Main References North America

- Positive Train Control (PTC)
- VitalNet™ PTC Components and System already implemented:
- Union Pacific
- CSX Transportation
- Burlington Northern Santa Fe Railways
- PTC Office TSR-Server:
- SEPTA
- Office Systems
- Over 80000 km of freight lines managed by ASTS Office Systems, among which:
- Union Pacific (Optimizing Traffic Planner)
- CSX Transportation (Dispatch and Automation System)
- MicroLok II Interlocking & Signalling Components (LED Signals, Level Crossings, Relays, Track Circuits, Switch Machines)
- Over 10000 units sold to U.S.A. & Canada Freight Railroads, among which:
- Union Pacific
- CSX Transportation
- Burlington Northern Santa Fe Railways
- Canadian Pacific
- Canadian National Railway
- Alaska Railroad
- Norfolk Southern
- Kansas City Southern Lines
- Quebec North Shore & Labrador Railway



Planning, Supervision & Traffic Control

From basic command/control functions to large - scale system:

- Centralized Traffic Control (CTC) for High Speed lines and conventional lines
- Management of main stations
- Centralized electrification control
- Automatic systems for switching stations
- Supervisory control and data acquisition (SCADA)
- Optimizing Traffic Planner (OTP)
- Operation Control Centre (OCC) for metro transport.

Wayside Train & Infrastructure Monitoring Systems



Ansaldo STS offers a range of systems and devices to monitor the conditions of railway Infrastructure

Wayside Train & Infrastructure Monitoring Systems (WTIMS).

WTIMS monitors the conditions of rolling stock and infrastructure in real time.

Train Conformity Check System.

Ansaldo STS's TCCS™ acquires and processes accurate data for trains to 3D, thermographic and high resolution cameras to detect rolling stock defects or fire on board.

Undercarriage Thermographic Analysis.

UTA reveals overheated components underneath the trains, increasing safety.



TCCS: (Train Conformity Check System)

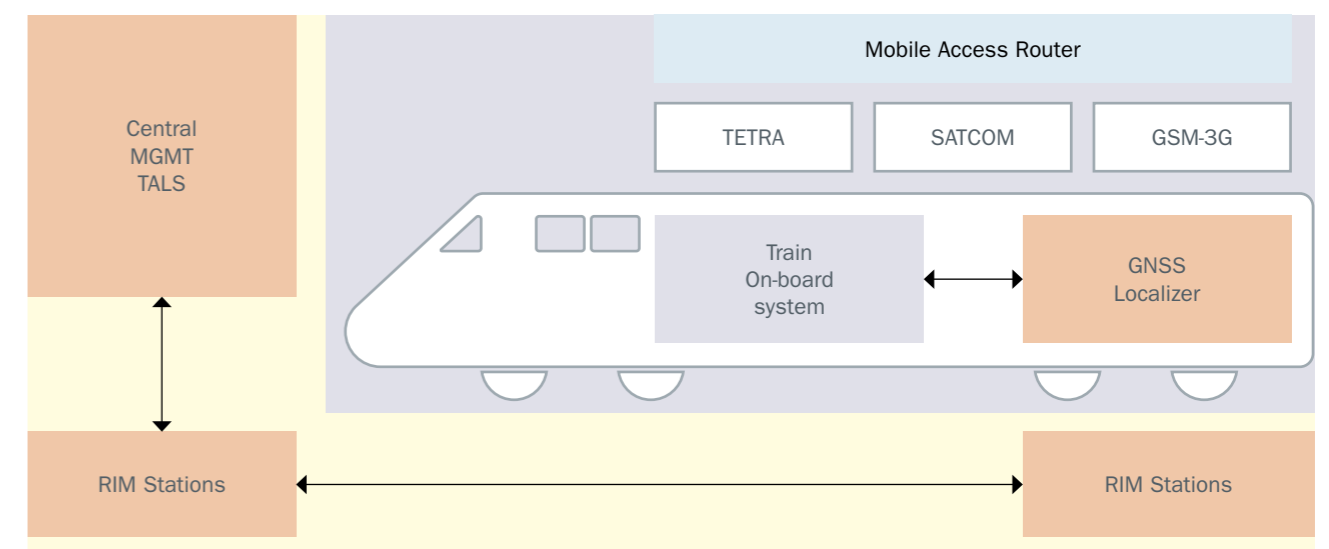
Satellite & Telecoms for Train Control System



Ansaldo STS is using the latest satellite and telecom technologies to develop cost-efficient train control systems with greater flexibility, global adaptability and optimized life cycle costs.

Satellite Localization System features:

- ERTMS / ETCS compatibility
- GPS, Glonass, Galileo
- Augmentation network
- SIL-4 compliant



Multi-Bearer Telecommunications features:

- TETRA
- Cellular, 2G/3G/4G
- Satellite
- Intelligent routing

Ansaldo STS is currently deploying and testing satellite train control technology in Australia and in Europe, with a considerable reduction of wayside & telecom equipment along the railway lines.

Catenary Free Solution TramWave®



TramWave® is an innovative ground-level traction power supply system without overhead catenaries. With TramWave®, power is provided safely and continuously through a ground contact line that energizes a small section of the line only when the vehicle passes over it and the power collector is in contact with the line.

Contact line

The basic principle of the TramWave system is a module that is embedded permanently in between the rails. The module is usually 3 or 5 meters long (dependent upon curve radius) and it contains all of the elements needed for the correct operation of the ground-level power supply system.

A series of steel contact plates (~50 cm) that are insulated from each other are located at consecutive intervals on the top of the TramWave modules (see pictures). The modules are joined together to form the continuous power supply system for the light rail line.

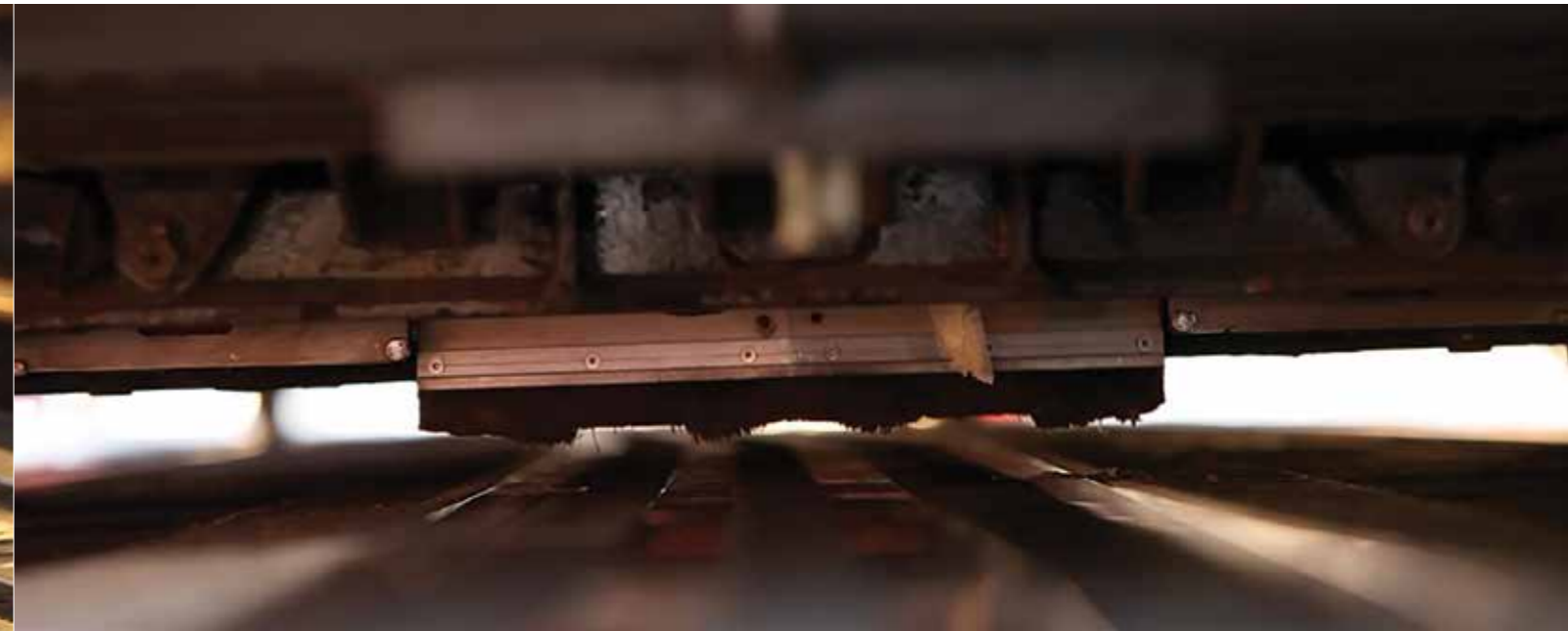
The modules are placed in a continuous conduit that also contains the positive and negative cables that feed and protect the line.

Vehicle Power Collector

Module located under the vehicle bogie frame and its functions are to: energize the segments in contact with the power collector located under the bogie frame and transfer energy to on-board equipment both for traction and auxiliary power. The collector is positioned against the contact line by a pantograph, which is physically mounted within the bogie structure.

The power collector includes copper and graphite sliding contacts and permanent magnets to attract a flexible ferromagnetic belt, which closes an electrical circuit inside the module, energize only the segments in contact with the power collector.

TramWave® - Benefits for Sustainable Urban Mobility



- Eliminate the visual impact of traditional overhead catenaries
- Easy installation and maintenance of the modules embedded in the middle of the rails
- Ensure safety, operability and availability in all working and environmental conditions
- Continuous power transmission, with no need for heavy, on-board power storage systems
- Works with different types of vehicles (trams or electrical vehicles on tires)
- No problems related to the effects of stray currents from the rails, since negative conductors are included in the module itself
- No need for electronic or induction devices
- Regenerative braking and energy savings.



Main Systems and Equipment



Interlockings of Computerized systems designed to meet the different needs of our customers:

Simple interlocking system for railway "Multi-station" for entire rows

Wayside platform

Since the late Nineties, Ansaldo STS has implemented the requirements for the "open" platform on standard protocols, such as: lines TVM Lyon and Marseille, ERTMS lines Rome-Naples, Turin-Milan, Milan-Bologna, Zheng-Xi, Madrid-Lleida, Cambrian, Poříčany - Kolin, Haparandabanan, CBTC lines in Chengdu, Shenyang, Ankara and conventional line Turin-Padua.

Ansaldo STS has implemented the platform WSP (Wayside Standard Platform) that is able to manage a reduced number of basic components, a higher number of bodies square and train connections to integrate into one central place, security features, diagnostics and control of movement appropriate to represent the best response to the market demands increasingly sophisticated rail and metro.

Main Systems and Equipment



Computer Based Interlocking

- For small stations / Interlocking
- For medium-sized / large stations / Interlocking
- For an entire line ("Multistations")

Other trackside equipment:

- Automatic block systems
- Track circuits
- Eurobalises
- Hot box and hot wheel detectors
- Point machines/switch machines
- Vital relays
- Level crossings
- Data transmission equipment
- Power supply equipment
- Diagnostic System (TCCS).



Riyadh Princess Noura University Campus



Brescia Metro

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Operations and Maintenance

Ansaldo STS can operate transportation systems 24/7 and provide complete maintenance to ensure full service availability. Since 2002, Ansaldo STS has successfully operated and maintained the Copenhagen Driverless Unattended Metro. Moreover, has been already awarded the O&M contract for the Honolulu Driverless Unattended Metro and other projects all over the world.

Ansaldo STS provides maintenance services for numerous railway networks and metro lines around the world, including:

- Channel Tunnel Rail Link (UK)
- Madrid-Lerida High Speed Line (Spain)
- Union Pacific, CSX (USA)
- Northwest and Perth TCS (Australia)
- Mainline railway (Botswana)
- Metros (Paris, Lyon)
- La Robla - Pola de Lena (Spain)
- Glasgow Subway (Scotland)

Ansaldo STS

A Hitachi Group Company

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