Ansaldo STS, a Finmeccanica Company, is a leading technology company listed on the Milan Stock Exchange. It operates in the global Railway & Mass Transit industries, providing signalling systems, transportation solutions and services. It also acts as lead contractor and turnkey provider on major projects worldwide.
### Listed on Milan Stock Exchange (STAR Sector) - 2011

<table>
<thead>
<tr>
<th>STS.MI</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>€ 1,212 Mln</td>
<td></td>
</tr>
<tr>
<td>Orders</td>
<td>€ 2,164 Mln</td>
<td></td>
</tr>
<tr>
<td>Backlog</td>
<td>€ 5,453 Mln</td>
<td></td>
</tr>
<tr>
<td>EBIT</td>
<td>€ 116 Mln</td>
<td></td>
</tr>
<tr>
<td>NFP</td>
<td>€ (290) Mln</td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>4,100</td>
<td></td>
</tr>
</tbody>
</table>
About us: Finmeccanica

Finmeccanica is Italy’s leading manufacturer in the high technology sector.

Finmeccanica is the largest shareholder in Ansaldo STS with a 40% stake.
## Finmeccanica Key figures - 2011

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>€ 17.3 Bln</td>
</tr>
<tr>
<td>New Orders</td>
<td>€ 17.4 Bln</td>
</tr>
<tr>
<td>Backlog</td>
<td>€ 46.0 Bln</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>€ 2.0 Bln</td>
</tr>
<tr>
<td>Employees</td>
<td>70,474</td>
</tr>
</tbody>
</table>
Worldwide presence
Legitimated by technological leadership in safety

Solid roots and track records where demand is

Serving future clients needs

Global organization

Rolling stock: no legacy, but preferred access

Partnering along the whole client value chain

Easing customer financial constraints
Company Organization

Innovation & Competitiveness
- Marketing Intel.
- Innovation network & Intellectual property
- Innovation Projects

CFO, HR, General Counsel, Facility and HSE, Strategy

Process Standardization

Signalling Business Unit
(SIG BU)
- Sales & BD
- Project & Risk Mgt.
- RAMS
- Engineering
- Construction & Commis
- Operation & Maint.

Transportation Solutions Business Unit
(TS BU)
- Sales & BD
- Project & Risk Mgt.
- RAMS
- Engineering
- Construction & Commis
- Operation & Maint.

Standard Platform & Products
(SPP)
- Portfolio Management
- Products & Generic application deliveries
- Supply Chain
The Signalling Business Unit contributes to the development of the railway signalling industry, pioneering the most advanced technologies to answer customers’ needs to safely and efficiently operate and manage rail and urban transport networks for passengers and freight.

The Business Unit provides design, verification, installation, commissioning, maintenance and training, for complete rail automation and safety related control systems and equipment.
General applications:
• Train control systems on board (ATP/ATO/ATC)
• Train control systems trackside
• Interlocking
• Centralised traffic control system (CTC)
• Security Management System (SMS)

Mass Transit applications:
• Traditional track circuit based metro systems
• Communications-based signalling systems (CBTC)
  (in both applications train operations can be attended or unattended)

Railway applications:
• Interoperable signalling systems ERTMS
• Positive Train Control
• Optimized Traffic Planner
• Train Conformity Check System (TCCS)
Following its innovative “full system approach” Ansaldo STS optimizes strategies, resources and investments and rationalizes the various types of technology in order to provide a state-of-the-art, viable and integrated transportation solutions within a municipality, region or country.

In this context, the Transportation Solutions Business Unit acts as lead contractor (or consortium partner) and system integrator for major projects around the world, providing end-to-end solutions on time and on budget for projects of any size and complexity, mainly under the following contractual schemes:

- Contracting for Design & Construction
- Project Financing
- Public Private Partnerships (PPP)
- Build, Operate and Transfer (BOT)
- Design, Build, Operate and Maintain (DBOM)
The Transportation Solutions Business Unit operates in the Railway and Mass Transit business delivering:

- System integration
- Traffic Management
- Train Control and Signalling Systems
- Telecommunications
- SCADA
- Power Supply
- Electrification
- Platform Screen Doors
- Fare Collection
- Depot Equipment
- Track Works
- Operation and Maintenance
Ansaldo STS delivers a full range of Railway and Mass Transit Transportation Solutions and Signalling Systems, such as...

- High Speed Main Lines
- Sub-urban
- Conventional Metro
- Tramwave (catenary free)
- Driveless UTO Metro
- Tramway
- Light Rail
Ansaldo STS has won contracts to install the equipment for over 3,300 km high-speed and conventional lines, and to supply more than 3000 on-board systems around the world, including:

- First ERTMS level 1 in Italy (SCMT)
- First ERTMS level 2 in Italy (high-speed line)
- ERTMS level 1 & 2 in Spain (high-speed line)
- ERTMS level 2 in the UK (low density line)
- ERTMS level 2 in Sweden (regional line)
- ERTMS adapted to Chinese standards: C3 (DPL)
- ERTMS level 1 in India (TPWS)
- ERTMS equipment level 2 for European cross-border trains (e.g.: P-B-K-A Thalys)
Global ERTMS & High Speed applications

**France**
- High Speed network
- LGV EST - lev. 2
- Tournan-Marles en Brie - lev. 1-2
- On-board - lev. 1-2
- On-board - lev. 2

**Cross border**
- Figueres-Perpignan - lev. 1-2
- Paris-Brussels-Cologne- Amsterdam
- Channel Tunnel Rail Link

**Spain**
- Madrid-Lleida HSL - lev. 1-2
- Madrid-Atocha HSL by-pass
- On-board - lev. 1-2

**Italy**
- Rome-Naples HSL - lev. 2
- Turin-Milan HSL - lev. 2
- Milan-Bologna HSL - lev. 2
- SCMT projects
- On-board - lev. 1
- On-board - lev. 2

**UK**
- Cambrian Coast - lev. 2
- High Speed One

**Sweden / Finland / Norway**
- Haparandaban - lev. 2
- STM Nordic

**Germany**
- Saarbrücken-Mannheim - lev. 2
- Berlin-Rostock - lev. 2
- Velaro on-board - lev. 2

**Czech Republic**
- Příčany-Kolin - lev. 2

**Austria - Hungary**
- Vienna-Budapest - lev. 1

**Turkey**
- Bogazkopru-Yenice
- Mersin-Toprakkale - lev. 1
- On-board - lev 1

**South Korea**
- On-board - lev. 1
- Seoul-Busan HSL

**China**
- Zhengzhuang-Xi'an - lev. 2
- Shijiazhuang-Taiyuan - lev. 1
- Qinhuangdao-Shenyang DPL
- On-board - lev. 1-2

**India**
- Chennai-Gummudipundi - lev.1
- Delhi-Agra - lev. 1

**Libya**
- Ras Ajdir - Sirt - lev. 1-2
- Al-Hisha - Sabha - lev. 2

**UAE**
- Shah Habshan Ruwais - lev. 2
High Speed technology around the world

A pioneer in High Speed technology as early as 1981 with the Paris-Lyon line (indeed, the first HS line in Europe) Ansaldo STS is now global leader in the sector and supplies over 50% of world's High Speed technology nowadays.

High Speed Technologies

- TVM
- ERTMS L1
- ERTMS L2
Ansaldo STS Mass Transit solutions satisfy every type of need for the urban mobility

Mass Transit

Conventional Metro
- Transport system running on dedicated and protected track
- Capacity between 8,000 - 50,000 (and more) passengers per hour per direction (pphpd)

Driverless Unattended Metro
- Same features as Conventional Metro without personnel on board
- Full operational flexibility with headway down to 75 seconds

Tramway
- Ordinary urban mobility with capacity between 2,000 and 8,000 pphpd
- Minimum headway depends on traffic priority
- Distance between two stops 500m or less (in the city centre)
Ansaldo STS has successfully delivered on time and on budget turnkey mass transit solutions all over the world

**AF TC (ATC)**

- Shanghai Line 2 (China) - 2002 & Extension - 2011
- Shanghai Line 2 East Extension (China) - 2011
- Shanghai Line 2 West Extension (China) - 2009
- Tanjin-Binhai (China) - 2006
- Washington DC Red Line & Blue Lines (USA) - 2012 & 2013
- Pittsburgh North Shore Corridor (USA) - 2012
- Pittsburgh South West Corridor LRT (USA) - 2008
- Chicago Blue Line (USA) - 2010
- Charlotte South Corridor LRT (USA) - 2007
- Los Angeles Green Line (USA) - 2005
- Portland West Side Corridor LRT (USA) - 1998
- Dallas DART LRT (USA) - 1997
- Genova Line 1 (Italy) - 2011
- Napoli Alifana Line (Italy) - 2009
- Sao Paulo Lines 7, 9 (Brazil) - 2011
- Seoul Lines 5, 7, 8 (Korea) - 1996

_AF: Audio Frequency_  
_RF: Radio Frequency_  
_TC: Track Circuit_
Worldwide Mass Transit references and contracts on execution

<table>
<thead>
<tr>
<th>AF TC (STO)</th>
<th>RF CBTC (STO)</th>
<th>RF CBTC (UTO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lisbon Line B (Portugal) - 2003</td>
<td>• Paris Line 3 (France) - 2010</td>
<td>• Taipei Circular line (Taiwan) - 2013</td>
</tr>
<tr>
<td>• Paris RER A (France) - 1995</td>
<td>• Shenyang lines 1, 2 (China) - 2011-2012</td>
<td>• Copenhagen City ring M3/M4 (Denmark) - 2018</td>
</tr>
<tr>
<td>• Copenhagen lines M1/M2 (Denmark) - 2002</td>
<td>• Chengdu lines 1, 2 (China) - 2011-2012</td>
<td>• Roma line C (Italy) - 2013</td>
</tr>
<tr>
<td>• Riyadh (Saudi Arabia) - 2011</td>
<td>• X’ian line 2 (China) - 2012</td>
<td>• Thessaloniki (Greece) - 2013</td>
</tr>
<tr>
<td>• Brescia (Italy) - 2012</td>
<td>• Hangzhou line 1 (China) - 2012</td>
<td>• UI-Shinseol (Korea) - 2014</td>
</tr>
<tr>
<td>• Milan line 5 (Italy) - 2012</td>
<td>• Zhengzhou line 1 (China) - 2013</td>
<td>• Honolulu (USA) - 2015</td>
</tr>
<tr>
<td>• Rome line C (Italy) - 2013</td>
<td>• Ankara line M1, M2, M3, M4 (Turkey)</td>
<td>• Honolulu (USA) - 2015</td>
</tr>
<tr>
<td>• Thessaloniki (Greece) - 2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• UI-Shinseol (Korea) - 2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Honolulu (USA) - 2015</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AF: Audio Frequency
RF: Radio Frequency
TC: Track Circuit
Today, CBTC solution are 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, from green-field to brown-field projects, from STO to UTO, from light to heavy rail and from signalling systems to complete turnkey solutions, Ansaldo STS is a leading provider of CBTC technology with proven success worldwide including:

### Main signalling project referring to ATO

<table>
<thead>
<tr>
<th>Shenyang line 1</th>
<th>Shenyang line 2</th>
<th>Chengdu Line 1</th>
<th>Chengdu Line 2</th>
<th>Xian Line 2</th>
<th>Hangzhou Line 1</th>
<th>Ankara Line 1</th>
<th>Ankara Line 2</th>
<th>Ankara Line 3</th>
<th>Ankara Line 4</th>
<th>Alifana Railway</th>
<th>Stockholm Red Line</th>
<th>Paris Line 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 km</td>
<td>25 km</td>
<td>15 km</td>
<td>41 km</td>
<td>26.6 km</td>
<td>53.6 km</td>
<td>32 km</td>
<td>18 km</td>
<td>8 km</td>
<td>5 km</td>
<td>11 km</td>
<td>41 km</td>
<td>12 km</td>
</tr>
</tbody>
</table>

### Main turnkey projects referring to UTO technology

<table>
<thead>
<tr>
<th>Taipei Circular line</th>
<th>Copenhagen City ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,5 km</td>
<td>16 km</td>
</tr>
</tbody>
</table>
## Driverless Unattended Metros 

### main features

The Driverless Unattended metro assures high performances, both in terms of technology and transportation. Here following 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, Brescia, Rome line C, Thessaloniki, Taipei, Riyadh, Copenhagen Cityringen M3/M4, Honolulu, etc…)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service around the clock (24h / day - 7days / week)</td>
<td></td>
</tr>
<tr>
<td>Min service headway</td>
<td>75 s</td>
</tr>
<tr>
<td>2 cars train length</td>
<td>29 m to 38.5 m</td>
</tr>
<tr>
<td>3 cars train length</td>
<td>39 m to 55 m</td>
</tr>
<tr>
<td>4 cars train length</td>
<td>50 m to 78 m</td>
</tr>
<tr>
<td>6 cars train length</td>
<td>80 m to 108 m</td>
</tr>
<tr>
<td>Train width</td>
<td>2.65 m / 2.85 m</td>
</tr>
<tr>
<td>2 to 4 doors per car per side</td>
<td></td>
</tr>
<tr>
<td>Aluminum body - shell</td>
<td></td>
</tr>
<tr>
<td>IGBT traction inverter</td>
<td></td>
</tr>
<tr>
<td>under body equipment =&gt; easy maintenance</td>
<td></td>
</tr>
<tr>
<td>Min curve radius</td>
<td>50 m</td>
</tr>
<tr>
<td>Max speed</td>
<td>100 km/h</td>
</tr>
<tr>
<td>Train Capacity (6p/m² – train 3 to 6 cars)</td>
<td>434 to 1.200 pass</td>
</tr>
<tr>
<td>Max system transport capacity (6p/m² - train 3 to 6 cars)</td>
<td>20,832 to 57,600 pphpd</td>
</tr>
</tbody>
</table>
### Ansaldo STS has more than 150 km of Unattended Metros projects all over the world

<table>
<thead>
<tr>
<th>Copenhagen M1/M2</th>
<th>Brescia</th>
<th>Thessaloniki</th>
<th>Rome line C</th>
<th>Milan line 5</th>
<th>Taipei (CBTC)</th>
<th>Riyadh</th>
<th>Copenhagen Cityringen (CBTC)</th>
<th>Honolulu</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 km double track double tunnel</td>
<td>13.7 km double track single tunnel</td>
<td>9.5 km double track double tunnel</td>
<td>25 km (+17) double track double tunnel</td>
<td>12.6 km double track single tunnel</td>
<td>15.4 km double track viaduct</td>
<td>11.3 km double track viaduct</td>
<td>16 km double track double tunnel</td>
<td>32 km double track viaduct</td>
</tr>
<tr>
<td>22 stations</td>
<td>17 stations</td>
<td>13 stations</td>
<td>30 stations (*12)</td>
<td>19 stations</td>
<td>14 stations</td>
<td>14 stations</td>
<td>17 stations</td>
<td>21 stations</td>
</tr>
<tr>
<td>min headway 90 s</td>
<td>min headway 90 s</td>
<td>min headway 90 s</td>
<td>min headway 120 s</td>
<td>min headway 75 s</td>
<td>min headway 90 s</td>
<td>min headway 90 s</td>
<td>min headway 100 s</td>
<td>min headway 159 s</td>
</tr>
<tr>
<td>12,000 pphpd (4p/m²)</td>
<td>17,000 pphpd (6p/m²)</td>
<td>21,000 pphpd (6p/m²)</td>
<td>36,000 pphpd (6p/m²)</td>
<td>28,000 pphpd (6p/m²)</td>
<td>26,000 pphpd (6p/m²)</td>
<td>4,400 pphpd (2.5p/m²)</td>
<td>12,000 pphpd (4 p/m²)</td>
<td>7,200 pphpd (3.2 p/m²)</td>
</tr>
<tr>
<td>34 trains 3 cars per train (39m)</td>
<td>21 trains 3 cars per train (39m)</td>
<td>18 trains 4 cars per train (50m)</td>
<td>30 (+13) trains 6 cars per train (108m)</td>
<td>21 trains, 4 cars per train (50m)</td>
<td>17 trains 4 cars per train (70m)</td>
<td>22 trains 2 cars per train (29m)</td>
<td>28 trains 3 cars per train (39m)</td>
<td>40 trains 2 cars per train (38.5m)</td>
</tr>
<tr>
<td>13 + 3 years O&amp;M In operation since 2002</td>
<td>2 years of operation 7 years of maintenance</td>
<td>3 years of service assistance</td>
<td>27 years of Operation &amp; Maintenance</td>
<td>Future system extension: 52 km, 56 stations, 64 trains</td>
<td>5 + 3 years O&amp;M</td>
<td>15 years O&amp;M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SPP supports the Business Units activities providing the following services:

- Products portfolio management
- Product development
- Supply chain
- Supplier Performance Management
- Procurement
- Planning & Logistic
- Manufacturing & Industrialization
- Product and generic application safety case
Computer-based interlocking (CBI) systems tailored to our customers’ requirements

• For small stations
• For medium-sized / large stations
• For an entire line (“Multistations”)

Other trackside equipment:

• Automatic block systems
• Track circuits
• Eurobalises
• Hot box and hot wheel detectors
• Point machines

• Vital relays
• Level crossings
• Data transmission equipment
• Power supply equipment
• Diagnostic System (TCCS)
From basic command/control functions to large-scale systems:

- 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
The Innovation and Competitiveness Unit of Ansaldo STS is dedicated to developing new and alternative products, materials, technologies and services that contribute to keeping Ansaldo STS in a competitive and advanced technological leading position.

Company competitiveness is supported by the Market Intelligence staff as well as close Customer Satisfaction monitoring.

The I&C unit activities encompass the followings:

- Market Intelligence and Customer Satisfaction
- Product Innovations (e.g. Technologies for Security application)
- Intellectual property management
Ansaldo STS is a pioneer in the development and implementation of fully integrated security systems for Railways and Mass Transit.

References:

- MetroCampania NordEst, Naples
- Circumvesuviana suburban network, Naples
- Security for Copenhagen’s Cityringen
- Security Control Center for Italian Railways
- Security for Sicily Rail Network
- Security system for Libyan Railways
TCCS™, Train Conformity Check System is Ansaldo STS’s Wayside Train Monitoring System.

TCCS™ automatically acquires and processes measurement data for all trains with the scope of detecting a series of rolling stock defects, which:

- may be a cause of an accident
- indicate the need of corrective maintenance of rolling stock
- would cause infrastructure damage or abnormal wear.

Acquired data may also be used for predictive maintenance modeling both on rolling stock and infrastructure.

The system has been successfully tested by RFI on the line between Rome & Naples.
Tramwave® is an innovative traction power supply system without overhead catenaries.

With Tramwave® power is provided safely and efficiently through a ground contact line that energizes a small section of the line only when the vehicle is on top of it.

**Tramwave® was conceived, designed and developed to:**

- Eliminate the visual impact of traditional overhead catenaries
- Enable easy insertion of the power line between the rail tracks
- Ensure safety, operability and availability in all working and environmental conditions
- Eliminate the need for on-board power storage systems
- Be configured for different types of vehicles (trams or electrical vehicles on tires)
Ansaldo STS can operate 24/7 transportation systems and provides the complete maintenance to ensure full service availability.

Since 2002 Ansaldo STS has operated and maintained the Copenhagen Driverless Unattended Metro

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 and Kansas City (USA)
- Northwest and Perth TCS (Australia)
- Gaborone (Botswana)
- Metros (Paris, Lyon, Lisbon, Caracas)