



RAIL INFRASTRUCTURE
DELIVERING LIFECYCLE SOLUTIONS

ALSTOM



Catenary installation on high speed line, Reggio Emilia - Bologna, Italy



Track work on the Lausanne metro, Switzerland

TRACK FOR ALL TERRAINS AND TRAINS

Alstom offers a complete portfolio of rail transport infrastructure services, with the expertise and plants and tools to assure the success of any project. We design and supply new systems, upgrade existing ones and provide maintenance for any length of time: Track work, catenaries, power supply, control systems, station utilities and depot workshops.

THE DECISION OF A LIFECYCLE

The search

Urban transit authorities, mainline rail infrastructure managers and rail freight operators work in very different contexts, but they share the same basic concerns in infrastructure: they need completely safe lines they can rely on to optimise their overall performance and lifecycle costs, while satisfying their customers. In new infrastructure and renovation projects, decision-makers weigh engineering solutions, seeking the best value for money at lowest risk. Which company is most likely to deliver on time, to cost and to contractual commitments? Who understands local conditions best and has the flexibility to assure the least disruptions?

Proof of capability

Alstom provides expertise in rail infrastructure through every step including design, engineering, procurement, construction, commissioning and maintenance. Drawing on a 30-year track-record in over 25 countries, Alstom alone has the experience in project management and advanced technology to offer a complete range of lifecycle solutions for track, electrification and electromechanical equipment along the line, in stations and in depot. Not every customer requires such a wide scope of state-of-the-art services, but every project we undertake profits from our resources and expertise. Whether integrating a high speed rail system or just adding track ballast, we deliver the same degree of professionalism. We engineer for functionality and performance. Our specialists draw on our detailed understanding of the entire rail system, to solve interface issues.



INFRASTRUCTURE SOLUTIONS FOR EVERY RAIL NEED

For every type of rail infrastructure project, we offer expert design and engineering services for new solutions and optimised lifecycle costs. We provide the plant and tools needed on site, the skilled labor and project management. We provide project management for integration and commissioning on a full turnkey basis or separately. We also provide renovation and maintenance services.

TRACK

Alstom has strong worldwide experience in providing rail infrastructure solutions for tramways, metros, high speed lines and main lines with ballast or concrete. Our major references in track systems total more than 2000 km of single track already built or under construction around the world. Our primary added value is in providing project management expertise and construction with full deployment of resources, including a large department of specialists in conceptual engineering, global performance and detailed design. For new tram lines, we can provide our own Appitrack technology, fully validated for all LRT projects. Appitrack enables us to accelerate track work and minimise worksites to reduce disruption to city life.

ELECTRIFICATION

We provide full electrification services for new and existing urban and main lines: catenary and power supply design and engineering, procurement, installation, commissioning and maintenance. We have installed 10,000 km of catenary worldwide and contributed to hundreds of power supply projects. Our APS street-level power supply for tramways eliminates overhead wires, preserving the city's character.

- Technical expertise: we can deliver a catenary suitable for any current (AC/DC), from 750 V to 2x25 Kv 50 or 60 Hertz and for all types of speeds, from 70 to 350 km/h.
- Innovative solutions: for energy savings and environmental respect. EMI/EMC management reduces electromagnetic interferences.

ELECTROMECHANICAL WORKS

We offer a full range of E&M solutions for stations and tunnels. Transport authorities rely on us for the design, supply, integration and commissioning of systems for road & tramway signalling, telecommunications and passenger information, platform screen doors, as well as equipment for security, ventilation, automatic fare collection (ticketing), and depots.

MAINTENANCE

Alstom maintains rail infrastructure equipment and systems worldwide under short or long-term contracts with performance and availability guarantees. Maintenance, parts logistics and renovation services represent over 20% of our business. Our experts design each maintenance programme using state-of-the-art methodology, processes and organisations to answer needs at a local level. Full or specific maintenance includes rapid-response, corrective and preventive care, main revisions or overhauls, damage repair.

Six reasons to consult Alstom on rail infrastructure

1. Expertise in rail infrastructure design and engineering
2. Proven, innovative technology to suit each project
3. World-class project management expertise and experience for smooth interfaces and on-time delivery
4. Local teams recruited and trained for lasting added value
5. Guaranteed quality at competitive prices
6. Commitment to customers through life-time support



APPITRACK

Automatic Pin and Plate Insertion for Track

Appitrack



Concrete mixer

Survey station

Slipform machine

Appitrack machine

Rail base-plates storage

Survey station

Slip-formed concrete slab

Control panel

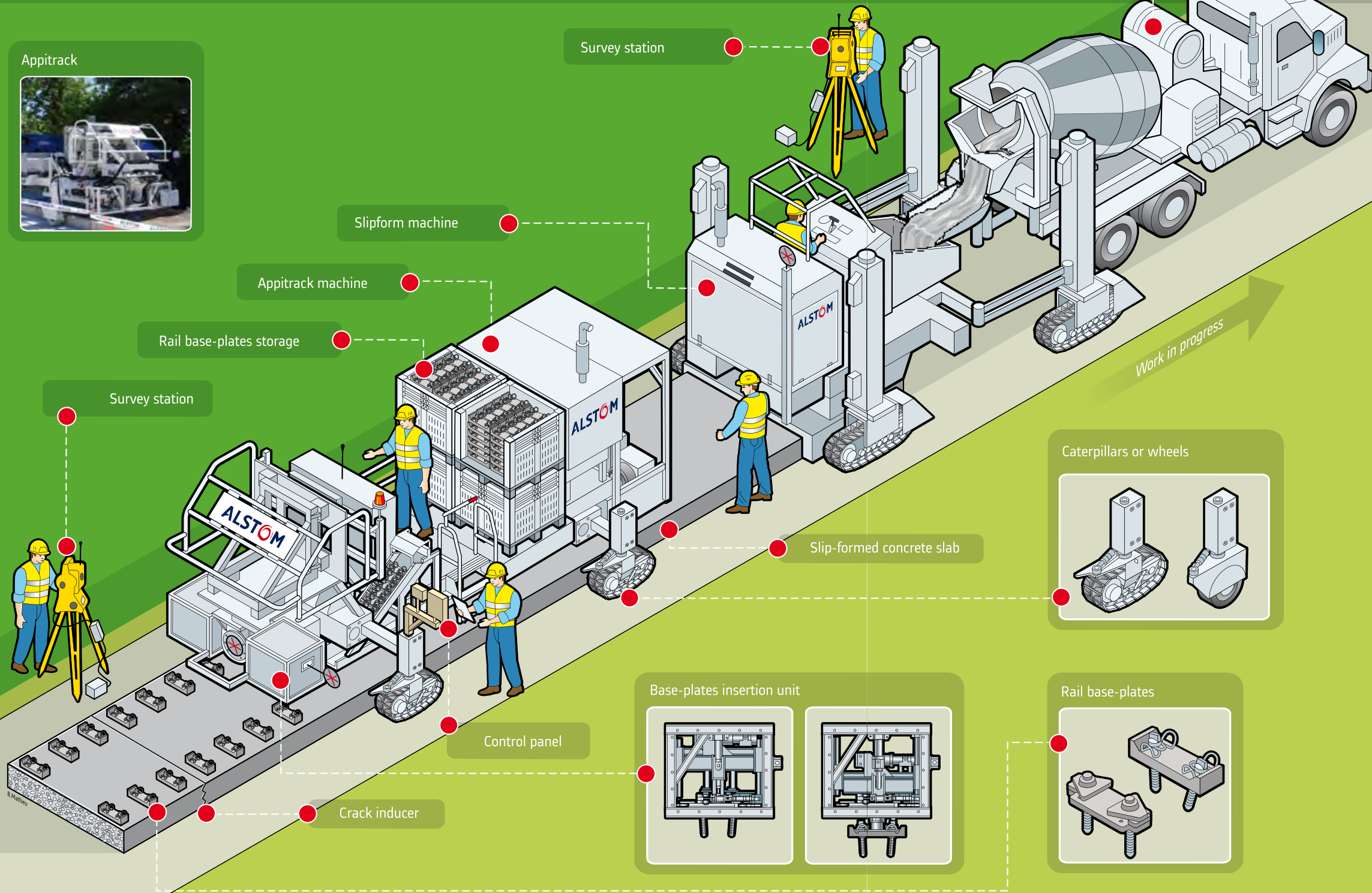
Crack inducer

Base-plates insertion unit

Rail base-plates

Caterpillars or wheels

Work in progress



Appitrack: our way to lay track

Faster, better, quieter

Appitrack is an innovative process developed by Alstom for laying tracks on concrete, similar to the method used for building motorways or runways. It can be used for all light rail projects with all types of surfacing. The process involves two machines: a slipform machine, which constructs the trackslab, and behind it an insertion machine, which automatically positions and inserts railseats, holding down bolts in fresh concrete. It is guided by an on-board pc and communicates with a survey station post for high precision rail positioning. By 2010, Alstom will have laid over 100 km of track using our Appitrack system, in Algiers, Jerusalem, Reims and Orleans.

Key benefits

- Preserves the environment
- Reduces civil work
- Accelerates construction
- Minimises disturbances to neighborhood
- Uses the latest proven technologies
- Ensures cost effective, high quality track construction

Réalisation Bernard Tavernier - Illustration Bernard Mathieu.

APS Aesthetic Power Supply

Open skies for cities

A modern, clean, quiet technology for transport in city centres, APS (for *Alimentation par le sol*, or ground-level power supply) is a proven power system developed by Alstom for light rail. By supplying electricity at ground level, APS makes it possible to do without overhead wires. With APS, cities can introduce tram service to their historic quarters while respecting their unique characters.

Bordeaux leads the way

Bordeaux, one of France's most visited cities, was the first city to recognise the APS advantage. The open-sky system, integrated over 13 km of its 44 km tramway network, has a 99.8% rate of availability. The French cities of Reims, Angers and Orleans ordered APS systems in 2006. More than 15 km of APS will soon be installed and operated in Dubai, on the Al Saffooh line.

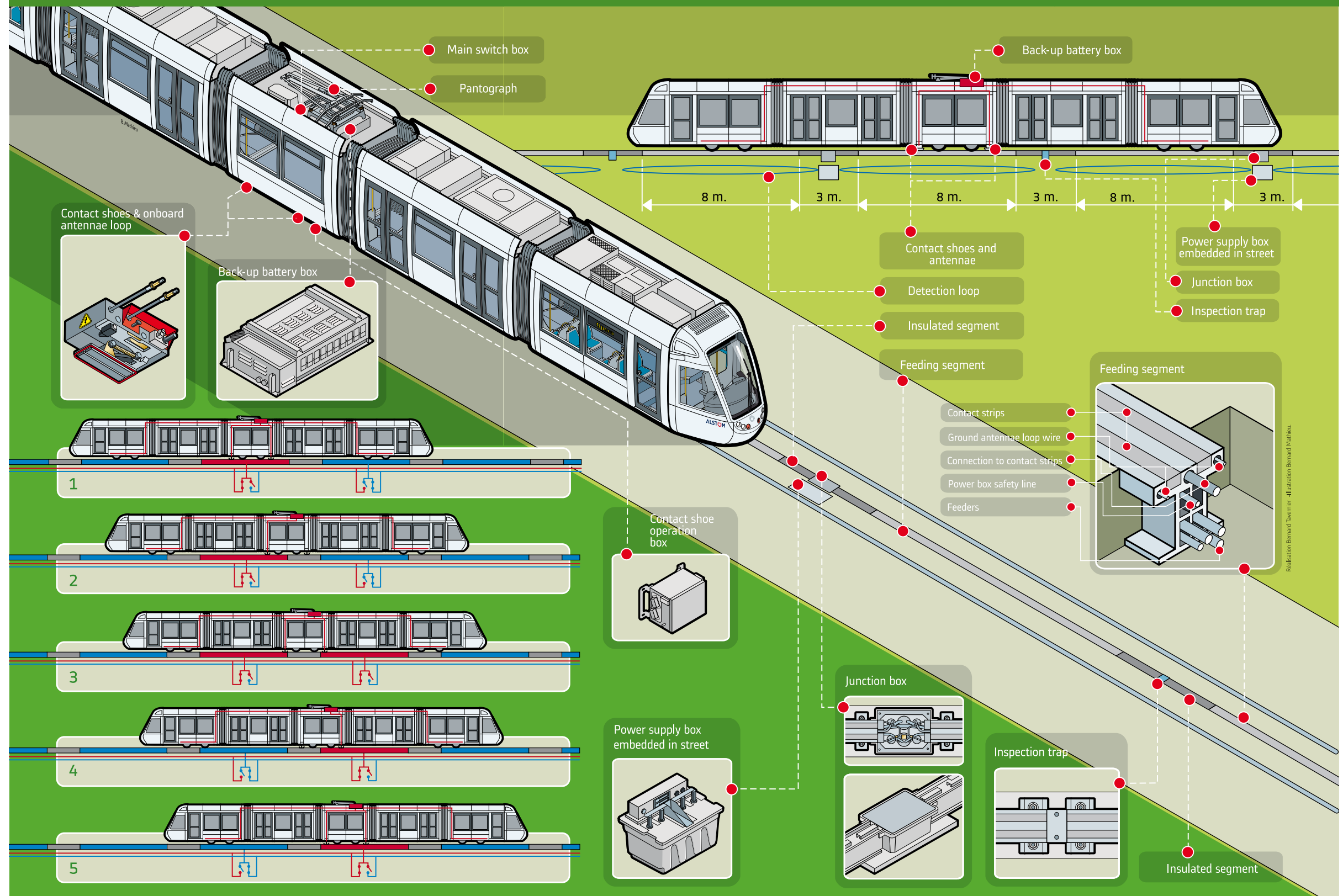
Award-winning technology

APS functions via a third rail embedded in the ground. Conducting segments are placed at regular intervals, separated by insulated joints. The segments are supplied by power boxes, only activated when the tram passes directly over them to ensure perfect safety for pedestrians and traffic. The power supply is triggered by coded radio dialogue between tram and ground. Power is collected through two collector shoes located in the tram's mid-section.

Key benefits

- Preservation of historic sites and urban environment
- High reliability for optimum tram performance
- Fully modular system
- Total safety for pedestrians and car traffic
- Elimination of overhead obstacle to firefighters' ladders

APS Aesthetic Power Supply



OUR INFRASTRUCTURE REFERENCES



Infrastructure work in depot, Singapore Circle Line Metro



Catenary installation and works on High Speed 1, UK



Alstom-supplied LRT system in Lyons, France

TRAM TRACK LYONS, FRANCE

For the design, supply and installation of the third tram line T3 in the city of Lyons, transit authorities Sytral chose Alstom. Alstom had previously supplied 52 km of single track and the depot for lines 1 & 2 between 1998 and 2003. The new 14.6 km tram line, the first ever to use ballast track, was delivered in 2006.

METRO TRACK SINGAPORE CIRCLE LINE

When it opens in 2010, Singapore's new 33-km Circle Line will be the world's longest fully automatic metro. Land Transport Authority selected an Alstom-led consortium to design and supply the line's core system in 2000, following the success of its North East line, delivered by Alstom in 2003. Today, the NEL transports up to 2000 passengers per train with headways as low as 90 seconds. For the 31-station Circle Line, Alstom's scope of activity includes the track work (41 km of double track in tunnel and depot, 140 turnouts), power supply with 3rd rail, rolling stock, signalling, and the overall system integration.

ELECTRIFICATION AND E&M FOR URBAN TRANSIT SAO PAULO METRO LINE 4

Only 66 months, including the tunnel boring and other Civil Works activities, to deliver the first three stations of the new line 4, 72 for the rest—these are the customer requirements for this infrastructure project, underway since March 2004. Alstom is responsible for the design, manufacture, installation and commissioning of the line's E&M systems. This covers rigid catenary, high voltage power supply substation, traction substations with thyristor rectifiers, low and medium voltage power supply networks, auxiliaries, elevators/escalators and telecom systems.

ELECTRIFICATION FOR MAINLINES HIGH SPEED 1 (CTRL 2), UK

Delivered in 2006, High Speed 1 (formerly CTRL 2) links the Channel Tunnel to the new London terminus, St. Pancras. The 40 km section of high speed line can handle eight Eurostar trains per hour at 300 km/h. In the tunnel, noise from passing trains is reduced and vibration attenuated by 32 db thanks to an innovative track bed on concrete base, designed and installed by Alstom. Our scope of work included the design, procurement, and installation of CTRL 2 track and overhead line equipment. Our project management experts also delivered and coordinated the overall logistics for all electromechanical contractors, designed, built and operated two construction rail heads, and performed the testing and commissioning of the entire railway system—20 km of open double track and 20 km of double track under London and the Thames.

And also...

Tramways:

- Norway Bergen electrification
- Italy Firenze electrification and track
- France Bordeaux, Grenoble & Toulouse track
- Montpellier & Strasbourg electrification
- Algeria Algiers turnkey infrastructure
- Tunisia Tunis electrification

Metros:

- France RATP Signaling works
- Brazil Brasilia maintenance
- Taiwan Taipei track
- Switzerland Lausanne electrification and track
- Chile Santiago L5 electrification and track
- Venezuela Caracas Los Teques electrification

Main Lines:

- Italy Very High Speed Lines electrification
- Spain Very High Speed Lines electrification
- Korea KTX Very High Speed Line electrification
- China Shi-Tai High Speed Line electrification
- France RFF TGV Est signaling works
- France SCNF catenary works
- Morocco Meknes-Fes main line track
- Turkey Marmaray Crossing turnkey infrastructure
- Greece Athens Suburban electrification



LRT system, Barcelona, Spain: Alstom has a 25-year maintenance contract for infrastructure and rolling stock.



Night maintenance on the Dublin LRT, Ireland

E&M FOR URBAN TRANSIT BARCELONA TRAMWAY

Trambaix and Trambesòs, Barcelona’s two tram lines, are BOT concessions. The contract for the network, a total of 30 km. and 58 stations, was awarded by city transport authority ATM to an Alstom-led consortium in 2000. Alstom’s scope of activity included power substations and on-line cabling, design and construction of the maintenance depots, telecom, signalling and ticketing systems. All were delivered on time in 2004.

MAINTENANCE FOR URBAN TRANSIT DUBLIN TRAMWAY NETWORK

Maintenance takes on its broadest scope with Dublin’s LRT: our staff provides total care for the Red and Green lines—50 km with 36 stops, two depots and a fleet of 40 cars. Service covers cleaning, inspection, rapid-response and preventive and corrective maintenance for tracks, overhead catenaries, power supply, signalling, automatic vehicle location system, telecoms and landscaping. The 5-year contract, awarded to Alstom in 2004, is based on availability and quality performance obligation, and includes maintenance plans and management system covering full operations: sales, finance, material and service.

INFRASTRUCTURE AND THE FULL ALSTOM OFFER

Alstom has the expertise and experience to offer a complete lifecycle infrastructure solution, from design through installation, testing, commissioning and maintenance.

THE UNDERSTANDING

Unlike other aspects of the rail industry, infrastructure only exists in situ – and no two sites are alike. Each infrastructure project has its own environment and requirements, based on geography, interfaces with third parties, technology, current use and growth, safety, operator and passenger expectations.

THE EXPERIENCE

As the product is the site itself, success is never a foregone conclusion. Our project managers are able to assure smooth interfaces whatever the volume or complexity in main line or urban projects because they have the experience to draw on. Alstom is the market leader in turnkey urban and mainline rail transport systems, with references worldwide.

PROJECT MANAGEMENT

Infrastructure projects are largely about coordination. They call for excellent project management—a team with the PM tools and processes, expertise and experience to be able to assess the job correctly and plan the most efficient solutions, anticipating all eventualities to guarantee on-time delivery of a high-quality system. Our role is to optimize and integrate schedules, manage costs and deliver quality.





COMPLEMENTARY ACTIVITIES

- Signalling
Alstom designs, manufactures and installs rail control signalling systems and information technology solutions: CBTC manned and driverless metro traffic control, ERTMS-ETCS mainline rail traffic control systems for interoperability, and a wide range of E&M products.
- Trains
Alstom designs, builds and commissions a full range of rolling stock for urban and mainline use.
- Maintenance
Alstom provides lifecycle maintenance services for trains and signalling systems, as well as infrastructure, with contractual guarantees for availability, spare parts and integrated logistics.

INTEGRATION

Since we cover every aspect in rail, we can optimise all elements in the system: they are literally made to work together. With decades of experience, we can equally integrate other companies' products to work just as well. Our level of expertise allows a dialogue between experts.

THE RESOURCES

Our commitment to the transfer of our skills and expertise adds lasting value to the region. Our local team makes us easily available, able to carry out a technical dialogue locally for greater reactivity.

CONTINUOUS INNOVATION

We're not resting on our laurels. In track and catenary, we listen to our customers and innovate as necessary with significant R&D resources. APS and Appitrac are two of Alstom's innovative rail transport technologies. In addition Alstom is a member of the European Research Program for Urban Track and Innotrack.

Through its know-how and the excellence of its products, Alstom is shaping the future of energy and transport infrastructure and contributing to improving the living and working conditions of people throughout the world. Today, more than 65,000 people in 70 countries are making an active contribution to the growth and development of its business.

Europe, Middle East and Africa
Alstom Transport
48, rue Albert Dhalenne
93482 Saint-Ouen Cedex France
Phone: +33 1 41 66 90 00

Latin America, Spain & Portugal
Alstom Transport
Paseo de la Castellana 257 -6°
Madrid 28046 Spain
Phone: +34 9 1334 5800

Asia-Pacific
Alstom Transport
24 Raffles Place #27-01
Clifford Centre
Singapore 048621 Singapore
Phone: +65 6220 1138

North America
Alstom Transportation
353 Lexington Ave.
Suite 1100 New York
NY 10016 USA
Phone: +1 607 281 2481

www.transport.alstom.com