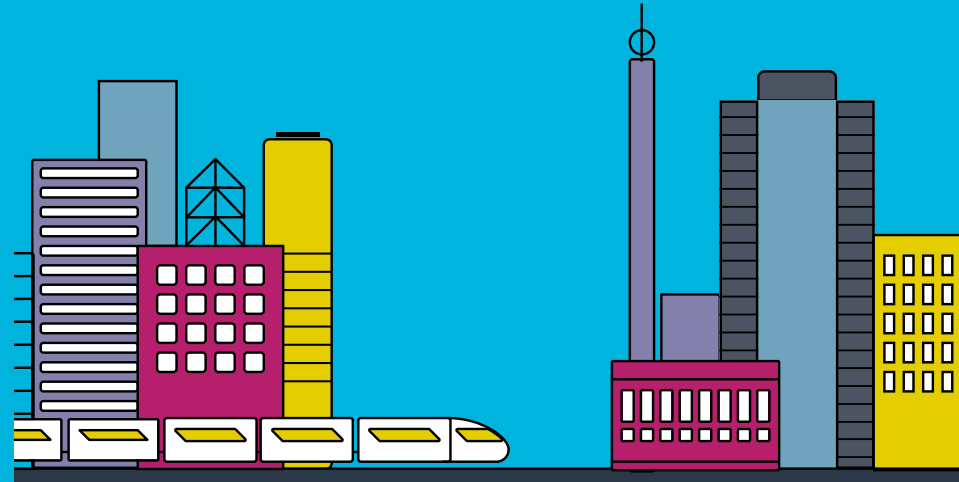


# THALES

thalesgroup.com

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# THALES

Thales Ground Transportation  
19-21 Avenue Morane Saulnier  
78140 Vélizy-Villacoublay  
France

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# GROUND TRANSPORTATION SYSTEMS

Transforming mobility

# BY YOUR SIDE...

Countries, cities and transport operators rely on Thales' ground transportation solutions to adapt to rapid urbanisation and meet new mobility demands – locally, between cities and across national frontiers.

Our expertise in signalling, communications, fare collection and cybersecurity gives people and goods the connected journey they need to move safely and efficiently.

And no matter how challenging the project, we stay by your side, committed to helping you creating the digital railways of the future – whatever it takes.

## ... SUPPORTING YOUR BIG AMBITIONS

### A WORLDWIDE PRESENCE

in rail technology  
**since 1950**



### AREAS OF EXPERTISE



**Signalling**



**Communications  
& Supervision**



**Fare Collection**



**Services**

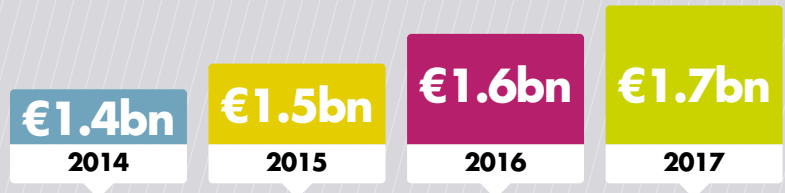


**Digitalisation**



**Cybersecurity**

### SALES GROWTH



# PARTNERING WITH YOU

## OUR CUSTOMERS

Transport authorities

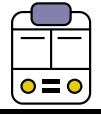
Transport operators

Rail infrastructure owners

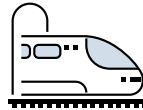
EPCs

Consultants

## THE MARKETS WE SERVE



MAIN LINE RAIL



METRO



TRAMWAY AND LIGHT RAIL TRANSIT



BUS



ROAD

# WHY CHOOSE THALES ?

- TOTAL FLEXIBILITY:** Thales equips trains from any rolling stock manufacturer.
- BROWNFIELD TO GREENFIELD:** from network modernisation to the development of new lines.
- AN END-TO-END SUPPLIER:** from stand-alone equipment to integrated turnkey projects.
- A GLOBAL PARTNER:** with teams worldwide, help is always close at hand.
- DIGITAL BY NATURE:** from IoT to autonomy, we enable the transition to a more sustainable world.
- DEDICATED TO DELIVERY:** no matter how complex the project, Thales gets the job done.
- LONG TERM:** pioneers in railways systems for 50 years and for years to come

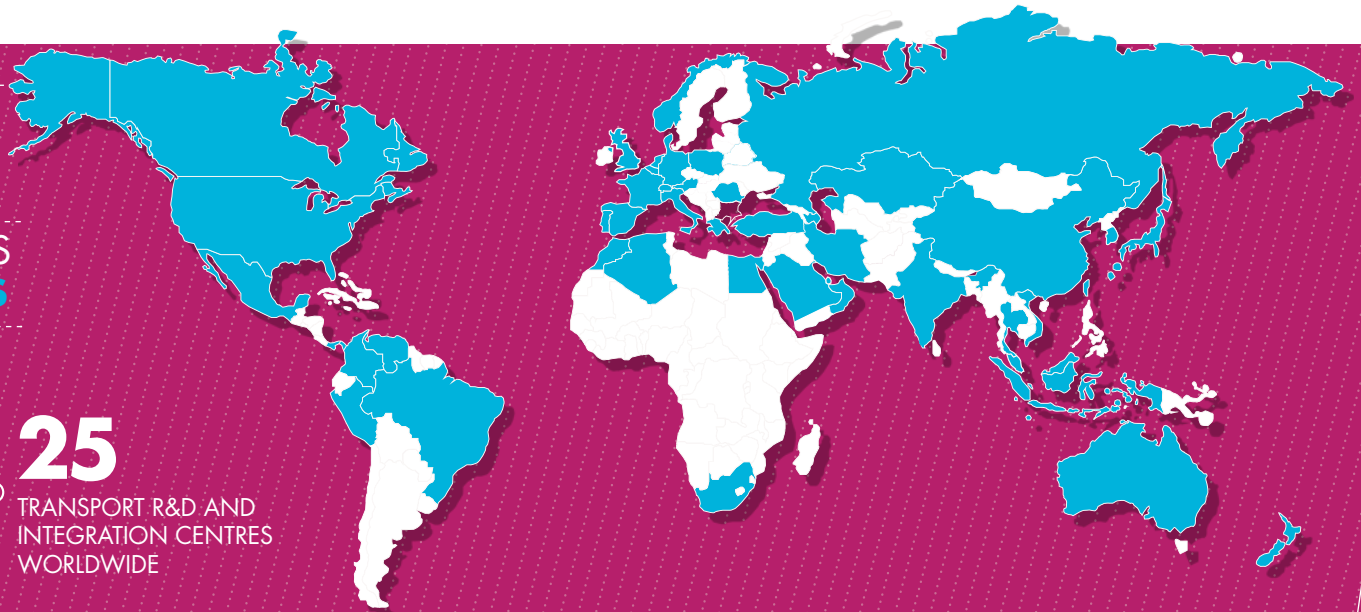
CLOSE TO YOU

DEDICATED TEAMS IN 52 COUNTRIES



25

TRANSPORT R&D AND INTEGRATION CENTRES WORLDWIDE



# OUR SOLUTIONS



## SIGNALLING SYSTEMS

- Train control systems: ETCS L1, L2, L3
- Train control systems (attended or driverless): CBTC
- Route control systems: electronic interlocking
- Field equipment: Lite4ce™ acter digital axle counters, point machines and signals
- LRT & Tramway management control systems
- Traffic management systems
- Driver advisory systems



## COMMUNICATIONS AND SUPERVISION SYSTEMS

- Integrated Operation Control Centres
- Telecom solutions: network backbone and radio
- Passenger information and connectivity
- Security and video surveillance
- SCADA for fixed assets and traction power
- Digital Services



## REVENUE COLLECTION SYSTEMS

- Open multimodal fare collection systems
- Ticketing inspection and validation equipment
- Innovative ticket validation with contactless bank cards or smartphones
- From field equipment to cloud-native back-office solutions
- All-inclusive ticketing with road tolls and car park payments

# SUPPORTING YOUR DIGITAL TRANSITION

Thales couples expertise in digital technology with a deep understanding of rail operations – a combination that makes us unique in the transport marketplace. Here are some examples:



## INTERNET OF THINGS

Our cloud-based **predictive maintenance service** detects signs of trouble in assets and prescribes corrective action – before anything goes wrong.



## ARTIFICIAL INTELLIGENCE

Our research into artificial intelligence in control centres and trains paves the way for **rail autonomy**.



## BIG DATA

We're helping to boost passenger satisfaction with big data tools such as **passenger journey analytics** to monitor and manage overcrowding.



## CYBERSECURITY

Your infrastructure is critical infrastructure. That's why our solutions are **cybersecured by design**, from signalling to fare collection systems.



# OUR STRENGTH

As part of the **Thales Group**, we have access to innovative technologies from across five key industrial sectors: **transport, aerospace, space, defence and security.**

We draw on these capabilities to ensure the safety, efficiency and best performance of your transport networks.

When you choose Thales, you are choosing a partner with extensive expertise in managing complex projects across different domains worldwide – and the dedication to make sure you succeed.



**65,000**

Employees



Mastery of civil and military technologies



Global technology leader in **5** MARKETS



Financial strength

**€15,8bn**

Revenues in 2017



Global presence in 56 countries



Environmentally responsible and ethically driven





**EUROPE MAIN LINE REFERENCES:**

- |                   |            |          |
|-------------------|------------|----------|
| Austria           | Finland    | Poland   |
| Bosni-Herzegovina | Germany    | Romania  |
| Bulgaria          | Hungary    | Serbia   |
| Croatia           | Latvia     | Slovakia |
| Czech Republic    | Luxembourg | Slovenia |

- METRO, TRAM, LIGHT RAIL, MONORAIL, APM AND BUS
- MULTIMODAL TICKETING
- MAIN LINE

**USA**

- Detroit
- Jacksonville
- Las Vegas
- Morgantown
- New York
- Newark
- Orlando
- San Francisco
- Tampa
- Washington DC
- West Virginia

**CANADA**

- Edmonton
- Montreal
- Ottawa
- Toronto
- Vancouver

**PANAMA**

- Panama City

**MEXICO**

- Mexico City (BRT line 3 and BRT)

**DOMINICAN REPUBLIC**

- Santo Dominguo

**VENEZUELA**

- Caracas

**CHILE**

- Santiago

**BRAZIL**

- Santos
- Sao Paulo

**DENMARK**

**UNITED KINGDOM**

- Croydon
- London
- Manchester

**SPAIN**

- Alicante
- Bilbao
- Madrid

**IRELAND**

- Dublin

**PORTUGAL**

- Lisbon
- Porto

**NORWAY**

- Bergen
- Oslo

**TURKEY**

- Istanbul

**AZERBAIJAN**

- Baku

**QATAR**

- Doha
- Lusail

**MALAYSIA**

- Kuala Lumpur

**KOREA**

- Seoul

**CHINA**

- Beijing
- Chongqing
- Guangzhou
- Hefei
- Hong Kong
- Nanchang
- Nanjing
- Qingdao
- Shanghai
- Shenzhen
- Shijiazhuang
- Tianjin
- Wuhan

**MOROCCO**

**FRANCE**

- Bordeaux
- Lyon
- Marseille
- Nantes
- Orleans
- Paris
- Strasbourg

**BELGIUM**

- Brussels
- Charleroi

**ALGERIA**

- Algiers

**NETHERLANDS**

**TUNISIA**

**NIGERIA**

**EGYPT**

- Cairo

**SAUDI ARABIA**

- Mecca

**UNITED ARAB EMIRATES**

- Dubai

**GREECE**

- Athens
- Thessaloniki

**SOUTH AFRICA**

**ITALY**

- Brescia
- Florence
- Milan
- Naples
- Palermo
- Turin

**INDIA**

- Bangalore
- Chennai
- Hyderabad
- Jaipur
- Mumbai
- New Delhi

**SINGAPORE**

- Singapore

**THAILAND**

- Bangkok

**TAIWAN**

- Taipei

**NEW-ZEALAND**

- Auckland

**AUSTRALIA**

- Sydney

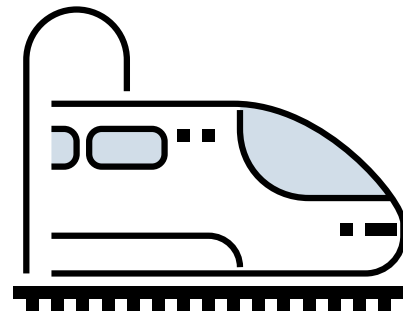
# METRO AND URBAN SOLUTIONS

## TRAIN CONTROL (CBTC AND TRAMWAY)

- **Brazil:** Santos
- **Canada:** Edmonton, Ottawa, Toronto, Vancouver
- **Chile:** Santiago
- **China:** Beijing, Guangzhou, Hefei, Nanchang, Nanjing, Shanghai, Shenzhen, Shijiazhuang, Songjiang, Wuhan
- **France:** Paris
- **Hong Kong**
- **India:** Hyderabad
- **Italy:** Cosenza
- **Malaysia:** Kuala Lumpur
- **Qatar:** Doha
- **Saudi Arabia:** Mecca
- **Singapore**
- **South Korea:** Busan, Incheon, Seoul
- **Taiwan:** Ankeng, Danhai, Kaohsiung
- **Turkey:** Istanbul
- **UAE:** Dubai
- **UK:** London
- **USA:** Detroit, Jacksonville, Las Vegas, Morgantown, Newark, New York, Orlando, San Francisco, Tampa, Washington

## COMMUNICATIONS & SUPERVISION

- **Australia:** Sydney
- **Azerbaijan:** Baku
- **Belgium:** Brussels
- **Brazil:** Santos, São Paulo
- **Canada:** Edmonton, Montreal, Ottawa
- **Chile:** Santiago
- **China:** Beijing, Changqing, Guangzhou, Shenzhen, Songjiang Tianjin
- **Denmark:** Copenhagen
- **Dominican Republic:** Santo Domingo
- **Egypt:** Cairo
- **France:** Lyon, Marseille, Nantes, Paris
- **Germany:** Munich
- **Greece:** Athens, Thessaloniki
- **Hong Kong**
- **India:** Bangalore, Delhi, Hyderabad, Jaipur, Mumbai
- **Ireland:** Dublin
- **Italy:** Brescia, Florence, Palermo
- **Japan:** Tokyo
- **Malaysia:** Kuala Lumpur
- **Mexico:** Mexico City, Toluca
- **Norway:** Bergen
- **Panama:** Panama City
- **Portugal:** Lisbon
- **Qatar:** Doha, Lusail
- **Saudi Arabia:** Mecca
- **Singapore**
- **Spain:** Alicante, Bilbao, Madrid
- **Taiwan:** Ankeng, Danhai
- **Turkey:** Istanbul
- **UAE:** Dubai
- **UK:** Croydon, London, Manchester
- **USA:** Morgantown
- **Venezuela:** Caracas
- **Vietnam:** Hanoi



## ROUTE CONTROL

- **Azerbaijan:** Baku
- **Canada:** Toronto, Montreal
- **Portugal:** Oporto

## FARE COLLECTION

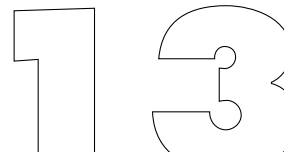
- **Algeria:** Algiers
- **Canada:** Toronto
- **China:** Beijing, Nanjing, Shenzhen
- **Dominican Republic:** Santo Domingo
- **Egypt:** Cairo
- **France:** Bordeaux, Strasbourg
- **India:** Delhi
- **Italy:** Naples, Turin
- **Mexico:** Mexico City
- **New Zealand:** Auckland
- **Norway:** Oslo
- **Portugal:** Lisbon
- **Qatar:** Doha
- **Singapore**
- **Spain:** Gran Canaria
- **Taiwan:** Taipei
- **Thailand:** Bangkok
- **UAE:** Dubai
- **USA:** Morgantown
- **Venezuela:** Caracas

## SERVICES

- **Algeria:** Algiers
- **Australia:** Sydney
- **Belgium:** Brussels
- **Canada:** Ottawa, Toronto, Vancouver
- **Chile:** Santiago
- **Dominican Republic:** Santo Domingo
- **Italy:** Brescia
- **Hong Kong**
- **Malaysia:** Kuala Lumpur
- **New Zealand:** Auckland
- **Norway:** Oslo
- **Panama:** Panama City
- **Portugal:** Lisbon
- **Qatar:** Doha
- **Singapore**
- **Taiwan:** Ankeng
- **UAE:** Dubai
- **UK:** London, Manchester
- **USA:** Detroit, Jacksonville, Newark, New York, San Francisco, Tampa

DID YOU KNOW THAT

**86** METRO LINES IN MORE THAN **40** MAJOR CITIES depend on Thales SelTrac™ CBTC systems



# MAIN LINE SOLUTIONS

## ROUTE CONTROL

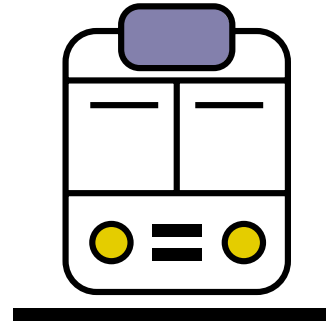
### ETCS

- Algeria
- Austria
- Bulgaria
- Czech Republic
- Denmark
- Egypt
- Greece
- Hungary
- Luxembourg
- Malaysia
- Mexico
- Morocco
- Nigeria
- Poland
- Romania
- Saudi Arabia
- Slovakia
- Slovenia
- South Korea
- Spain
- Switzerland
- Thailand
- Turkey

- Algeria
- Austria
- Bosnia-Herzegovina
- Bulgaria
- Croatia
- Denmark
- Egypt
- Finland
- France
- Germany
- Greece
- Hungary
- Iran
- Latvia
- Luxembourg
- Mexico
- Morocco
- Nigeria
- Norway
- Poland
- Portugal
- Romania
- Saudi Arabia
- Slovenia
- South Africa
- Spain
- Switzerland
- Thailand
- Tunisia
- Turkey
- UK

## COMMUNICATIONS & SUPERVISION

- Algeria
- Austria
- Bulgaria
- Denmark
- Egypt
- France
- Greece
- Hungary
- Morocco
- Poland
- Portugal
- Saudi Arabia
- South Africa
- Spain
- Turkey



## FARE COLLECTION

- Denmark
- Netherlands
- Saudi Arabia
- Taiwan
- UK

## TRAFFIC MANAGEMENT & DRIVER ADVISORY SYSTEM

- Austria
- Bulgaria
- Croatia
- Denmark
- Finland
- Germany
- Hamburg
- Hungary
- Israël
- Latvia
- Luxembourg
- Norway
- Portugal
- Saudi Arabia
- Slovenia
- South Africa
- Sweden
- UK

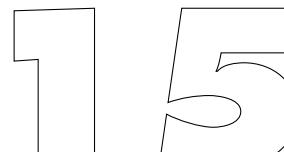
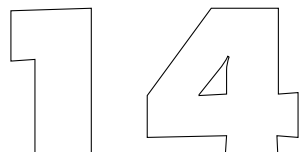
## SERVICES

- Austria
- Denmark
- Egypt
- Finland
- France
- Germany
- Mexico
- Morocco
- Netherlands
- Nigeria
- Norway
- Portugal
- Spain
- Switzerland
- Turkey
- UK

### DID YOU KNOW THAT

THALES TRAFFIC MANAGEMENT SYSTEM CURRENTLY CONTROLS

**72,000** KMS ROUTE AND  
**52,000** TRAINS PER DAY  
 IN **16** COUNTRIES.





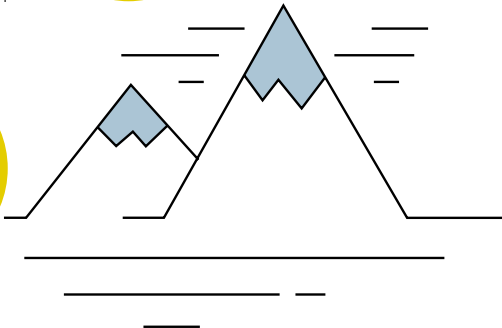
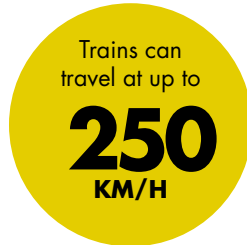
# SUPPORTING YOUR BIG AMBITIONS

## SIGNALLING UNDER THE ALPS SWITZERLAND

Switzerland is committed to shifting freight from road to rail. The Gotthard Base Tunnel is tangible evidence of that commitment: stretching for 57km beneath the Alps, it is the longest rail tunnel in the world and it plays a vital role in reducing the impact of road traffic in the fragile Alpine environment.

Thales' ETCS Level 2 signalling ensures this landmark asset is used to its full potential. The system uses continuous track-to-train radio communications to link trains to the signalling system, making it possible to run trains at up to 250km/h and shaving an hour off the previous best Zurich-Milan journey time. The new tunnel opened in December 2016, a year ahead of schedule.

Thales also equipped the Lötschberg tunnel (34.6km) and is now equipping the Ceneri tunnel (15.4km) with ETCS Level 2 train control technology as part of the Swiss project aimed at moving traffic from road to rail.

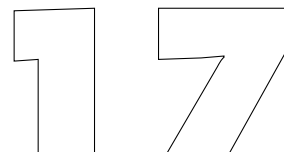
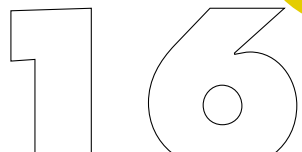
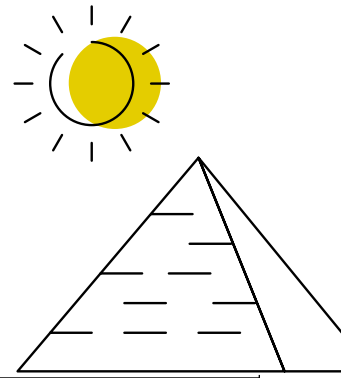


## UPGRADING EGYPT'S BUSIEST RAILWAY EGYPT



Egyptian National Railways is embarking on an ambitious programme to modernise its rail network. Signalling upgrades are a key part of this programme: high-performance signalling makes it possible to improve safety, capacity and reliability at the same time.

Modernisation of the 208km Cairo-Alexandria corridor – Egypt's busiest line – highlights what can be achieved. Thales' signalling upgrade has made it possible to increase train speeds by 20km/h to 160km/h and has reduced the time interval between trains from 10 minutes to 5, boosting the frequency of services. The solution includes electronic interlocking, wayside equipment, telecommunications and a Centralised Traffic Control system.



## MODERNISING THE LONDON UNDERGROUND

### LONDON

To help transport operator TfL (Transport for London) cater for rising demand, Thales is implementing SelTrac™ CBTC signalling across the District, Circle, Hammersmith & City and Metropolitan lines – four of London's busiest routes. The upgrade will mean faster and more frequent journeys for millions of passengers, with capacity up by a third. The main benefits will be delivered by 2022, when the frequency of trains at peak periods will increase to 32 trains per hour in central London.

IN OPERATION  
SINCE **1863**

Jubilee and  
Northern lines  
already  
in service

One of the  
world's busiest  
metros

UNDERGROUND

## SUPPORTING CHINA'S METRO EXPANSION

### CHINA

China is the world's biggest urban rail market. It's also one of the fastest growing, with 8,500km of new lines planned in 40 cities. Thales is supporting this expansion through Thales SAIC Transport (TST) – a joint venture with Shanghai Electric dedicated to urban rail signalling. Since its foundation in 2010, TST has put 630km of lines into service with SelTrac™ CBTC. A further eight lines go into operation in 2017.

SelTrac™ CBTC  
**630** km  
of lines in service



**8** LINES  
into operation  
in 2017

## 1<sup>ST</sup> METRO IN THE GULF REGION

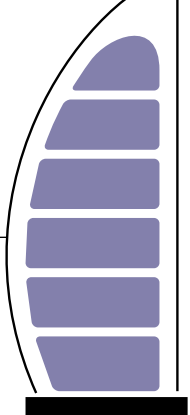
## WINNING HEARTS AND MINDS IN DUBAI

### DUBAI

**7%**  
increase  
in ridership  
in 2016

Driverless  
operation

The Dubai Metro in the United Arab Emirates is the centrepiece of a successful programme to combat congestion and boost productivity in one of the world's fastest-growing cities. Thales implemented a complete technology package to deliver a world-class passenger experience: the solution includes SelTrac™ CBTC for reliable driverless operations, easy multimodal ticketing and passenger information. Wi-Fi is provided on trains, so passengers can make the most of their journeys.



## BREAKING NEW GROUND IN TAIWAN

### TAIWAN

## TAIWAN'S 1<sup>ST</sup> TRAMWAY

Kaohsiung is Taiwan's second largest city and its LRT (Light Rail Transit) system provides an attractive and reliable alternative to journeys by road. Work on extending the LRT to better serve Kaohsiung's nearly 2.8 million citizens is now underway. Thales is providing the customer, China Steel Corporation, with a signalling solution that includes the supply of interlocking systems, Traffic Light Priority systems and Automatic Vehicle Localisation Systems (AVLS).

Modern  
safety-critical  
systems

Reliable  
journeys for  
passengers

