

# SYSTRA SOLUTIONS



The partner you can  
trust to build your  
**LIGHT RAIL TRANSIT**

# LIGHT RAIL TRANSIT

## A DURABLE SOLUTION FOR RESPONSIBLE URBAN MOBILITY

Since the year 2000, Light Rail Transit has made a major come-back in France and worldwide, enabling towns to enhance the quality of air and the life of their inhabitants. LRTs redraw the cityscape, redesign mobility and built-up areas, and promote urban well-being.

SYSTRA has been entrusted with the finest projects. In France, Lyon, Paris and, of course, the whole network of Bordeaux. Further afield, SYSTRA has built networks for Algiers, Dubai, Casablanca and Ouargla.



### CHECKLIST FOR DEPLOYING YOUR PROJECT

#### Before you decide

- 1 Take a long-term view of your project,** in line with your town's development objectives.
- 2 Factor in** the project's urban and environmental requirements.
- 3 Clarify the town's overall transport policy,** particularly for road traffic.
- 4 Simulate funding and forecast ridership,** to assess the project's viability.
- 5 Estimate whether the project is economically profitable,** find ways of cutting the cost per km.

#### Before breaking any ground

- 1 Choose the route carefully**
  - Build on established travelling habits
  - Choose the best criteria for efficient service
  - Locate stations and depots judiciously
- 2 Define the level of passenger comfort:**
  - LRT tramcars
  - Frequency
  - Stations
  - Commercial speed
- 3 Choose the best way of fitting** LRT lines into roads along the route.
- 4 Opt for the greatest energy savings**



For your  
**LIGHT RAIL TRANSIT**  
**CHOOSE SYSTRA**  
 TO GET THE BEST

**500 km of LRT**

track the world over,  
 including 125 km new  
 lines in 2015

**1** The first-ever catenary-free  
 LRT in Bordeaux

**ALL** 80 km of the LRT network  
 in Bordeaux

**1** The first-ever totally  
 catenary-free LRT in Dubai

**30** months: the record time to  
 build a LRT line in Casablanca

In 2012, Casablanca and Brest  
 won 2<sup>nd</sup> prize for "Worldwide Light  
 Rail Project" (British Light Rail Transit  
 Association & Tramways and Urban Transit  
 Magazine)

©Hywel Waters/PANOS-REA - Dubai

**Our world's finest Light Rail Transit projects**

From tree-lined to catenary-free LRTs, from Besançon's the most cost efficient line ever constructed in France, to Dubai's air-conditioned LRT stations featuring platform screen doors, SYSTRA puts the client at the heart of every project.





©SYSTRA - Casablanca

# URBAN ARCHITECT

**WE TURN YOUR VISION INTO A PROGRAMME OF PERFECTLY CONTROLLED STAGES, PERFORMED ON TIME AND IN BUDGET.**

We deploy the latest technology on your projects, operate in extreme conditions and respect your deadlines and budgets scrupulously. We love challenges!

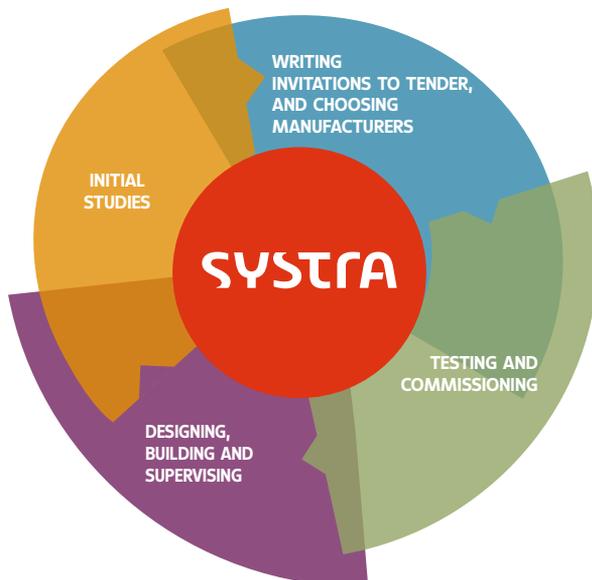
You benefit from our experience gained on emblematic worldwide projects, and the skills we have tried and tested at every stage of the LRT infrastructure lifecycle. We offer you the most practical and original solutions, while respecting international standards and your local environmental and safety requirements.

## 1 SIMULATE FUNDING

and conduct ridership forecasts, to assess the viability of your project

## 2 DEFINE THE BEST ROUTE, TO

- find the sweet spot between demographics, principal destinations and technical constraints
- build connections between present and future high-footfall areas.
- fit the LRT into the road network, particularly at intersections and parking places, from the earliest design phase.



# 3

## SPECIFY THE BEST TECHNICAL SOLUTION, TO DELIVER CAPACITY, COMFORT, SAFETY AND ACCEPTABLE OPERATING COSTS

Our experts from each sector will help you define your transport system

- Stations: location & insertion
- Track: integration
- Systems: for streamlined service and easy maintenance, energy efficiency, overhead wiring to blend into the cityscape
- Commercial operating speeds to suit urban traffic flows
- Passenger information: rationalise fare collection and ticket control, video surveillance for trouble spots
- Rolling stock: save up to 30% on procurement.

# 4

## MANAGE YOUR PROJECT EFFICIENTLY, RESPECT YOUR TIMETABLE AND BUDGET

We can match up architectural design and technical requirements. By taking an overall view, we think outside the box and work pragmatically. We are able to manage your project methodically, while integrating the dynamic requirements of infrastructure projects. We pay particular attention to cost control, risk anticipation, quality supervision and the tendering process. This means combining all present and future issues into a robust, original and competitive solution.

# 5

## MANAGE INTERFACES

Transport system projects are often complex and multi-disciplinary. To meet such challenges, SYSTRA offers a proven systems integration strategy, delivering smooth project management. Our project coordinators and engineers take care of each interface between every technical component, to meet the most exacting standards.

# 6

## SUPERVISE CONSTRUCTION AND TESTING

This crucial phase requires meticulous coordination, and has to be planned, right from the start of your project. Our experts are on hand to help you.

# 7

## GUARANTEE OPERATIONAL RELIABILITY

From the first design blueprint to the start of commercial service, our experts ease your processes, apply the relevant regulations and eliminate every potential operating risk.

## SYSTRA +

- **OUR CLIENTS GET THE BENEFIT OF THE EXPERIENCE** we have gained on more than 50 other projects worldwide.
- **WE PLAN OPERATING AND MAINTENANCE CONDITIONS,** right from the start of design, to deliver cost-effective operations and maximum comfort for passengers.
- **COMBINE OUR ARCHITECTS TALENTS** with those of famous architects.
- **WE CAN DEPLOY EVERY SINGLE TRACTION POWER** system, with or without overhead wires.
- **WE RECONCILE THE HIGHEST TECHNICAL REQUIREMENTS** with extreme climates or operating conditions.
- **WE TAKE AN IMPARTIAL VIEW OF INDUSTRIAL** deliverables. We select the best solution and adapt it to meet your real needs.
- **OUR PERMEABLE TRACK DESIGN SAVES ON BUILDING MATERIALS,** cuts costs and meets the highest standards.



© Philippe Hervouet Pictures - Lyon



©SYSTRA - Tours

## COMBINE EFFICIENT TRANSPORT AND URBAN INTEGRATION

The traveller's experience and the resident's perception: thereon hang the acceptance and success of your new LRT. From the outset, your project has to aim for these targets:

- Integration of the LRT to conciliate other road users (pedestrians, cyclists, drivers), run at the best commercial speed, guarantee safe transport and respect the environment.
- Efficient, reliable and regular service.
- Cost-effective investment and maintenance.

### 1 - Help with integrating Light Rail Transit

Type of integration	Principal characteristics	Interfaces with pedestrians	Interfaces with road traffic	Interfaces with residents	Complexity of work
Axial	<ul style="list-style-type: none"> <li>• LRT runs along the centre of the road</li> <li>• The most frequent layout</li> <li>• Extra space is needed for stations</li> </ul>	Little effect on pedestrians' habits, although they do have to cross the road to reach the stations.	<ul style="list-style-type: none"> <li>• Makes little difference to LRT and road traffic</li> <li>• Safer crossroads</li> </ul>	Minimal impact on businesses and residents	<ul style="list-style-type: none"> <li>• Simpler, with fewer diversions of service networks</li> <li>• Little effect on vegetation</li> </ul>
Lateral	LRT runs along one side of the road	Convenient, with no need to cross the road, walkways can be created	Makes little difference to traffic, but road vehicles (emergency services, residents, deliveries), have to cross the LRT lines for access		Additional work to divert service networks, which are often buried beneath pavements close to buildings

#### Axial integration

#### Lateral integration



M.Kadri/CAPA Pictures - Algiers



O.Toussaint/CAPA Pictures - Bordeaux

## 2 - 6 reflexes for fast, safe & reliable service

- ✓ Efficient power supply to save energy
- ✓ Track integration to guarantee trouble-free LRT movements
- ✓ Dependable passenger information in real time, along with mobile applications interfacing with other solutions for urban mobility
- ✓ Enhanced passenger protection at stations
- ✓ Rolling stock selected to improve comfort, streamline passenger flows and run at optimum speed in all circumstances

## 3 - Reserved or shared lane: How to define the best solutions

In France, most LRTs run along reserved lanes, or else share their route with pedestrians, cyclists and those vehicles authorised to drive through pedestrian precincts. Unlike other European countries, there is little use of shared lanes where sections of track are also accessible to road vehicles.

Different means of integration may be adopted for different track sections, to suit local circumstances.

Road share option	Principal characteristics	Interfaces with road traffic
Reserved lane	Road vehicles are entirely excluded from the LRT track	<ul style="list-style-type: none"> <li>• Keeps road traffic away from the LRT track</li> <li>• Interfaces occur only where roads cross LRT track. Whether these crossings are crossroads or roundabouts, they all require urban integration and development studies, to conciliate road users and respect safety standards</li> </ul>
Shared lane	Road vehicles can drive along the LRT track for significant distances	<ul style="list-style-type: none"> <li>• Maintains road traffic in districts with narrow streets. Encourages local service</li> <li>• Affects service regularity on the line, may be alleviated by access lanes at crossroads, priority at traffic lights, measures to prevent LRTs overtaken at stations or U-turns</li> </ul>

Reserved lane

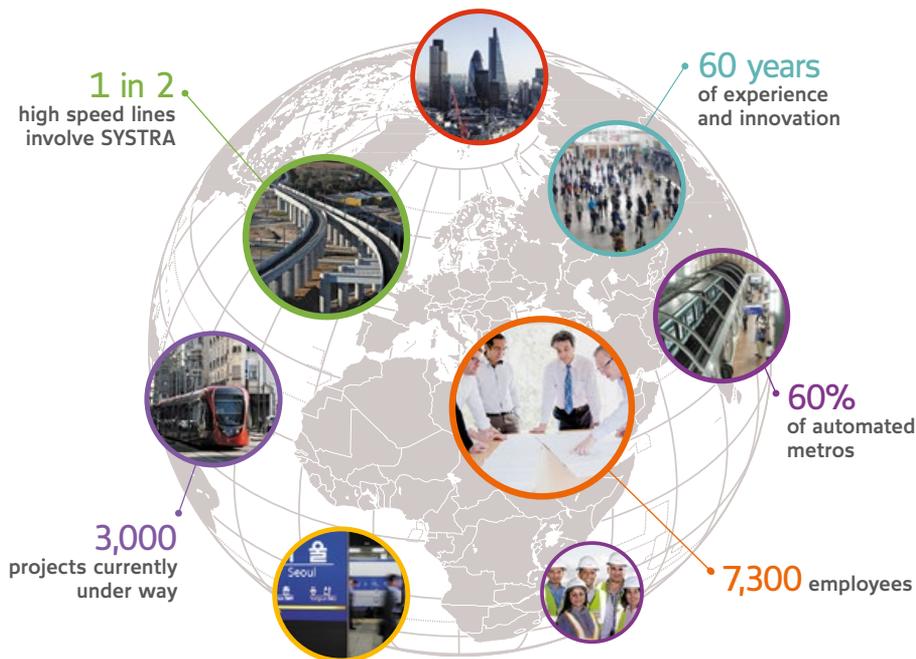


Shared lane



# CONFIDENCE MOVES THE WORLD

The Group assists growing towns and regions that need reliable, fast, clean transport systems, to make a lasting improvement to their residents' living standards.



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