Building urban tram depots for the twenty-first century

www.tramstore21.eu
European cooperation

TramStore21 is a European public sector cooperation project. It forms part of the European Union’s regional policy, which aims specifically to boost cohesion between Europe’s various regions and provides funding for a dedicated programme: INTERREG. This cooperation will make it easier for TramStore21’s five partners to resolve local difficulties that they would have found it hard to overcome by themselves, chiefly by conducting detailed studies of other local situations. Transnational working groups are being set up on the ground to review the projects of each partner and amend them wherever useful. Moreover, the partners’ technical departments are sharing their expertise in order to expand the project and select best practices. The partners will also be suggesting ways to improve national and European policies possibly impacting on the sustainable aspect of public transport infrastructures.

Further details about the INTERREG IVB programme for North-West Europe:
www.nweurope.org

TramStore21: annual events

One of the project partners will be organising an open event each year throughout the project’s duration. These events mark an opportunity for anyone to come and take stock of the state of progress of new depots and of exchanges of good practices alongside the partners. The first such event was held in Dortmund on 16 December 2008.

Next annual event:
28 October 2009 in Rotterdam.
Full details available from September 2009 on www.tramstore21.eu
Subsequent events:
October 2010: Dijon
October 2011: Blackpool
October 2012: Brussels
Depot-workshop:
A vital infrastructure, but few reference points

All public transport networks need places in which to stable, protect and maintain their rolling stock. A tramway vehicle is a complex and expensive piece of machinery: it requires a roof, a vehicle-wash area and a repair shop. An infrastructure like this requires an urban location close to the network so that trams do not run empty over long distances.

A well-built depot can last for over a century. In other words, new tram depots are a rare occurrence even in large cities. As a result, reference points are not always available. Collaboration between several partners makes it possible to speed up the learning process and avoid errors caused by inexperience.

Of course, the depot-workshop is a place which is active 24 hours a day, seven days a week, at the very heart of public transport vehicle movements. It is also a large structure. As a result of these factors, it can be a source of annoyance for local residents and therefore demands the adoption of preventive measures – to combat noise and vibration in particular – in order to optimise its visual impact and ensure optimal management of run-off water.

The construction of a depot-workshop also provides an opportunity to create local jobs and improve staff working conditions, rehabilitate a disused industrial site, and provide a better neighbourhood service. The latest techniques are used when a new depot is built; these can provide reference points for the construction sector in general.

TramStore21 in brief

TramStore21 is a cooperation project in North-West Europe co-funded to the tune of 50% by the European Union (INTERREG IVB programme). The aim of the project is to ensure that the construction of tram depots – vast hangars in which to maintain and stable tramway vehicles – abides by the three aspects of sustainable development: economic, social, environmental.

The project partners are: STIB (the main public transport operator in Brussels, Belgium, and project leader), RET (public transport in Rotterdam, Netherlands), the Dijon metropolitan area (Communauté de l’Agglomération Dijonnaise, France), the city of Blackpool (United Kingdom) and the Fraunhofer Institute for logistics (Dortmund, Germany). Between 2008 and 2013 these partners will be cooperating and exchanging their technical expertise with a view to optimising depot construction.

The results obtained by TramStore21 are intended to provide a benchmark for tram depot construction in Europe. Given the strong growth in urban public transport today and the need to build depots in many towns and cities, it was important to consider how best to integrate these industrial infrastructures within urban settings.

TramStore21’s three challenges:

1. Pooling existing good practices in North-West Europe for the construction of depots and efficient infrastructures in terms of sustainable development
2. Constructing four benchmark tram depots
3. Creating a favourable local and overall context for the production of high-quality public transport infrastructures.

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Seven exchange topics, three working groups

Working group 1: the decision-makers’ viewpoint

Topic 1: depot location

How to choose between several possible locations? How to optimise a depot’s location in keeping with the network to be served and also optimise services in keeping with the chosen location?

What urban-planning measures will allow depots to be integrated seamlessly into their urban environment? What synergies exist between building these new infrastructures and the implementation of related operations aimed at improving the living environment or urban regeneration?

Topic 2: economic analysis applied to the choices to be made

When choosing between a project’s assorted variants, it is necessary to assess the choice’s constituent components objectively. Several techniques have been developed by economists in order to achieve this goal: calculation of the return on investment (ROI), integration of total lifetime cost, cost-benefit analysis, multi-criteria analysis.

The results of these analyses can vary considerably depending on the hypotheses used. Some are fairly traditional, e.g. fuel price, product lifetime, better productivity linked to investment. Others are more innovative and immaterial, e.g. workplace comfort, air quality, noise. Some countries, but not all, have developed standardised assessment methods. Furthermore, the selected values can vary enormously.

Applying different analysis values to the choices to be made for depots will make it possible to compare these methods and devise recommendations for the future.
Working group 2: the designer’s viewpoint (architects, engineers)

**Topic 3**: designing a depot

Producing an overall design for a depot-workshop is harder than it appears: optimising available space, articulating vital functions intelligently, choosing the right equipment dimensions, promoting operating flexibility and inflow/outflow fluidity, and making allowance for staff and local residents – all are elements offering multiple possible combinations.

The application of standards, where available, can help. Moreover, extensive experience and expertise are necessary in order to ensure that the depot has the right proportions and will adequately fulfil its role.

**Topic 4**: arranging work in a depot-workshop

The depot is a place for organising the work of staff and also a meeting point: it is often the only point of physical contact drivers have with either the undertaking they work for or their colleagues.

The workshop must satisfy all modern work-related requirements: diagnosis of the condition of trams, computerised management and intelligent stock control of spare parts, easy access to all parts of the tram as well as to tools and equipment, adequate lighting, safety, noise, temperature, waste management network, etc.

Topic 4 will allow a comparison of partners’ proposed solutions for making depots efficient and user-friendly workplaces.
Working group 3: the environmental viewpoint

Topic 5: major ecological issues linked to depot construction

This topic, which is at the very heart of the TramStore21 approach, will make it possible to maximise the potential of innovative depot design from the environmental management standpoint, in particular:

- water management – water run-off and permeability, rainwater storage tank and local use, water discharge;
- energy performance – feasibility of applying the “passive building” (low energy) standard;
- local energy production – photovoltaic, wind, heat pump, biomass, feasibility of “CO2 neutral” depots;
- heat diffusion, ventilation, cooling;
- natural and artificial light, orientation of premises.

Topic 6: environmental analysis of construction materials

The aim is to establish a method for comparing existing materials on the market that are useful in depot construction, including insulation materials, from the durability angle: longevity, production process, energy consumption, waste.

Topic 7: site management

Sites running for over two years can generate a range of annoyances for the surrounding area: demolition of an old building, trucks ferrying materials to and from the site, noise, road occupancy, waste. TramStore21 partners will actively exchange information before building their depots with a view to minimising such annoyances and optimising site arrangements. Particular attention will be paid to relations with nearby residents.

Standards and good practices identified for construction of the depots will provide a model for other sites built by the partners later on.
Blackpool modernising the historic tram and revitalising the city

Blackpool is one of the main coastal resorts in northwest England: each year its population of 140,000 inhabitants is swelled by the influx of ten million tourists! Since the onset of the new century, central Blackpool has been the focus of model regeneration efforts.

Blackpool’s coastal tram began operating 120 years ago and is the only tramway line in the United Kingdom to have remained in uninterrupted service. The line’s historic vehicles are an attractive hallmark of the system.

Blackpool City Council, aided by the UK Government, has embarked on the complete refurbishment of the tram system in order to make it a key mobility player in Blackpool over the years to come. The large sum of £100 million (€115M) will be assigned to this ambitious project: new track, new overhead lines, new platforms, new rolling stock … and, of course, a new depot-workshop.

The new depot: not just a location, but also a development choice

Blackpool City Council initially intended to build its new depot on the site of the old one. However, the old site was too cramped and the narrow access ways located in an urban area so densely built up that the Council ultimately embraced an alternative solution: building the new depot at the southern terminus of the line below the sea wall. This larger, less densely populated area will offer adequate space in order to stable and maintain the new tram vehicles and even to increase the number of vehicles required by any future line extensions.

Blackpool regards its involvement in a European project dedicated to tramway as a means of absorbing expertise from mainland Europe and studying operations in several modern networks. The project will make it possible to optimise arrangements for the new depot and also to choose the most eco-friendly building materials and techniques.
Dijon: two tram lines to breathe life into the metropolitan area

The Dijon metropolitan area views its tramway project as “pivotal for the development and appeal of Burgundy’s regional capital and the whole of the Dijon population centre (315,000 inhabitants, 135,000 jobs). In association with other rail projects, for example the arrival of the TGV high-speed train, the tramway project will provide the final link in a journey chain that will make it possible to contribute actively to reducing greenhouse gas emissions”.

The two scheduled tramway lines will boast a total track network of 20 km, 37 stations, 32 vehicles (each 33 metres in length), and be worth €400 million in investment. Tramway’s integration in the city will provide an opportunity for the re-allocation of public spaces at a host of different locations. Commissioning is scheduled for 2013.

Depots and workshops: revitalising a former SNCF depot

The Dijon metropolitan area’s future tram/bus depots and workshops will be built on a 14 ha site formerly used by SNCF. This project aims therefore to symbolise continuity and respect for the region’s industrial and railway heritage.

Depot construction/refurbishment will also be resolutely future-orientated and geared to sustainable development:

• use of expansive roof areas for the installation of solar panels;
• rainwater collection and use;
• use of residue from waste incineration to provide the track bed on access ways;
• development of economic activities on part of the site;
• use of social integration clauses in public contracts so that the site provides an opportunity to train people who are finding it harder to return to the jobs market.

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The Beverwaard depot: intermodalism and environment

The new Beverwaard depot, located in the south of the metropolitan area, is needed in order to support the development of tramway transport capacities. The new depot will be a major intermodal centre: a Park & Ride facility, providing space for 500 cars and offering optimal public transport connections, will occupy a large part of the roof.

The depot, whose construction phase will run through until 2010, will also be a model development in several other ways:

- installation of assorted heat pumps in the basement of the building;
- low-energy lighting;
- ergonomically designed equipment for maintenance teams;
- rainwater management – storage, use, treatment.

The constant desire to offer high-quality, clean public transport is at the heart of the strategy being pursued by RET and the city council, whose aim is to make Rotterdam one of the world’s most sustainable cities, in particular by actively offering an alternative to the car and doing its utmost to counter the process of climate change.

RET Rotterdam: the ambition of sustainable transport

Electric tramways in the city of Rotterdam date back over a century. The latest generation of low-floor vehicles provides a transport mode that is particularly well-suited to people’s journey needs in this cosmopolitan and vibrant city. RET operates eight tram lines, 125 tram vehicles, two depots, not to mention a metro network, 36 bus routes and a fast-ferry service. It transports some 600,000 people daily.

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STIB Brussels
a decade of unparalleled growth

In 1999 STIB carried 159 million passengers in Brussels. By 2008 the same figure had soared to 286 million passengers – an 80% increase. This record-breaking ridership trend on public transport in the ‘capital of Europe’ has made it essential to adopt an ambitious development programme in consultation with the Brussels-Capital Region. The completion of the metro system’s inner loop section in 2009 means that the metro network now offers 40% more seats on four lines.

The tram network has also been restructured with efficiency in mind following the acquisition of 68 high-capacity vehicles. An order for an additional 100 new trams will allow further travel improvements for passengers on over 50 per cent of the network. These new vehicles require the construction of two new tram depots: one, in the north of Brussels (Haren), is now nearing completion; the other, in the south of the city ((Uccle-Forest, on the former Marconi industrial site) will be built between 2010 and 2012.

The future Marconi depot: practical and easy on the eye

STIB has always regarded this new depot as an opportunity to set new standards in integrated eco-design ever since the plan was first floated, and also as a chance to offer a workplace that is clean and pleasant for the 320 staff who will be working there, allied to the functions of a depot with stabling space for 75 trams and a workshop servicing up to 15 vehicles.

Eco-construction:
• choice of a disused industrial site relatively isolated from local residents;
• general arrangement of the site into three separate, but closely linked, buildings (depot, workshop, staff quarters);
• reduced impact of the complex, both visually and in terms of noise emanating from it;
• sustainability of materials;
• arrangement of a green way for pedestrians and cyclists alongside the site.

Eco-management:
• low energy consumption: efforts to make the new site CO₂ neutral;
• optimised management of water resources, lighting and heating/cooling circuits.

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TramStore21, dynamic knowledge management

Exchanges organised within the framework of TramStore21 draw inspiration from the knowledge life cycle concept, which is becoming more and more widespread in management.

On the one hand, the expertise held – often tacitly or unconsciously – by “resource people” within one or more organisations should be shared. In a fairly fragmented sector like public transport there is a real danger of losing a significant proportion of local expertise as the “baby boomer” generation nears retirement. TramStore21 hopes to limit this phenomenon by arranging critical transfers of such expertise within the “TramStore21 Exchange Group” and also by formalising and publishing it.

On the other hand, modern society is now a “knowledge society” in which information production outstrips industrial production. Identifying information that is useful to a public transport operator and knowing how to apply it to problems in need of a solution is an important and complex orientation exercise. Teams of colleagues from complementary backgrounds can help one another in order to achieve this goal.

Creating a context that promotes to the construction of sustainable infrastructures

At local level, the aim is to create a positive context

• among people living near sites: consultation, creation of activities with a local impact (jobs, training, services for workers), transport service improvements;

• within teams designing and executing projects (architects, engineers, entrepreneurs): enhanced knowledge of sustainable technologies taking into account the multiple needs of the PT operator, its staff and the urban environment.

In terms of the general and European context, the project will contribute to the debate on:

• the harmonisation of eco-building standards and certification to be developed in Europe;

• appropriate rules for the construction of industrial buildings for the twenty-first century (in particular, the national application of EU Directive 2002/91/EC on the energy performance of buildings).
The Fraunhofer Institute IML (Dortmund, Germany), the project’s scientific partner

Fraunhofer is a public venture owned by the German Government, pitched halfway between universities and industry and, therefore, between theory and practice. Its job is to carry out assignments that involve both research work and technology transfers.

Fraunhofer today groups together 56 institutes and 15,000 researchers.

Fraunhofer’s institute for material flows and logistics (IML) in Dortmund specialises in the construction and operation of all journey chains for goods, from production to final use, via smart labelling, storage, site logistics, resource management, environmental impact, and waste management networks.

Fraunhofer IML’s role in the TramStore21 project is to:
• organise exchanges between partners and lead the technical groups;
• publish the results of exchanges on each specific topic;
• coordinate examination of the legal and regulatory context;
• initiate partnerships with actors in Germany.

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The tram come-back
an opportunity for sustainable urban mobility

Tramway networks were very commonplace in Europe until the middle of the twentieth century, but were often then replaced in the 1960s and 1970s by bus networks, which were regarded as offering greater flexibility at lower cost, particularly in the United Kingdom and in France.

Over the past two decades the tendency has been reversed and many new tramway lines have been built throughout the world. There has been a rediscovery of tram’s advantages:

- high capacity: a large, modern tram can carry twice as many people as an articulated bus;
- electric propulsion: no urban pollution and can run in tunnel;
- comfort: trams running on well-maintained tracks offer unbeatable ride comfort;
- predictability: the presence of a tramway line provides a solid backbone for people’s activities and journeys;
- public space: building a tram line provides an opportunity to re-align the public space. Grassed tramway track beds give rights-of-way the ‘green’ touch they so often lack and also combine perfectly with pedestrian thoroughfares.
- Rotterdam and Brussels have invested large sums of money in their tram networks since 2000 (new vehicles, line extensions). Blackpool, the only city in the United Kingdom to have kept its trams in the twentieth century, has now decided to modernise the whole system. In Dijon, the introduction of two tramway lines will mark the culmination of the metropolitan area’s extensive eco-mobility efforts.
The website for the tram depots of the twenty-first century.

A forum for technical exchanges.

An interactive site: identifying, accessing documents, responding, contributing.

www.tramstore21.eu
In partnership with
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