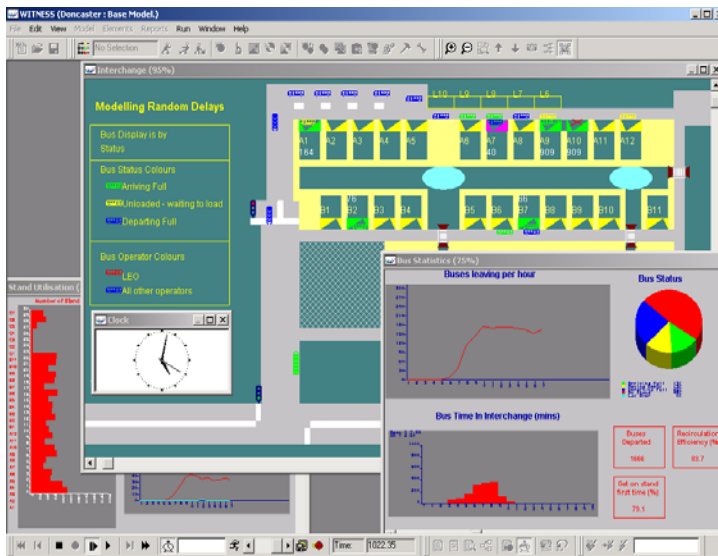


A Model Bus Station For Doncaster



Business modelling and simulation from Lanner has helped the South Yorkshire Passenger Transport Executive (SYPTe) to finalise its plans for the new Doncaster Interchange that will open in 2004. The models created using Lanner’s WITNESS program were used during the planning and design phases to test concepts and support negotiations with the local authority, transport operators, developers and the design team. The new Interchange has been designed to promote public transport and provide an enhanced service to passengers compared with existing facilities.



“With WITNESS we were able to test out our ideas and demonstrate the validity of our proposals before making any firm decisions on the new Interchange,” says Peter Elliott, Senior Project Manager. “It was invaluable in helping us to predict vehicle and passenger flows, so we could work with the local authorities and bus operators to devise a solution that suited everyone involved.”

Serving the Community

Serving the area of South Yorkshire that includes Sheffield, Rotherham and Doncaster, the SYPTe is responsible for identifying the travel needs of local people and promoting the best possible public transport within the financial resources available.

The Executive operates bus stations, specifies and funds local rail services, funds concessionary fares, provides transport-related information and works closely with local councils and bus, train and tram service operators.

“Overall, WITNESS provided confidence in the design of the Interchange,” says Peter Elliott. “It has been excellent as an ongoing tool to help refine plans and to use for operational planning as the Interchange is built.”

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- SYPTe
- Transport Executive
- Planning New Bus Interchange
- Demonstrated Validity of Proposals

The new Doncaster Interchange is designed to replace two existing bus stations serving the town centre. It is funded by a combination of PFI and regeneration investment as part of a development to revitalise the town centre with new amenities and shopping areas.

Planning a Complex Interchange

Planning the new Interchange was a complex task that required taking a number of physical and operational factors into account. First, the Interchange had to provide an effective and long term solution to local public transport requirements and support strategies to increase passenger numbers. Second, because the Interchange was part of a larger development, space limitations and existing road layouts placed constraints on the design.

Finally, the Interchange had to accommodate the needs of the private sector operators that have operated the bus network since public transport deregulation a decade ago. SYPTE needed a flexible solution that would not create any traffic bottlenecks or delays to services.

“Modelling and simulation is ideal for assessing and understanding such complex interactions in the real world,” says Peter Elliott. “We chose WITNESS because the company demonstrated similar applications in transport and other industries.”

Setting Priorities

The Interchange only exists to enable people to get on or get off buses in Doncaster town centre. This means that the main factors affecting the operation of the Interchange are the times of bus arrival and departure and the number of people getting on and off (which dictates the time a bus spends at a position). In an ideal world, SYPTE would be able to dictate the arrival and departure times to help ensure smooth traffic flows and allow the layout of the Interchange to be optimised. But timetables are decided by the individual operators, and adherence to them is affected by congestion. This limits SYPTE's control over arrival times.

The designs also had to take account of the passengers' needs. While buses can set down at any stand they can only load at the stand allocated to that service. This stops passengers having to run between stands to get their bus but also prevents buses being allocated to stands dynamically.

Real Information Makes Model

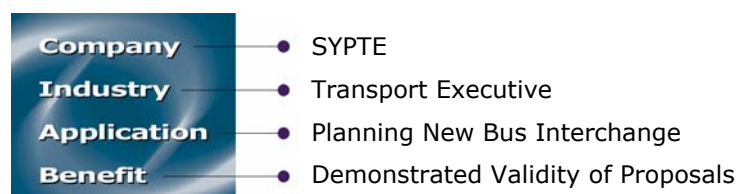
WITNESS is a highly configurable business modelling and simulation tool designed to provide a visual interpretation of complex processes. The most successful models are based on high quality information that can be used to create the simulated “real world” representation. At the Interchange, for example, there is a dynamic interaction between the timetable, types of bus, routes or services, and physical layout of the interchange. Peter Elliott and his colleagues used information from a variety of sources to devise a simulation model that took into account all of the potential factors affecting the operation of the Interchange, including:

- timetable details including service number, arrival time, departure time, bus loading
- bus details including vehicle types, number of doors, alighting and boarding times
- service details including operator, destination, vehicle type, allocated stand, entry and exit points
- interchange details including road lengths, stand positions, travel speeds, traffic light cycles

Key Performance Indicators

The model was used to assess the operation of the Interchange for a number of potential designs with particular attention paid to road layout, number and position of stands, and how buses would arrive and depart. SYPTE was able to define a number of key performance indicators (KPIs) that helped identify which layout would provide the best service to customers while also accommodating the requirements of operators. These KPIs included:

- bus lateness, showing how many buses would leave their stands late, compared



- with the published timetable, for a given layout when other factors such as late arrival had been included
- percentage of buses getting on stand first time
- recirculation efficiency, a measure of how much a bus drives round looking for a vacant stand
- time spent at the Interchange
- percentage of time at Interchange spent on stand

Benefit from Simulation

Simulation proved to SYPTE that the Interchange could work with the 30 stands allowed for in its original proposal. This was important because some operators had been sceptical about the original plans and were only convinced of the feasibility once they had seen the simulation in action. The simulation also provided SYPTE with information about every bus using the Interchange, which was used in negotiations with operators. Information on passenger and pedestrian flows was used by architects and engineers to finalise the design of walkways and other facilities.

“One factor that simulation identified was that the design is sensitive to the way services are allocated to stands,” says Peter Elliott. “This has helped us to plan how we will operate the Interchange when it opens and manage the arrival and departure of buses.”

Another important outcome of the simulation was the support it provided in helping SYPTE to persuade the local council of the need for highway changes in the vicinity of the Interchange, to help smooth traffic flows and reduce the risk of bottlenecks in the busy town centre.

“Overall, WITNESS provided confidence in the design of the Interchange,” says Peter Elliott. “It has been excellent as an ongoing tool to help refine plans and to use for operational planning as the Interchange is built.”

WITNESS the Future

By using WITNESS optimisation technology to automate the process of allocating services to

stands, a better service has been provided to SYPTE customers, in terms of reduced waiting times of buses and better grouping of buses by destination. This successful solution in Doncaster has led SYPTE to use it to model the existing Sheffield Interchange to plan for future development and a similar exercise is also being planned for the existing Rotherham Interchange.

SYPTE is now considering how to use modelling in other aspects of its operations, such as analysing staffing levels for its travel shops and to simulate traffic flows at road junctions.

