

## Fleet sizing studies

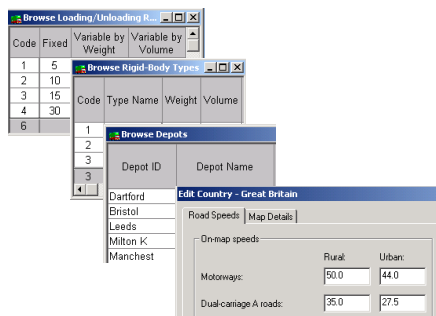
Do you need to establish the size of a vehicle fleet? You may want to:

- review whether you have the right number of vehicles in an operation
- establish the affect on vehicles and mileage of changing depot location
- produce fixed routes for the next month, quarter or season
- quantify the impact of different service levels, such as delivery frequencies and time windows
- test different vehicle sizes or designs or new operating methods, such as double shifting
- respond to an Invitation to Tender

We use the Paragon routing and scheduling system for this type of project. Paragon Software Systems plc specialises in the development and support of vehicle routing and scheduling systems, and has a market share of over 65% in the UK. The system can be used strategically, tactically and operationally. We have been using Paragon since 1991 and are skilled in using it to its full capability.



### Setting up a model



The level of detail in a Paragon model depends greatly on the nature of the project. For example, the data required for a strategic study to compare different depot locations would be much simpler than for a project to determine the routes that were to be run next week. We can include data on products and set up compatibility tables to determine which goods can travel on a vehicle together.

The data required for a project includes:

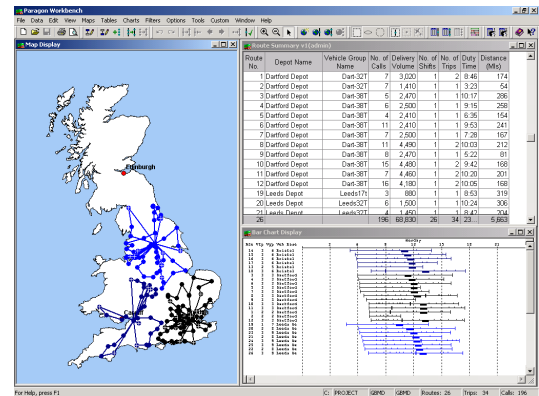
- the depots and delivery points, their location and characteristics, such as time windows and vehicle access constraints
- the capacities of the vehicles in the fleet
- drivers' hours constraints
- vehicle running speeds and unloading rates

We can then schedule sets of orders, which may represent different time periods or strategic scenarios. The order data would contain the volumes, deliveries and collections to be scheduled; scheduling parameters, such as the depots and vehicle types in this run; and any overrides on time windows, unloading rates or working time.

## Reviewing and refining results

After the scheduling algorithm has finished, the results can be examined graphically and in tables. Custom tables can be defined, so that only relevant statistics are presented. These tables can be exported to spreadsheets or other applications for the comparison of options or further analysis, such as deriving individual delivery costs.

There is also the ability to carry out interactive work to refine the solution. When carrying out a strategic study, when a large number of options need to be compared, it is unlikely that interactive work will be carried out. However, if the routes are to be implemented, it is likely that the initial output will be reviewed and refined. It is possible to drag and drop calls between routes and to dismantle some trips and routes, freeze others, and schedule the unrouted calls.



## Special features

Paragon was initially developed for the multi-drop single depot environment but many special features have been added. These include:

- multi-depot operations, where the allocation of calls to depots can be made according to travel time, depot capacity, product and vehicle availability
- calls that are collected and delivered on the same route
- allowing vehicles to call at other vehicle bases to pick up deliveries, or to make collections for other depots
- planning multi-frequency deliveries over periods up to 4 weeks with different frequencies and acceptability patterns

## Typical process

Although each project varies, a typical process in a strategic study would be:

- collect data on delivery and collection points and volumes, geocode and tabulate for verification
- collect data on vehicle running speeds, unloading rates and other settings, possibly with a detailed evaluation of sample routes
- produce Paragon schedules from existing sites with current service levels to produce a base case, investigating any discrepancies from current resources
- run a series of different scenarios, tabulating the results for easy comparison, highlighting the changes in KPIs
- possibly select one scenario for refining, carrying out sensitivity tests or for more detailed analysis prior to implementation

*For further details contact Phil Gibbs of Logistech on 01327 811641 or at [phil.gibbs@logistech.co.uk](mailto:phil.gibbs@logistech.co.uk)*