

Dynamic Transport Optimisation - Wincanton PLC

Background

Wincanton is a leading supply chain partner for British businesses, providing supply chain solutions up and down the country with colleagues working across more than 200 sites.

Through a wealth of experience and knowledge, Wincanton provides business-critical services including storage, handling, and distribution; high volume fulfillment; retailer 'dark stores'; two-person home delivery; fleet and transport management; and network optimisation for many of the UK's best-known companies.

The Challenge

Effective optimisation of large transport networks is critical for efficiency and customer satisfaction. There are many options around collection, aggregation, staging and final delivery. However, of these many options, only a few will deliver the required level of service at minimum cost within the applicable rules and regulations.



The Project

Opturion carried out a modelling and optimisation exercise for Wincanton on options for dynamic staging in a given transport network. The main characteristics of the network are as follows:

- Multiple depots
- Tractor and trailer, as well as rigid vehicles
- Requirement for staging via a depot or specified staging location
- Staging can potentially be in the form of:
 - Trailer drop and pick up at a secured location
 - Trailer swap
 - Driver swap
- Requirement for overnight stays (e.g. using sleeper cab) for some journeys

Opturion analysed data from Wincanton on three consecutive days of operation within the network, intending to demonstrate how its transport optimisation technology would apply to such a network. Wincanton provided a data set on locations, consignments, and fleet characteristics. Below are some approximate data:

- 1,000 locations
- 2,500 consignments
- 40,000 pallets
- 40 vehicles (and contractors)



Modelling

This section describes some of the more interesting aspects of modelling a transport network like the one described above.

Tractors and Trailers

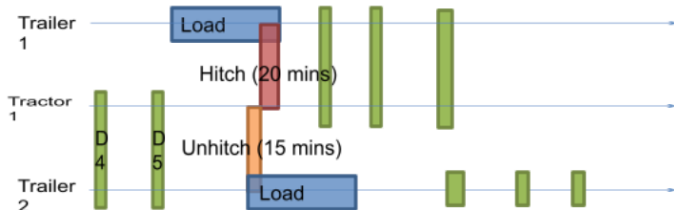
Opturion offers a unique capability to optimise tractors and trailers simultaneously. In contrast, the traditional approach optimises the trailers and overlays an allocation to tractors on top of that.

There are problems with that approach:

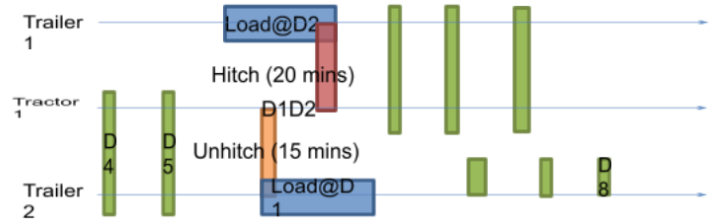
- What is cost optimal for the trailers is not necessarily so for the tractors, as tractors don't need to incur the entire loading time of the trailers and may take different routes.
- Driving legislation (fatigue rules) may make it infeasible to overlay tractors onto the trailer routes

The Opturion approach ensures that we consider all constraints from the start (mainly transit times and vehicle capacity for the trailers and driving legislation for the tractors) while optimising the most expensive resources (i.e. the tractors).

The main benefit of having tractors and trailers over rigid vehicles lies in the ability to do a quick hitch and unhitch operation:



There are some complications with this. One is if we allow trailers to roam between depots, then the unhitch operation may be at a different location to the hitch operation:



This scheme essentially models a forward distribution model from depot to customer. However, many consignments originate from a customer (not a depot) location and go to another customer. In such cases, the above operation may not be feasible. For instance, if the first load for a trailer is at a non-depot, then this trailer needs to be moved to its loading location before loading starts.

Dynamic Staging and Multi-Day Operation

Given the distances involved, delivering each load within a driver's workday is not always possible. In that case, there are two options: let the driver have an overnight stay and continue the next day(s), or move the load to an intermediate location, where it is picked up later on by someone else (staging).

The former option is relatively straightforward and only relies on an extension of the fatigue management rules.

For the latter option, there are several alternatives:

- The load is in a trailer, is left at a secured location, and picked up later;
- The load is in a trailer, swapping at a potentially unsecured location, which requires tractors to meet;
- The load is in a trailer or on a rigid vehicle, and drivers swap vehicles.

Outcomes

This exercise showed that it is possible to optimise a significant network over several days with no approximation or loss of detail. The difference between a good and a typical solution represented a difference in cost of between 5% and 10%.

Further Information

Please contact Opturion for a demonstration, or give us some data that we can use to identify potential benefits.



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