



# Turnaround Time Analysis

## Port Simulation for Vessel Loading / Unloading

Central to the success of many ship types is the ability to load and unload within a certain time frame. For new designs or for vessels changing route this should be quantified (taking into account all random variables and events) as early a stage as possible to allow planning in ports or alterations to the vessel concept.

### Port Efficiency

With the current trends in Ro-Ro design tending towards larger vessels and high speed crafts, pressure is increasing on the vessel operators to turn these ships around in the most efficient manner possible. The advantage gained by high speed craft in terms of speed at sea can be at least partially negated by poor performance during the turnaround process in the port itself. For new vessels and new routes, it can be essential to accurately predict the in-port performance of the vessel in order to schedule timetables and even to size engines in order to meet required time targets.

Increasing port efficiency can be a question of many different factors. In some cases, small changes in the port layout can have a major effect on the flow of traffic and can prevent queues that delay the vessel. In other cases, the order in which vehicles embark from the vessel and the way in which loose trailers are handled can also have significant effects.

### Simulation Approach

Vehicle traffic simulations are carried out with our in-house simulation software a simplified vehicle kinematics simulation code developed by the Ship Stability Research Centre (University of Strathclyde) and **SafetyatSea**.

Our software can be used to model combinations of vehicle types including cars, minibuses/campervans, coaches, small lorries, articulated lorries, loose trailers/MAAFI trucks and cars towing caravans. Each vehicle type has different parameters for speed, size and reaction time etc.

## Simulation Approach (Continued)

The simulations are carried out for user-defined scenarios, which can include among others, the following events:

- Random time arrival of vehicles at terminal
- Check-in of vehicles (variable check-in time)
- Impact on traffic (congestion) outside the terminal
- Manual sorting of vehicles into waiting lanes before loading
- Movement of vehicles between the vessel car decks and terminal parking / waiting areas
- Movement of loose trailers by independent traction units
- Effects of driver error (entering the wrong lane, arriving late etc.)
- Customs procedures

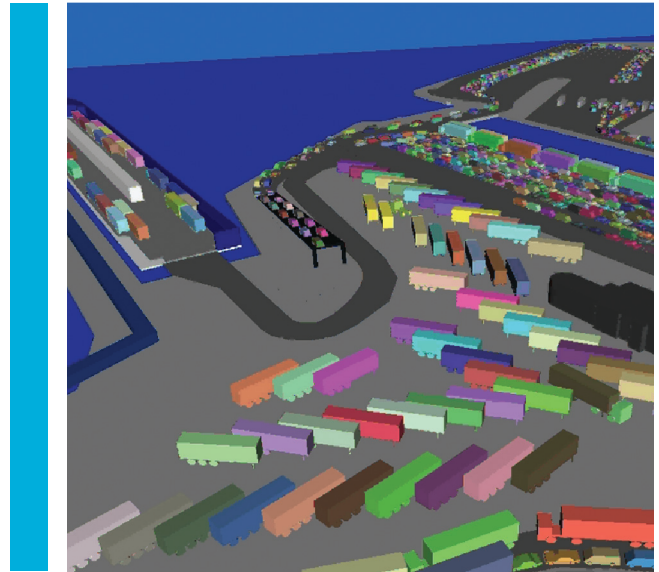
## Operational Information for planning and design

- 3-D visualisation
- Quantitative information (e.g. time, congestion) for design and planning of loading/unloading operations
- Quantitative information for design and planning of layout of vessel and terminal - identification of dimensioning scenarios (e.g. turning circles)
- Identification of critical operations and potential logistic or technical problems
- Quantitative verification of design and operational changes – impact on performance
- Information for emergency planning

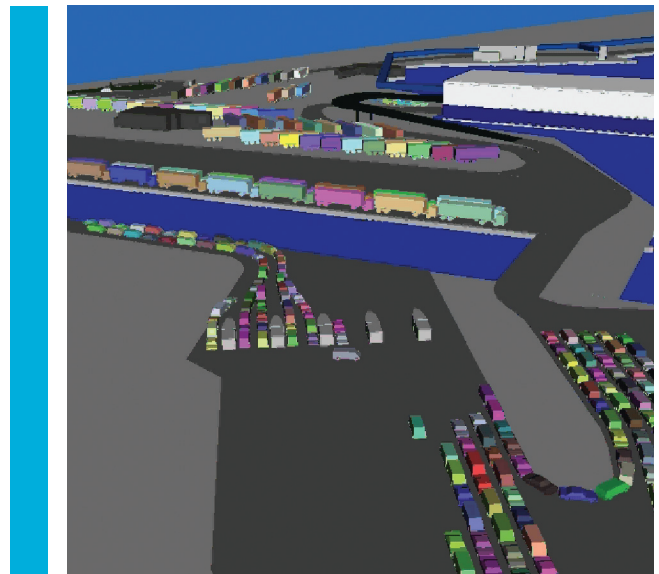


## References

Ferry terminals in Norway (Kristiansand, Larvik), France (Calais) and the UK (Dover) on behalf of Color Line, Deltamarin, P&O Ferries.



Vehicles queuing to clear customs (foreground) with loose trailer operations (background).



Full port simulation including check-in desks and waiting lanes

## Further Information

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