Floating Container Storage and Transhipment Terminal –

An innovative and low-cost port solution

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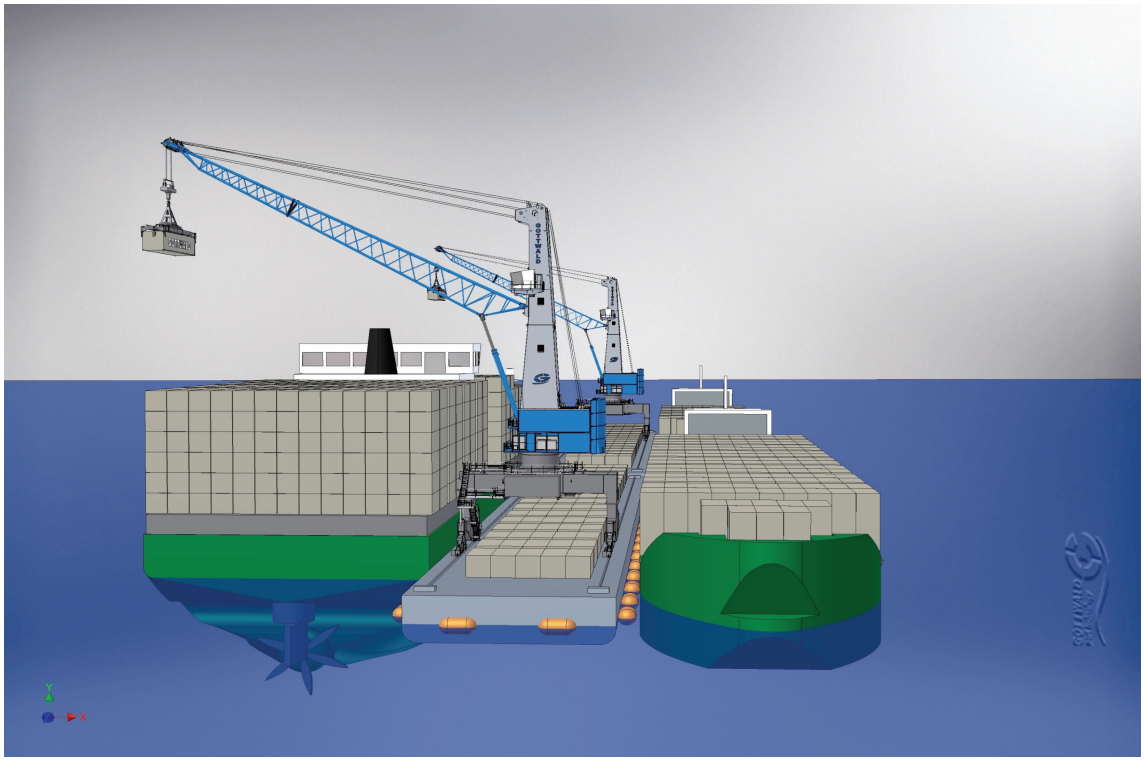
The Demonstration Project 5 “Offshore Hubs and Motorways of the Sea Linkages”, outlines the work carried out to review container transhipment in Northern Europe, and investigates the trend towards increasing transhipment. The work analyses the cost and environmental advantages of container transhipment based on an innovative floating crane-barge system. StratMoS project partners’ in collaboration with Gottwald Port Technology GmbH have produced what are considered to be highly positive results. The research collaboration has resulted in development of a new and highly innovative maritime logistics concept, known as the **Floating Container Storage & Transhipment Terminal**, or **FCSTT**. The case study considers the location competitiveness of Scapa Flow in the Orkney Isles as offshore hub location serving markets in the North Sea Region and neighbouring countries. The system analysed offers transhipment services at lower cost than a comparable conventional land-based terminal. The mobility and planning benefits represent other important features. As a floating facility, the offshore terminal is an easily transferable concept, and can be rapidly positioned anywhere there is demand.



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Investing in the Future by working together for a sustainable and competitive region

The Interreg IVB North Sea Region Programme
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Background and challenges

This work in DP5 follows on from earlier studies in the NMC project and also work carried out by the Transport Research Institute (TRI), and by the Orkney Islands harbour authority (OIC). Previous research identified the former Naval Base at Lyness on the island of Hoy (Scapa Flow) as potential location for a container transhipment terminal. OIC secured interest from an international terminal operator. However the port authority decided not to run a tender to appoint an operator through an operating concession. Moreover the authority did not apply for planning permission.

Instead the port authority/OIC developed a new strategy to use the ex Naval Base as a port for handling marine renewable traffic. A planning application was granted by OIC for a new port facility which was completed in 2011, financed by OIC and ERDF funds.

The loss of the Naval Base instead led TRI to look into a new option via the StratMoS project – i.e. to develop a floating hub. The approach therefore developed a focus on initiating a hub based on using a floating terminal. The floating terminal would use the anchorage within Scapa Flow.

Objectives

The offshore hub concept has gained pace over the last decade or so. In many regions of the world there are now offshore container terminals at which the majority of cargo handled comprises transhipment. Although these terminals are land-based, they are 'offshore' in the sense that very little of the cargo handled is for the immediate hinterland – i.e. most of the cargo involves transhipment.

As there is no such offshore transhipment terminal in the North Sea Region, it was therefore considered important to investigate whether such a terminal could be provided and what benefits it might give to the NSR. A key advantage of offshore hubs is the reduced deviation steaming time of mainline vessels, and also shorter distances for feeder ships serving local markets. This helps to reduce transport costs and also leads in turn to lower CO2 emissions. Another advantage is reduced capital and operating costs of the terminal itself. Amongst many other advantages, offshore hubs can also help to overcome congestion problems experienced at city hub ports.

Work processes

The DP5 initiative led by TRI involved several StratMoS partners including Port of Narvik, Aberdeenshire Council, Rogaland Council, and Scrabster Port. Samskip, the Icelandic-based shipping and logistics operator, was involved but withdrew as a consequence of the economic crisis in 2008-9.

In order to bring in further industry expertise, TRI and partners have developed close collaboration with Gottwald Port Technology GmbH. Gottwald specialise in the design and supply of harbour cranes, including cranes used on floating terminals.

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Description of results

FCSTT Design
The Floating Container Storage & Transhipment Terminal (FCSTT) design concept is based either on a bespoke barge type structure, or using a converted container ship as the main crane and storage platform. In either case container handling would be undertaken by slewing stevedoring cranes fitted to the FCSTT. Cranes would be either fixed/pedestal type, or running on rails. Deep-sea and/or feeder ships can be handled simultaneously on both sides of the FCSTT.

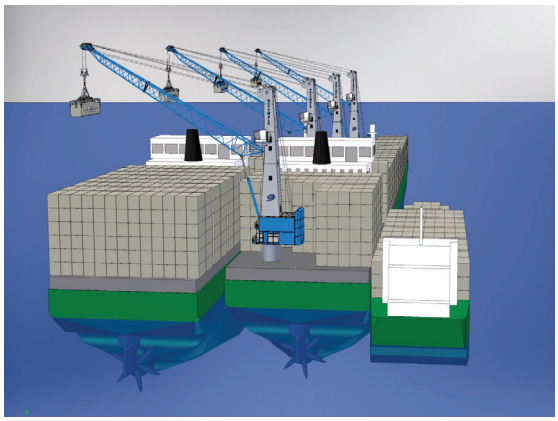
FCSTT Cash Flow Analysis
Results demonstrate that a 4-crane FCSTT costing around €50 million offers at least a two-thirds capital cost saving compared with a similar capacity land-based container terminal. The FCSTT also benefits from much lower operating costs, also estimated at around one-third that of a land-based terminal.

The cash flow analysis undertaken assumes a 100% transhipment scenario, which is not unlike a number of hubs elsewhere such as Freeport (Bahamas) and Salalah (Oman). Based on current container handling rates/ prices at existing hubs in the NSR, the financial outcome appears most positive for a 4-crane FCSTT offering up to 600m of berthing space (i.e. 300m either side of the FCSTT). Such a facility is estimated to have a maximum annual throughput capacity in excess of 500,000 TEU.

Modelled results indicate the FCSTT should be able to repay the total investment within 10 years, compared with 25 years or more for a typical land-based terminal.

The FCSTT concept has wide applicability and can be used wherever there is demand, especially in any situation where 100% transhipment is acceptable and practical. A further advantage of the FCSTT is that it can be put in place relatively quickly, overcoming many of the planning constraints faced by conventional seaport infrastructure developments. The FCSTT is considered to be ideal for any pure transhipment terminal scenario, but could also be positioned within existing ports, to supplement capacity, as required. The provision of future additional capacity is also greatly simplified compared with building a concrete land-based terminal.

FCSTT Liner Service Networks
The economic ship cost modelling exercise undertaken by StratMoS partners was based on using Scapa Flow in Orkney as a possible hub location for an FCSTT serving the North Sea Region (NSR), as well as offering linkages with neighbouring feeder/ transhipment markets throughout Northern Europe including the Baltic Sea, NW Russia, and Iberia. Scapa Flow offers 50 square miles of sheltered deep-water anchorage (over 20m depth), and also benefits from the availability of Single Point Moorings (SPM's) to which an FCSTT would be attached. Geographically, Scapa Flow is considered to be an ideal location for transhipment, situated at the crossroads between the North Sea and Atlantic Ocean thereby minimising mainline ship deviation time, and is well within feeder ship range of most of the main transhipment markets. The location also avoids the added Kiel Canal expense when serving Baltic/ Scandinavian transhipment markets.



FCSTT Liner Service Cost & CO2 Analysis
StratMoS DP5 research demonstrates that the much reduced deep-sea ship deviation distance plus mostly shorter average feeder distances involved for this location (i.e. compared with feedering via existing NSR hubs located in the North Sea Basin) would result in significant liner shipping cost savings. The reduced overall ship movement would lead in turn to large reductions in ship C02 emissions. Shipping cost and C02 reductions of up to 30% are achievable for liner services connecting established transhipment markets in Northern Europe via Scapa Flow.

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FCSTT – The Ultimate 'Green Port'
Other liner service advantages gained from using this location include reduced transit times serving transhipment markets, which are mostly in peripheral areas, plus avoiding the need for costly multi-terminal calls by feeder ships, the latter a common feature when calling at existing hub ports in the NSR.

In addition, Scapa Flow and Orkney is at the centre of Scotland's rapidly developing marine renewable industry, and a FCSTT would eventually be expected to therefore benefit from direct access to low cost marine renewable energy sources. This could potentially make a FCSTT at Scapa Flow the ultimate Green Port due to:

- Virtually zero impacts on the landside;
- Use of marine renewable energy;
- Reductions in deep-sea and feeder ship fuel consumption and emissions.

The location on the edge of the North Sea Region IMO Low Sulphur Emission Control Area (ECA) is expected to represent a further potential strategic advantage for users and investors.

Bringing the results forward

Work is ongoing to further refine the design of the FCSTT, involving continued collaboration between Gottwald Port Technology and StratMoS partners. The next stage of the work will involve promotion of the FCSTT for the North Sea Region, including drafting an EU project application aimed at helping to bring forward the development of a FCSTT.

The Scottish Government has included development of a container transhipment terminal at Scapa Flow as a strategic project of national importance within its National Planning Framework. A FCSTT has the potential to substantially increase Scotland's international trade, largely through interception of third-country trade as well as helping further develop existing trade. It is anticipated that the Scottish Government will work closely with the project partners in the next stage of the work.

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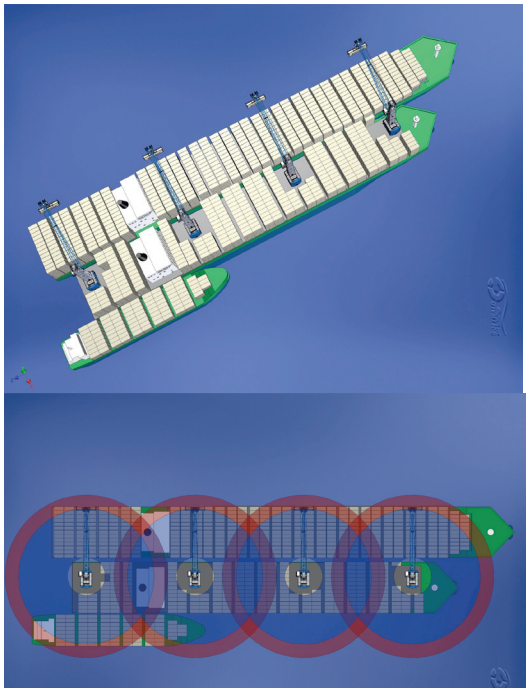

The StratMos Project

The core aim and idea of the StratMoS project is to promote and facilitate a shift of cargo from road to sea-based intermodal transport, and improve accessibility within the North Sea Region by supporting the implementation of Motorway of the Sea (MoS) and related transport networks in an integrated logistical chain.

The StratMoS project is funded by the EU and the Norwegian government through the Interreg IVB North Sea Region Programme. The project comprises 27 partners, covering the North Sea Region from Flanders in the south and Northern Norway in the north. The Murmansk, Arkhangelsk and Nenets regions in Russia are associated partners. The StratMoS project was approved in December 2007, and will end in March 2011 (extended to 2012).

Partners Involved

Partners involved in DP5 are:

- Transport Research Institute (TRI), Edinburgh Napier University
- Port of Narvik
- Aberdeenshire Council
- Rogaland Council
- Scrabster Harbour Trust

Thanks to Gottwald Port Technology GmbH.