

In equilibrium

*Bas Tolhuizen,
E-Crane International,
the Netherlands, examines the
success of modern crane systems.*



Swedish port company Mälärhamnar AB, with two locations approximately 100 km west of Stockholm (Västerås and Köping), has recently taken delivery of an E-Crane model 11264. This crane, mounted on an existing Kone rail portal, will be primarily used for unloading coal from coasters (5000 DWT) for the local power plant in Västerås. In addition, the machine will be used for handling firewood and peat.

According to Mälärhamnar AB, the E-Crane will be an important factor in the company's future bulk material handling capabilities. The port had previously concluded that its future would lie in hydraulic machines, rather than the rope cranes already in operation in the port (primarily Kone in this case). This type of equipment will provide better handling rates, more flexibility and lower operational costs.

Why the E-Crane?

The decision to choose the E-Crane was based on the following factors:

- Crane classification of the E-Crane is

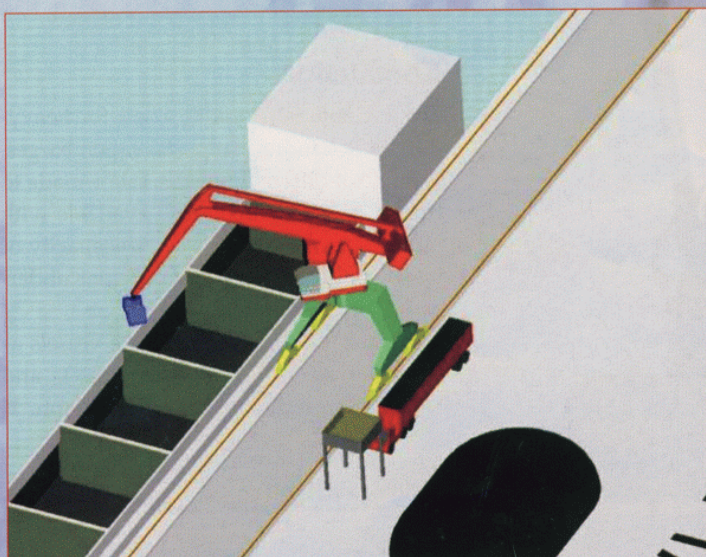
superior to the excavator-based machines, which results in a longer machine lifetime.

- The superior outreach and capacity of the E-Crane have resulted in improved handling rates throughout the vessel.
- The reduced power consumption and maintenance cost of the E-Crane compared to excavator and rope-type machines, which leads to lower cost/t of material handled.
- The E-Crane can be mounted on one of the existing rail portals available in the port. This was very important because of the low permissible ground pressures on the quay.
- The upper structure of the E-Crane can be adapted to Mälärhamnar's requirements. This included the installation of a special industrial air conditioning/heating system, ergonomic operator's seat and controls, etc.

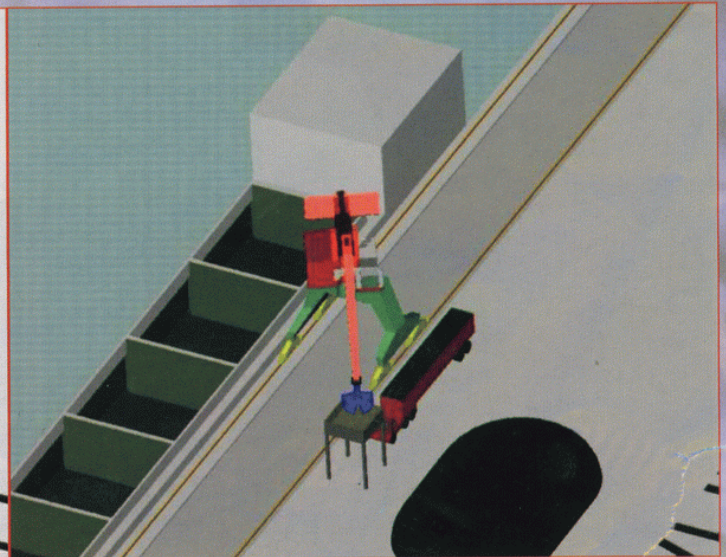
The choice to mount the new crane on an

existing rail portal was based on two requirements. First, short delivery time prevented the construction of a new rail undercarriage. Additionally, calculations made by DNV concluded that the crane, although considerably heavier than the existing Kone upper, could be mounted on the existing portal.

Due to the parallelogram design of the boom, stick counterweight and connecting rod, the crane remains in near balance throughout the working range of the machine. If the load is brought further away from the centre line of rotation, the counterweight is pivoted back in the reverse direction, resulting in almost identical load moments in front of and behind the centre of rotation. This results in significantly



E-Crane model 11264 on existing rail portal.



The E-Crane feeding the hopper.

reduced dynamic forces in the steel construction of the crane and the lower structure, as well as lower power consumption.

Performance

The E-Crane model 11264 has a maximum outreach of 26.4 m and a grab capacity of 15 t. The unit was supplied with two

hydraulic 10 m³ coal grabs, a 3 m³ log grab and a hook attachment in combination with a separate rotator, quick change device and quick couplings on the hydraulic hoses. This enables the users to change from one grab to another in a matter of minutes.

Actual cycle times as low as 28 s have been recorded when unloading a vessel

with peat. Average cycle times for loading trucks from a coaster are approximately 33 s including cleanup. This results in an hourly capacity of almost 1100 m³.

Coal unloading rates for the new crane, when loading directly into trucks, are well over 750 tph. Previously, it took the port two days (16 hours) to unload one vessel with two Kone rope cranes. With the E-Crane, it takes just over one day.

Layout

It is always important to compile a proper case study of the crane in combination with the vessels, hoppers, stockpiles, etc. to reach an optimal solution for the user.

Therefore an extensive 3-D CAD study was completed to show the new crane on the quay with a range of different vessels. This ensured that all corners of the vessels could be reached in both full and empty conditions. Additionally, the size of the grab relative to the hopper and trucks was examined.

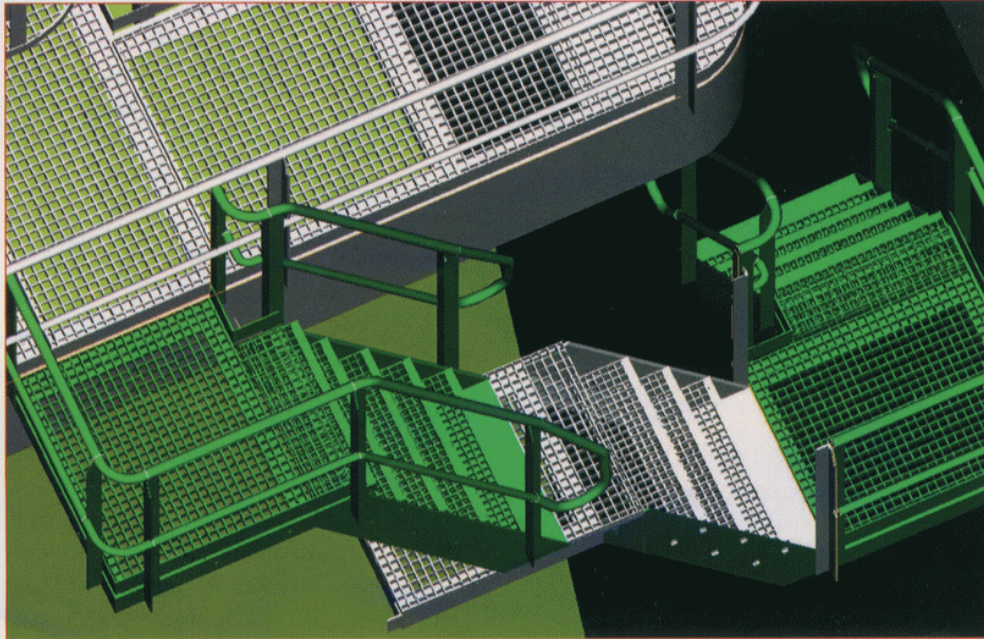
At a later stage a hopper travelling on the same rails as the E-Crane is planned to be connected to the crane by means of steel beams to even further optimise the crane performance/hourly capacity. The design of this arrangement will be jointly made by Mälärhamnar and E-Crane International.

Another important aspect of the crane's layout is the access from the Kone lower onto the E-Crane upper structure. Access was complicated since the Kone upper could be reached through the crane column, whereas the access to the E-Crane had to be made on the outside as there is simply no room to reach the operator's cab via the column. Several 3-D simulations were made and discussed with Mälärhamnar and DNV for the practical layout and from a safety point of view.

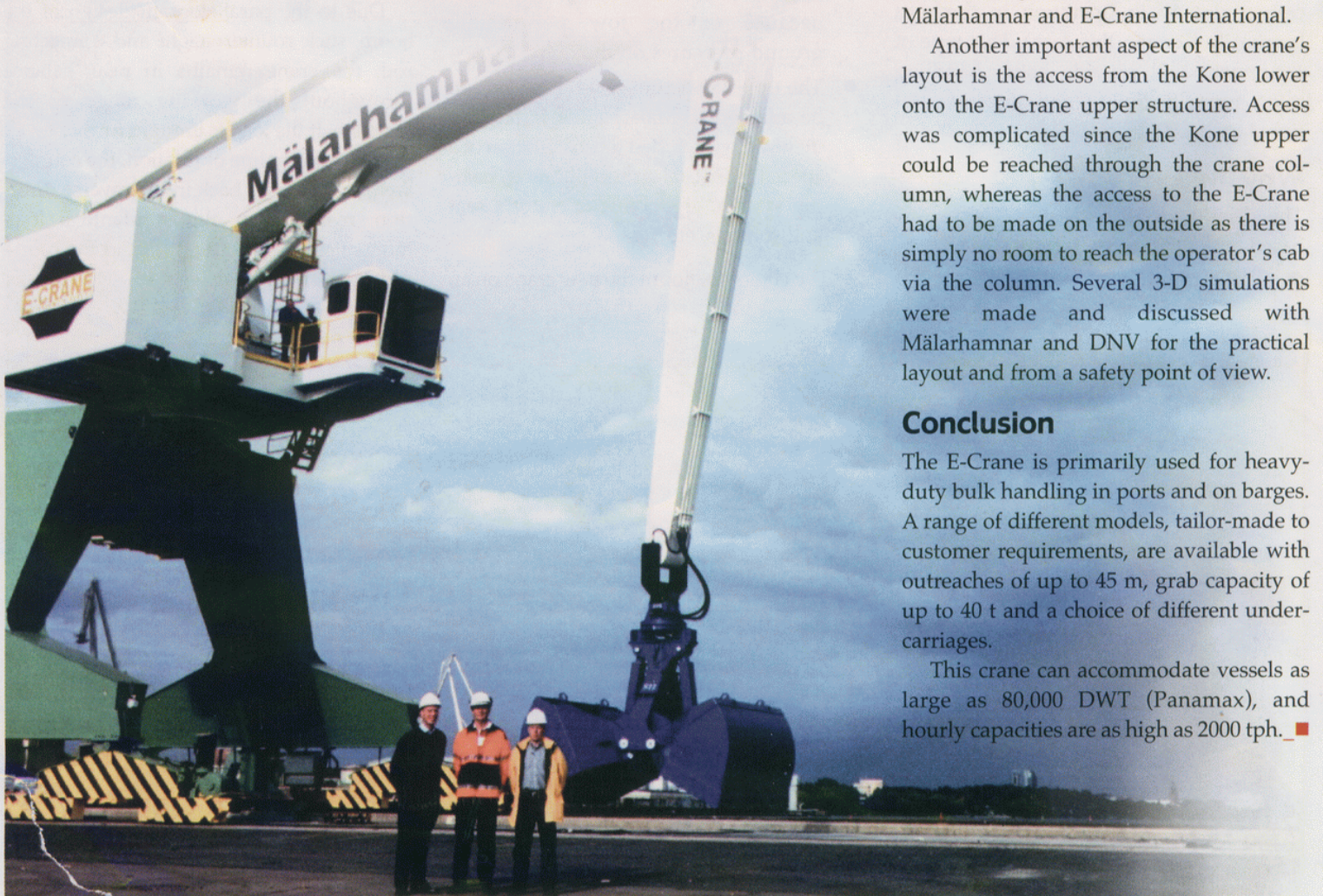
Conclusion

The E-Crane is primarily used for heavy-duty bulk handling in ports and on barges. A range of different models, tailor-made to customer requirements, are available with outreaches of up to 45 m, grab capacity of up to 40 t and a choice of different under-carriages.

This crane can accommodate vessels as large as 80,000 DWT (Panamax), and hourly capacities are as high as 2000 tph. ■



New 3-D picture of the access to the E-Crane upper.



The official handover of the E-Crane in Vasteras. From left to right: Peter Muller (Sales Manager, Port-Trade), Patrick Åmann (Managing Director, Mälärhamnar) and Bas Tolhuizen (Sales Manager, E-Crane International).