

*Over the years container cranes have come of age in more ways than one. Peter van Schie looks at how terminal operators can get the best out of an aging workhorse so that it can compete in today's fast moving port environment.*

**N**owadays, when you describe a crane as 'old' it is important to clarify what is meant – old in years or just out-dated (i.e. not capable of handling the latest generation of container ships) or, and this is more likely, a combination of the two. In our January/February issue we looked at the design of ship-to-shore container cranes and briefly touched on the first container crane manufactured back in 1958, which was capable of handling feeder vessels operated by Matson Navigation. Throughout the years the size of the container crane has increased and, in general, today's models are now capable of handling post-panamax ships with 15/16 (container) rows across with exception of those that service larger container ships with 22 rows across. So, when a crane has been classified as 'old', the question arises: what do you do with it? The options depend on the needs of the terminal operator and the age of the crane itself. Taking the age of the crane into account it might be sold for scrap (although in some cases the costs to scrap might in some cases be higher than the value of the crane itself). If there is still 'some life' in the crane, there is the option of modifying and refurbishing the crane and/or relocating it to a different part of the port or terminal for different use.

### Crane refurbishment

When a crane has come to the end of its working life the terminal operator can choose from a variety of options; replacing the components that caused the crane to stop working in the first instance, refurbishing the crane, or purchasing a new crane. Before making a decision, the operator will need to evaluate the cost of maintenance, extra repairs, and the cost associated with downtime operations and repairs. Which route to take depends on the condition of the crane, the needs of the users, the terminal, or the port, and most importantly, it depends on the associated cost. Such costs can be as little as US\$100k, 000 and as much as US\$ 3-4 million per crane. If the estimated cost is several millions and the existing crane is a Panamax, then the operator might consider purchasing a new Post or Super Post-panamax crane. However, if there is still use for the small crane (for example at different berths at the

# Growing old gracefully



terminal), the operator might consider refurbishment, as it will give the crane an additional 10-15 years of work, as long as the structure is in good condition (no steel fatigue etc.). However, making the decision to refurbish a crane is complicated and time-consuming. If the decision is made to refurbish, and provided it is performed properly, it is possible to end up with an efficient crane, which will give good service for several more years. Whichever decision is made, it is of utmost importance that it will result in the most efficient solution for both operator and customers.

### Modifications

Modifications of an existing crane might be appropriate towards the end of a system's service life when reliability starts to be an issue. Breakdowns become more common, and as a result there is a decline in productivity. But there are also other reasons to modify or upgrade a crane. To improve cycle times and enhance performance it is often advisable to upgrade the cranes drive and control

systems. Doing so might significantly increase the number of moves. Modifications to a crane might also be undertaken to achieve a higher performance of the crane itself, as dwell time with larger container vessels currently in circulation has to be kept to a minimum. Some operators have installed digital drives that incorporate productivity tools, such as management systems and automation features. In cooperation with the crane manufacturer (OEM) it may be prudent to consider fitting an increased drum size or a higher-ratio gearbox to increase motor speed and ultimately the speed of loading and unloading of the containers. In addition to the above there are also other (software) products on the market that might increase productivity, including specialised software that can be added as part of the modification, for example crane diagnostic software, which monitors crane activity and can assist in troubleshooting and problem identification in real time. Other software products include laser collision avoidance software that continuously detects and

calculates the speed of moving and fixed objects in the yard, and reduces the chance of two objects colliding with each other.

### Location

If the decision is taken to relocate the crane within the terminal or to another berth, there could be problems related to the span width, height changes and, in some cases, conversion to alternative power supplies. Differences in rail gauge is a common problem and depending on the degree of difference and the crane's geometry, some modifications might be necessary, such as lengthening and reinforcing the portal beams, re-positioning the land-side legs, adding to leg sections, or adding triangular trusses to enlarge the portal for cranes with a larger span. It might also be necessary to fit new wheels, or machine the existing ones to a new profile to suit the rails at the new location, and fit supplementary wheels. In reality, relocation of a crane is obviously more complicated, with surveys, structural analyses, finite element modeling and blueprinting leading to compliance with a range of EN and BS standards.

### Maintenance programme

The importance of regular maintenance cannot be stressed enough. With all equipment, manufacturers provide maintenance and operation manuals that outline the recommended maintenance schedules and procedures based on the average use of the equipment. These procedures are usually a very good starting point, but one also has to consider usage of the equipment in order to formulate maintenance schedules that can be performed efficiently. Depending on particular requirements and situations, changes may need to be made to these procedures, which will dictate a tailor-made maintenance schedule. This is where the knowledge of the existing operation and the equipment's location usage is crucial in developing or modifying the maintenance programme. The best maintenance programme is one that can be used effectively. A well thought out programme can be formulated, developed, and manuals turned over to the maintenance personnel and the programme implemented, but that does not mean the cranes will be properly maintained. It needs to take a proactive form in which the maintenance personnel can use it to perform the work efficiently and effectively. The plan needs to be in a clear language that maintenance personnel can easily understand and not in a legal or highly technical structure. It would be advisable to make sure that the checklists and procedures are detailed as simply as possible without being too elaborate. Size of the checklists and documents, which the personnel need to use and use effectively, may also need to be considered. Taking a reasonable approach is key as there is only so much work that can be performed in a given time period. Implementing a thick checklist booklet with maintenance procedures and expecting the work to be performed in a day is not perhaps the best practice! Maintenance programmes should be scheduled around the cranes operation, which is a very difficult task at busy terminals!



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