Screen shot from Nautical Technology Consultants new UKC Voyage Planner software. The program can help to prevent grounding in shallow waters.

Soft way to staying afloat

NAVIGATING in port areas is a hazardous enough task under the best of conditions, but the dangers increase dramatically when the water depth under the vessel is reduced or the vessel is operating in a confined channel.

Ships' navigating officers frequently face operating in such conditions that are less than ideal from a safety point of view, and in general have to rely on their own experience and that of the pilot guiding them into or out of port. So a new software programme that can alert navigators to the potential danger of limited under keel clearance could prove to be extremely useful.

UKC Voyage Planner is a new software program from Norwegian company Nautical Technology Consultants that has been developed using data and formulae from a variety of acknowledged expert sources and brought together in an extremely user friendly way. The program can be used to predict reduced under keel clearance due to a variety of reasons such as squat, heel, list and even interaction between vessels.

The reduction in under keel draught caused by speed related squat is a well understood phenomenon caused by a reduction in the upward acting forces affecting a ship's buoyancy. However, calculating the exact amount by which an individual ship will be affected is not a simple calculation as it must take into account factors such as roll, list, trim, swell, interaction and the physical environment in which the ship is navigating. Variables such as wind speed and direction also play an important role and must be taken into consideration.

Safe passage planning

UKC Voyage Planner is a Windows-based software application designed to be used by the ship officers and pilots as part of their passage planning procedures to optimise payload, estimating the tidal window and to ensure safe transit speed through UKC critical areas along a planned route. When first installed, basis static data such as length beam and service speed is inputted and will remain resident in the program. A version for pilots is also available in which the static data is entered each time the pilot boards a different vessel.

The program contains a list of 6,000 ports that can be used to build a selection of routes for ships on regular trades. The routes can contain an unlimited number of UKC critical areas the ship must navigate in. Such areas can be identified as either an open water, canal or channel condition.

The program requires an UKC Safety Margin to be entered. This represents the bottom clearance required after all UKC reduction parameters are accounted for. It has to account for all reasonable uncertainties involved, such as a lack of accurate water depth information. The safety margin may be based on guidelines, recommendations or requirements from authorities. It may also be based on company-specific UKC policy or be the captain's sole decision. For instance, PIANC (1997) lists 0.3 metres for muddy bottom, 0.5 metres for sandy bottom and minimum 1.0 metres for hard or rocky bottom.

The next step is to input dynamic data. The inputs of angle of heel in case of wind, turning, ship dynamic response in case of waves/swell may be based on the captain's experience on how the particular ship behaves. Examples of inputs of other UKC factors are the sum of effect of change in water density, allowances for siltation, survey and draught tolerances and tide level variations.

After this, appropriate inputs of topographical data such as location of the UKC critical area, ETA, charted depth and channel/canal width (unless an open water condition) can be entered for route planning.

The program then performs the calculation and presents the information in one of three ways enabling appropriate decisions to be made.

One option is determination of safe transit speed for a given height of tide in the critical area. Alternatively the program can advise on a tidal window showing the minimum required height of tide to accommodate the ship travelling at a given speed to a maximum of 10kt.

The final option helps to optimise cargo quantity as it calculates a maximum permitted static draught for any given transit speed and tide height. This could be used for example in a situation where sailing opportunities might be affected by falling tides and loading a full and complete cargo is not essential. S