

## Success story of the Z-Tech Class tugs

Cheoy Lee Shipbuilders of Hong Kong has delivered the first of the new Z-Tech Class tugs, christened as INDEE, to Teekay Shipping Ltd. of Fremantle Australia in late March 2004. The Z-Tech design was conceived and developed by Robert Allan Ltd. (RAL) of Vancouver, BC, Canada, who used **ShipConstructor** to create the tug's initial design and 3D product model.

PSA Marine of Singapore commissioned Robert Allan Ltd. to design a new and versatile class of tugboat for major port operations worldwide. Although the first two tugs were initially commissioned by PSA Marine for its own fleet, the vessels were sold to Teekay about two months before completion in order to satisfy an urgent requirement for new tugs at the BHP Billiton bulk terminal operations in Port Hedlund, in Northwest Australia.

The Z-Tech design represents a unique development in harbour tug design, capturing the best operational advantages of ASD "Pusher" configurations, and Z-drive "Tractor" configurations. Measuring 27.4m x 11.5m with a maximum draft of 5.0m, this new design concept offers a number of advantages. The forward deck (over the skeg) has a low, flat sheer, creating a spacious, relatively flat and safe working deck, without any obstructive anchor chains. Over the Z-drives, the aft deck is reduced in size to provide just sufficient space to install or withdraw them. A small anchor winch is also fitted on this deck.

For sea-going operations, the tug works astern in tractor mode, so the shape of this part of the hull is more rounded in plan than would typically be seen in an ASD design. There is no appreciable loss of bollard pull or speed in this direction of operation. The increased flare and freeboard at the 'aft' end is simply to ensure a drier operation when towing in this direction.

Only one winch is required for both harbour and coastal towing operations since, when towing long distances, the tug will simply tow in tractor mode going 'astern.' In practice, this is most likely to be a double-drum winch, with one drum carrying a synthetic hawser, and the other fitted with steel wire rope. The low sheer forward, coupled with the aft bias of the deckhouse and wheelhouse enable the tug to work under large overhanging ship flares. The Z-Tech includes many other noteworthy design features.

The Z-Tech design is also the latest example of a full kit design approach. RAL was commissioned by PSA Marine Ltd. to provide a complete production-ready design for both steel parts and piping for this vessel in order to offer maximum build flexibility in marketing this new design.

An extensive series of acceptance and performance verification trials were conducted in the waters off China and Hong Kong. The vessel performed exceptionally well, and exceeded all expectations. According to Robert Allan, the Z-Tech concept has been well proven by the success of this first vessel, and plans are underway to develop further designs in the series, from 45tonnes to 75tonnes bollard pull.

The use of a 3D product model, such as that developed using **ShipConstructor**, provided some major advantages in the design process. Obviously, there is a guarantee of virtually 100 percent accuracy in the design. More importantly, the structure can be optimized and altered if necessary, as the model is developed and better design solutions become apparent through the full 3D visualization of how all the parts fit together, and also how the spaces are best accessed.

**ShipConstructor** is the 3D product modeling and Product Data Management (PDM) system for shipyards and designers. It provides easy-to-use tools within AutoCAD for the design of curved plates, structure, pipe, HVAC, and equipment, for NC-processing and for generating sophisticated production documentation, including assembly drawings, pipe spools, and production reports. It has also been designed as leveled modules allowing consulting offices to buy, rent or lease only what they need for a reasonable cost.

"These tools are allowing small, medium or even large design offices to enter and benefit from the power of 3D product modeling," said Robert Allan. "Virtual reality walkthroughs are possible and easy to create in-house, allowing clients to see their ships prior to production. This capability also provides a powerful

marketing tool for design offices. Normally many of these capabilities were reserved for high-end applications and were generally out of reach of small to medium size design offices.”

**ShipConstructor** is proving its capabilities on a wide range of new construction, conversion and repair projects, including Robert Allan’s Z-Tech as well as the US Navy’s Littoral Combat Ship. More than 150 yards and designers worldwide, among which can be found well-known names such as Northrop Grumman Ship Systems, Gibbs & Cox, and Dubai Drydocks, trust **ShipConstructor** with their projects.