cad/cam/cae

Conversion is a model success

The AutoCAD based 3D product modelling software ShipConstructor, has recently played a major role in the conversion of a VLCC to a FPSO.

Completed at Dubai Drydocks, the carrier *Mosocean* was converted to the new *Xikomba* on behalf of Single Buoy Moorings of Monaco. It marked the first complete project of its type to be performed by Dubai.

The project required extensive amounts of steel, pipe, electrical, mechanical, painting and accommodation work, and, as such, the decision was made to utilise the ShipConstructor software.

Before opting for the program the conventional working practice at Dubai involved the structure and pipework being designed in 2D with several sectional views and details. Following several redesigns of the drawings, the pipe lines were then broken down into convenient spools. Each spool and isometric drawing was manually detailed to allow for pipe spool fabrication and subsequent installation.

However, such methodology left room for errors and as such took up unnecessary and costly time, with manual calculations of interferences between pipes and pipe and structure, usually leading to rework. Frequent visits to the assembly area to assist in the visualization of the complex layout also contributed to delays and misunderstandings, which further lengthened the overall design period.

According to the Dubai Drydock, the decision to incorporate the CAD element greatly aided the overall process. The ShipConstructor 3D product model incorporates numerous intelligent drawing objects that are connected to an integrated SQL server database. The project database, giving combined quantities, weight and CG while allowing for planning of

pre-outfitting and assembly, formed the backbone of the conversion project.

The problem of errors was addressed as the ISO spool pipe drawings are linked directly to the structural model and are updated and generated automatically. This process also takes in the BOM (Bill Of Materials), which lists accessory items required such as bolts and gaskets. Furthermore, minimal checking is required as the software ensures that the parts will be consistent with the 3D model.

Catalogs and specifications which are a subset of one or more company specific catalogs, also form part of the 3D product model database. Therefore, if an item in a reference catalogue is changed, then the same item is automatically updated in the specification. Dubai Drydocks customised the built-in and user-defined materials library database and transferred it to the project database to ensure further consistency.

The actual conversion was greatly assisted by adopting the 3D approach: the average time required to produce an error-free ISO drawing was estimated to be about one minute per ISO, in quantities of 10 spools or more, as compared to the conventional 2D method which could take up to two hours to produce a single fabrication drawing.

Dubai Drydocks significantly streamlined all production processes with integration of functions for the generation of pipe arrangement, isometric equipment, foundation and unit assembly drawings enabling an efficient working environment. Pipe and structural penetrations were computed early, defined in the 3D model and precut in the steel, thereby dispensing with the need for

▲▼ Before and after: the VLCC *Mosocean* (above) has been converted to the FPSO *Xikomba* with the assistance of software from the ShipConstructor stable
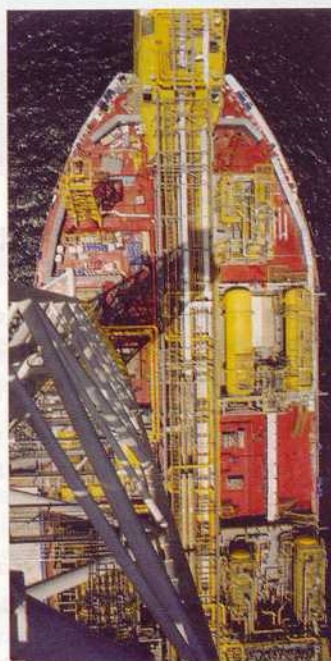
labour intensive cutting in the assembly area, reducing congestion and enabling a less cluttered workplace.

The Pipe module in particular was highlighted by Dubai as being of particular value. Building upon the intuitive menu and toolbars for elbows, tees, flanges, valves and pipes, the team found favour with the Port/Starboard/Aft/Forward orientation icons on spool drawings for installing pipe, outfitting and equipment items, and the bent pipes and saddle tee commands.

With the Pipe module integrated with all other disciplines, the Drydock had the facility to convert 2D piping drawings into 3D structural model and vice-versa. Also, to be able to check and create bulkhead pipe penetration openings and penetration spool pieces. The module's automatic interference checking of pipes and structure helped eliminate errors, while misalignment and incorrect gaps on their piping drawings were also efficiently tackled.

The multi-million dollar conversion was completed in 16 months and involved 3.5M man-hours. It should extend the working life of the 348m vessel by at least another ten years. The *Xikomba* is currently operational on a charter for Exxon Mobil on the oilfields offshore of Angola. ◀◀