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ABS software supports designs across most vessel sectors. This pilot project focused on tug and barge designs, producing promising results.

Edited by Joseph Keefe

Jensen Maritime, the naval architecture and marine engineering arm of Crowley Maritime Corp, and ABS have completed a precedent-setting pilot project using three-dimensional computer-aided design (CAD) models to support plan reviews for class approval.

In what is believed to be an industry first, the innovative pilot was not proprietary to specific brands of CAD software, allowing designers to use the versions with which they are most familiar, or those that are best suited to the design project.

Saving Time and Money

In eliminating the need to create 2D drawings to submit for the class design-review process, the initiative is expected to achieve a time savings of as much as 25%, and reduce the designer's costs of approval.

"Being able to send our 3D models directly to ABS for engineering review saves us time and resources that are currently used to develop 2D drawings," said Crowley Maritime Vice President of Engineering Services, Jay Edgar. "ABS's CAD-agnostic approach is an important factor in this process because it allows us to use the

modeling program that best fits our needs for the project."

The ABS software would support designs across most vessel sectors, but the pilot focused on tug and barge designs, a sector where Crowley and Jensen Maritime have considerable industry recognition and experience. It used a detailed 3D-model environment that seamlessly integrated with the ABS classification processes.

Unique to the ABS-engineered solution is the ability to upload 3D models that are developed by using all major CAD modeling software – including widely used brands such as Aveva/Tribon, Intergraph, Autodesk/Autocad and Rhino – expanding the options for designers and owners.

The Future: 3D Modeling

Three-dimensional modeling is increasingly relied upon by the maritime industry's design houses and builders for planning initial structural and machinery systems, with more than half of respondents confirming adoption in a recent ABS survey.

"Using 3D software models is the logical next step for ABS as we expand our digital footprint and continually enhance the class experience," ABS Vice President for

SOFTWARE & VESSEL DESIGN



“We expect significant time and cost savings for designers and shipyards if 3D CAD models are adopted during the construction phase. However, there will be challenges, because shipyards may need to modify some workflows. It may also impact a range of stakeholders, including crew on board vessels and Flag States.”

– Dan Cronin, ABS Vice-President Class Standards and Software



“Until now, only two-dimensional drawings have offered the fidelity of detail required to support ABS classification. But advances in technology and 3D modeling techniques now enable one end-to-end project model, backed by an extremely detailed data set, for plan approval.”

– Gareth Burton,
ABS Vice President for Technology

Technology, Gareth Burton said in announcing the pilot project with Jensen Maritime. “Until now, only two-dimensional drawings have offered the fidelity of detail required to support ABS classification. But advances in technology and 3D modeling techniques now enable one end-to-end project model, backed by an extremely detailed data set, for plan approval.”

The digital revolution is beginning to have a major impact on how class is delivering its primary services such as plan approval. While the overall objective remains the same – to help maintain life, property and the natural environment – how those services are delivered is being transformed throughout the lifecycle of the asset.

Class, in partnership with industry and academia, is using the digital revolution to make its processes less intrusive to stakeholders’ day-to-day operations; using 3D modeling for plan-review is just one example.

“The time and resources we don’t spend creating 2D models for review can be used on other strategic design activities, so using 3D models that are already an integral part of our design process to meet class requirements is clearly a benefit to us and, ultimately, our clients,” said

Edgar. “It is an example of how thoughtful application in technology can be used to streamline the design process.”

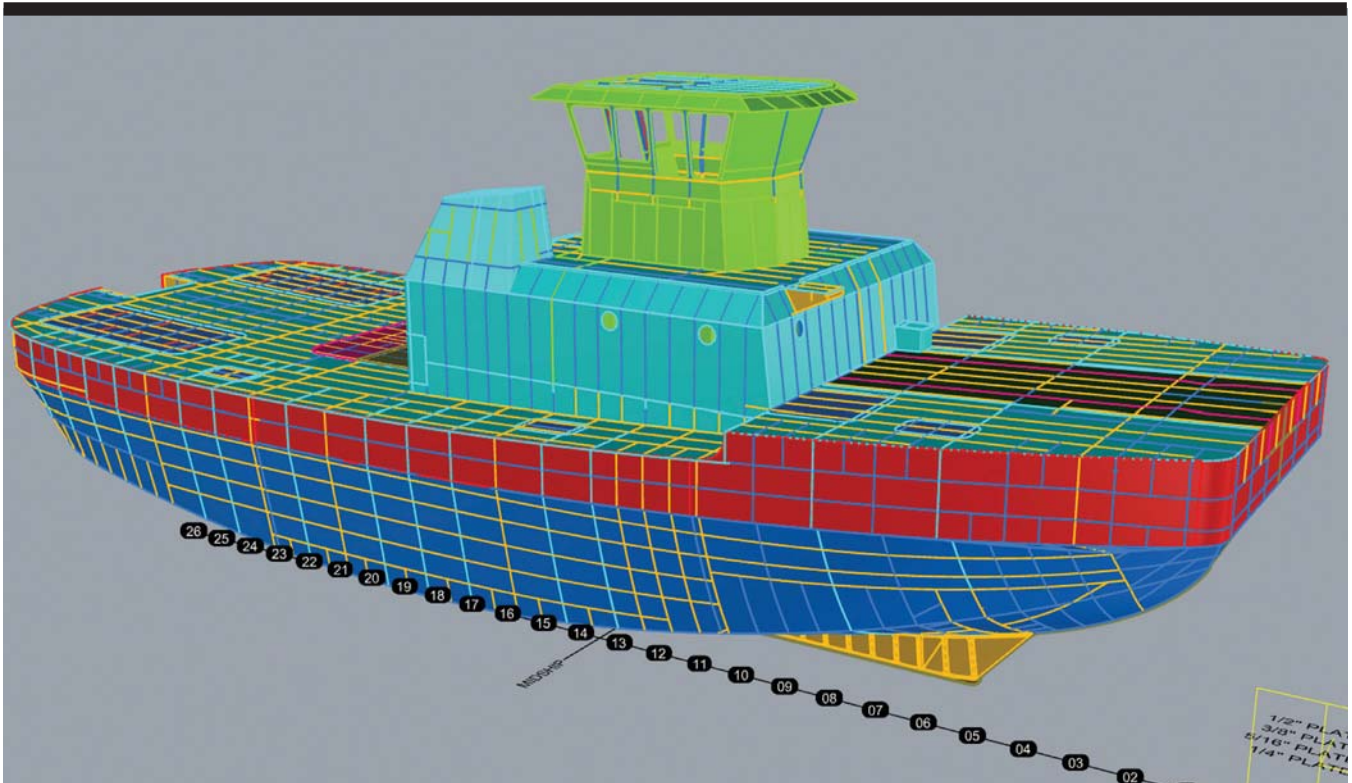
While using 3D CAD models to support class’s plan-review process is not entirely new, working with design houses and shipowners to create a process that supports many different types of CAD software is unique.

Traditionally, maritime partnerships have been formed with the CAD and/or software companies, compelling designers to work in that software environment. This has created the interoperability issues that are common in the hyper-competitive software world, where protection of intellectual property can restrict cooperation.

Agnostic, Interoperable – and Cutting Edge

Because designers and shipyards develop their 3D models using a variety of CAD software, ABS chose the agnostic approach to accommodate as many of the industry’s established tools and workflows as possible. “It was essential to the success of the review process because it provides clients with the confidence that their models can be accepted and reviewed by us,” Dan Cronin, ABS Vice-President Class Standards and Software, said.

SOFTWARE & VESSEL DESIGN



The software-agnostic goal was built into the work scope for the Crowley/Jensen pilot. It included the identification of 3D model formats that Jensen Maritime wanted to submit for ABS review, and the determination of the 3D models that were to be submitted for testing. The program was tested with hull scantling models. As the focus was on the plan-review workflow, a full engineering plan review of the models was not conducted for this part of the pilot.

ABS verified the design, conducted spot checks of the details required for plan review to ensure that the models could be fully reviewed. Other details of the work scope included:

- *Collection and preparation of documentation, data, and 3D model required for the test workflow, which addressed:*
 - **Stamping**
 - **Commenting and Amendments**
 - **Software compatibility**
 - **Archiving**
- *Testing of the pilot-approval workflow with the 3D model and accompanying documentation*
- *Report and review test results*
- *Development of best practices for the 3D model-based plan approval process based on the lessons learned from the pilot*

A key obstacle that had to be overcome was the interoperability of the third-party platforms, how to

develop a process so that data can be shared across different CAD platforms. To support an efficient design-review process, the designer creates sectional views, which allow ABS engineers to more easily navigate the model. When used in tandem with a file-transfer protocol, engineers and designers communicate comments and annotations via 3D PDFs, assuring the secure transfer of data.

Next Steps

As the next logical step for this technology, ABS is interested in piloting it for use in class surveys, an exercise that would build understanding about how designers and shipyards could best use 3D CAD models during vessel-construction phases.

“We expect significant time and cost savings for designers and shipyards if 3D CAD models are adopted during the construction phase,” said Cronin. “However, there will be challenges, because shipyards may need to modify some workflows. It may also impact a range of stakeholders, including crew on board vessels and Flag States.”

ABS is already talking to Flag States about how they may be able to accommodate 3D CAD models, particularly with regard to use in the field. They have expressed interest in 3D model plan review, even though use in the field is limited at present. Beyond this, ABS is also exploring ways to use 3D CAD models to reduce non-value added modeling time.