

Watch this 'Space

For vessel designer Knud E. Hansen, the development of its ShipSpace virtual reality tool is simply the latest evolution in producing innovative, realistic and workable ship and boat designs

Standing at Knud E. Hansen's exhibition booth at the SMM exhibition – in body, at least – I found myself prowling through a private apartment, snatching up candles from the mantelpiece and throwing them to the carpet.

There was some logic behind this seemingly mindless act of vandalism; I was merely testing the ability to interact with 'digitised' objects, using Knud E. Hansen's virtual reality (VR) tool, ShipSpace. Visitors to the Hamburg show were invited to don an HTC Vive 3D VR headset and trial the product, granting them visual access to virtual environments – which, for the sake of this demonstration, comprised a polar research icebreaker and an intricately designed luxury apartment.

Via a combination of software and the Cloud, users can explore and inspect proposed vessels whilst these are still at the design stage, in order to gain a true sense of depth and scale.

ShipSpace was initially developed as a design verification tool, enabling Knud E. Hansen's team of architects and engineers to provide realistic overviews of vessels under design to those customers unable to visualise vessel spaces through paper-based or CAD/CAM-generated plans alone.

"For some people, the computer doesn't provide enough of a sense of scale or perspective," Robert Spencer, head of simulation projects at Knud E. Hansen, tells *Ship & Boat International*. As an example, he brings up electronic navigation tables. Using a CAD/CAM package, it is easy to represent these items as simple 'blocks', and to check that they are correctly positioned within the wheelhouse. However, one does not necessarily get a grasp for the ergonomics of these tables – for instance, how easy they are to work around, especially in relation to other displays, seats and items of equipment; whether they have sloping or bulky back sections that 'jut out' or take up more space than originally anticipated; and so on.

As such, the ShipSpace solution has also proved a useful tool in securing sales. The ability to create an accurate VR representation



SMM attendees were able to trial ShipSpace at the Knud E. Hansen stand, using the 3D tool to explore a virtual polar research icebreaker

of a megayacht master suite, for instance, includes the option to get as specific as the customer desires, right down to previewing furnishings, textures and colours. Granting the owner to chance to walk around on his or her dream future boat can inspire tremendous confidence in the designer's ability to conjure up the exact, bespoke solution required.

"Designers can import 3D CAD/CAM files directly into ShipSpace and work directly from them, without having to modify them first," Spencer adds. "This enables them to iterate, without having to create special 'VR versions' of their models." Although ShipSpace has the capacity to handle any CAD/CAM file type, the Knud E. Hansen team is interested in achieving tighter integration with the big systems.

VR vs 3D walkthroughs

As a relatively new technology, there is still some confusion regarding what VR is and what it isn't, Spencer explains. Firstly, ShipSpace should not be viewed as a replacement for CAD/CAM, but more as a complementary

service, to assist visualisation. "It's difficult to be precise when moving objects freehand in VR, like it is in 'real' reality," he says. "Although we are experimenting with some interesting augmentations, I really think that, at the moment, traditional CAD/CAM systems are the most productive way to design when precision is required. ShipSpace can help you understand what those precise measurements translate into."

Secondly, VR should not be confused with more common '3D walkthrough' ship simulations. There are several key differences between these two technologies. The latter rarely affords the user actual control of movement. Although the user can look around and obtain a 360deg panoramic view of his/her virtual surroundings, the visuals typically roll by on a pre-programmed route; there is no opportunity to pause and inspect certain objects or vessel areas.

3D walkthroughs can also result in unpleasant physical sensations. Movements can be jerky, involving sharp and sudden changes in direction. From *Ship & Boat*

International's personal experience, this was not the case when using ShipSpace. Despite the obviously surreal nature of moving along an open deck whilst surrounded by exhibition chatter, and within the physical confines of a booth, there were none of the lurching 'seasick' effects, nor painfully lurid colours, that can often blight 3D walkthrough demos.

This could well be due to the fact that ShipSpace runs incredibly fast; the model displayed at SMM, Knud E. Hansen's largest at present, is rated approximately 600 million polygons and renders at 90 frames per second (90fps). "We intend for all [ShipSpace] models to display at 90fps, no matter how many billion polygons they might be," says Spencer. To handle this volume, he adds, "the local 'client' software does all of the graphics processing to display the images, but the Cloud crunches the data and prepares it into a system where it is practical to view detailed models in real time".

Another handy feature included in ShipSpace is the 'teleport' function. This

enables the user to aim a beam of light at a section of the virtual vessel and, at the click of a trigger, to instantly rematerialise at the selected point – certainly the easiest way to get from A to B when physical space is limited. To prevent users injuring themselves in physical space (for instance, walking into a table whilst inspecting a substantially more spacious virtual hold), a series of green grids – similar in appearance to LED cage bars – can be used as markers, providing 'cut-off' boundaries within the virtual world, based on real world restrictions.

Users can also pre-select certain locations aboard a vessel, to teleport to areas that are currently out of sight, using a 'globe' icon. Obviously, this is an invaluable feature for designers or customers wishing to explore a 12-deck cruise ship, without having to waste time searching for elevators or teleporting up one floor at a time.

Future developments

One of the most attractive aspects of ShipSpace, however, is its potential for evolution.

Although originally developed for in-house use, Knud E. Hansen is making the tool available for interested naval architects and shipyards. Future features, Spencer hints, could include the ability for users to call up pop-up lists when clicking on particular vessel components or items of equipment. These could be used to provide further data on the selected items, regarding voltage, construction materials, dimensions and functionality, for example.

The ability to interact with and pick up/drop objects in VR – currently limited to apartment candles – is also set to be developed further by Spencer and his team. This feature could be used in numerous ways; from previewing engine room ergonomics and opening doors and hatches in confined spaces, to undertaking virtual passenger evacuations and trialling handheld safety equipment.

As an add-on to CAD/CAM, VR definitely has the potential to create a more focused, realistic and persuasive picture of onboard realities. *SBI*