

European Boat Design Innovation Group: Applications of RAMSIS in the marine industry

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European Boat Design Innovation Group: Applications of RAMSIS in the Marine Industry

25 YEARS
OF BOAT DESIGN
IN INDUSTRIAL DESIGN
AT COVENTRY UNIVERSITY



Dr Sean McCartan
Tim Thompson

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25 YEARS
OF BOAT DESIGN
IN INDUSTRIAL DESIGN
AT COVENTRY UNIVERSITY

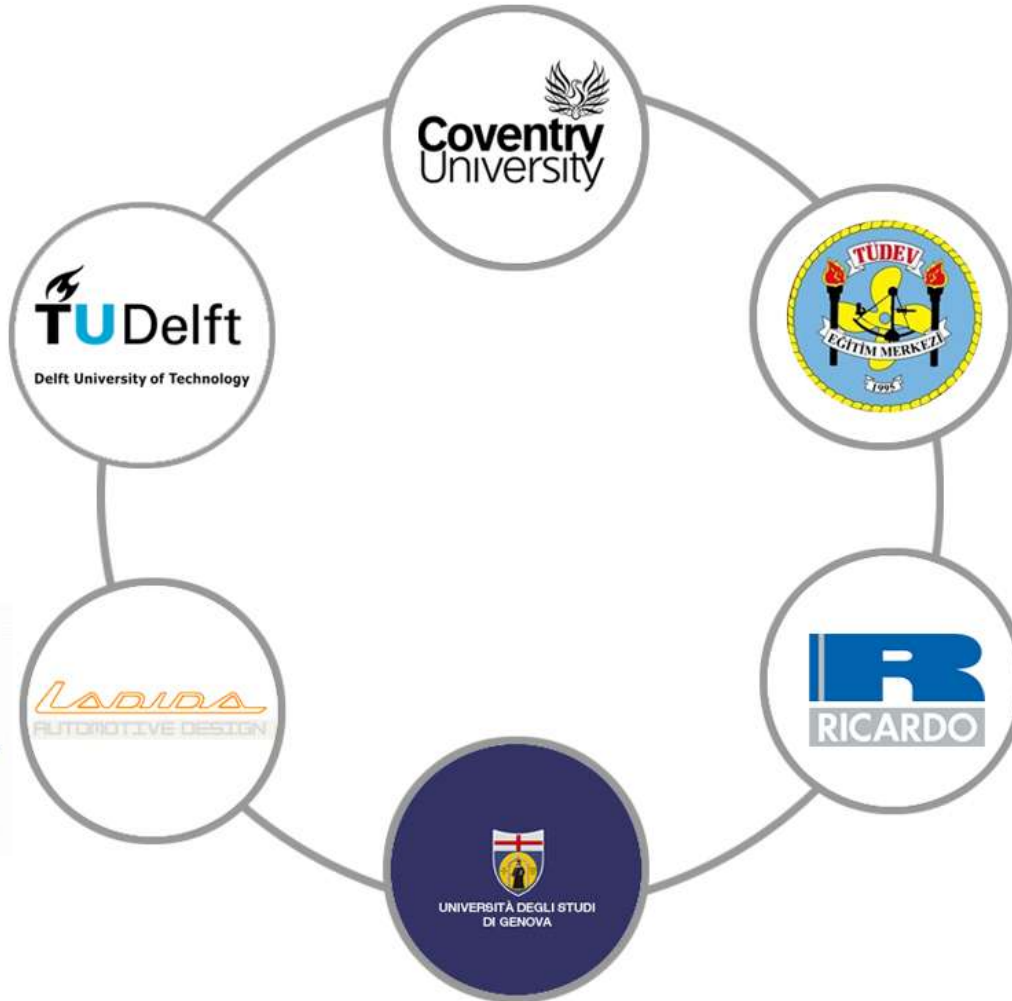


Contents

- EBDIG
- RAMSIS evaluation:
 - 25ft RIB
 - HSC Console
 - 50ft motoryacht
 - 40ft sailing yacht
 - Hovercraft
- Conclusion

EBDIG (European Boat Design Innovation Group)

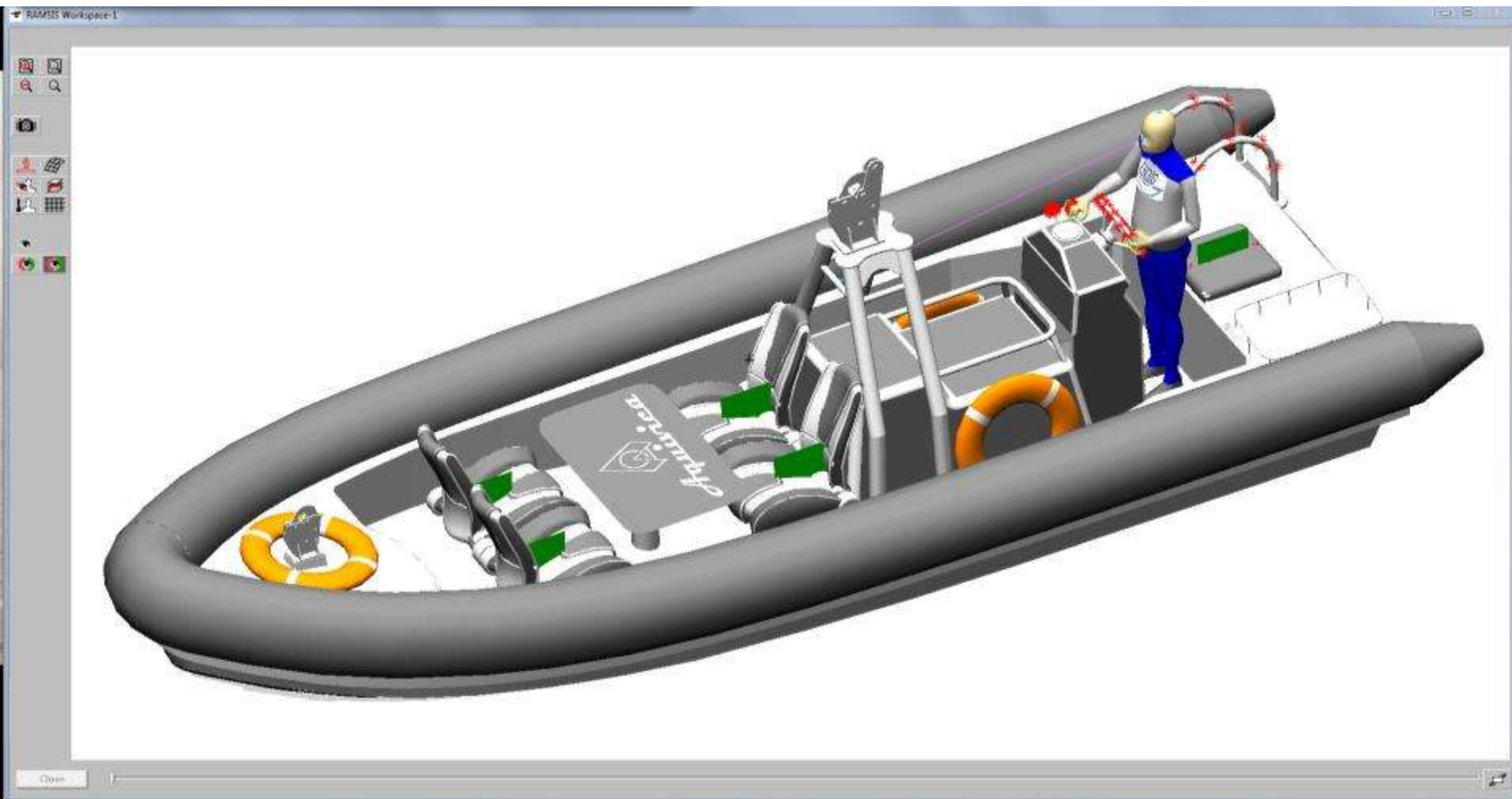
Partners



25ft Rigid Inflatable Evaluation

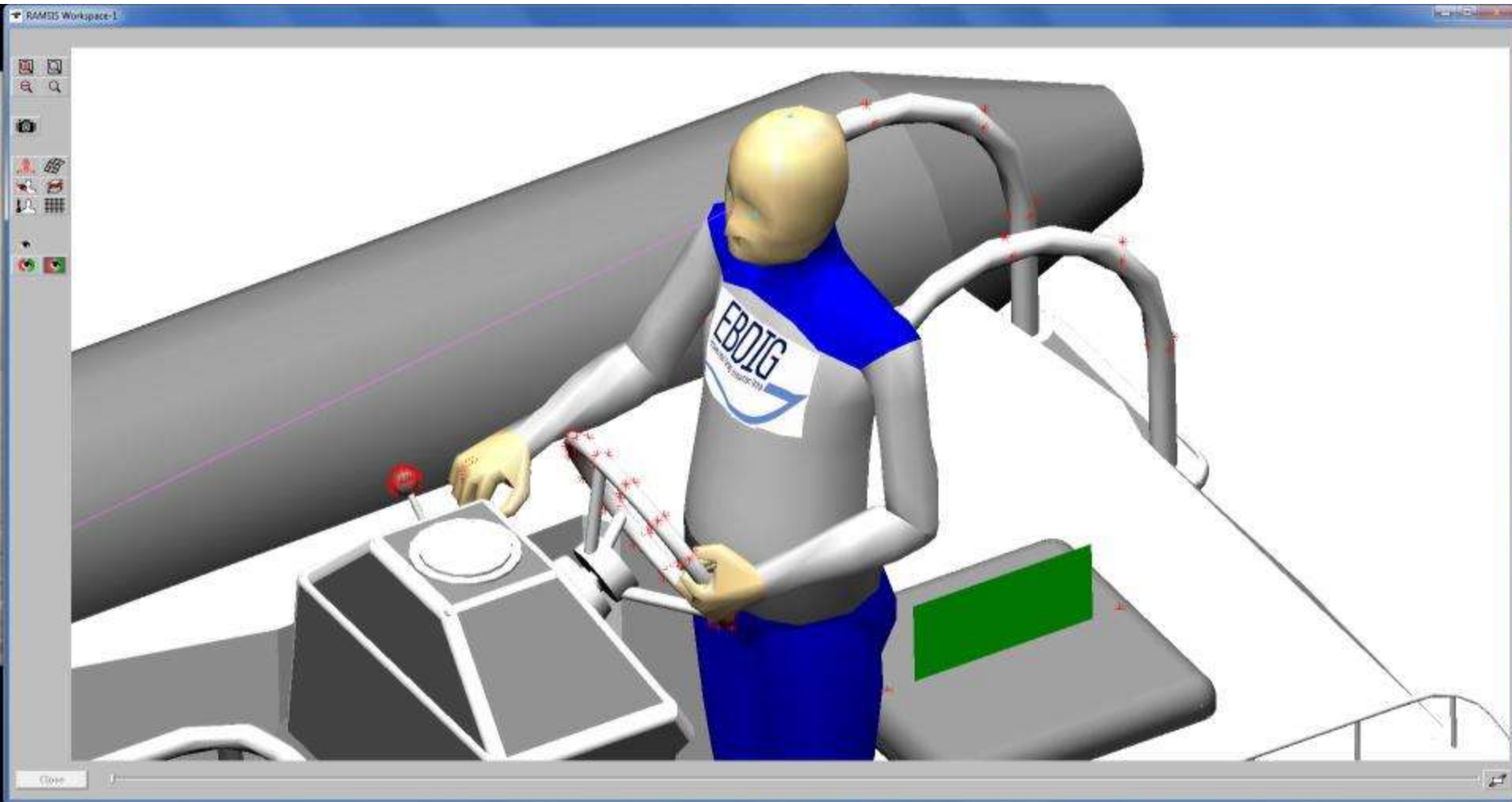


Rigid Inflatable Project Ramsis Ergonomic Evaluation



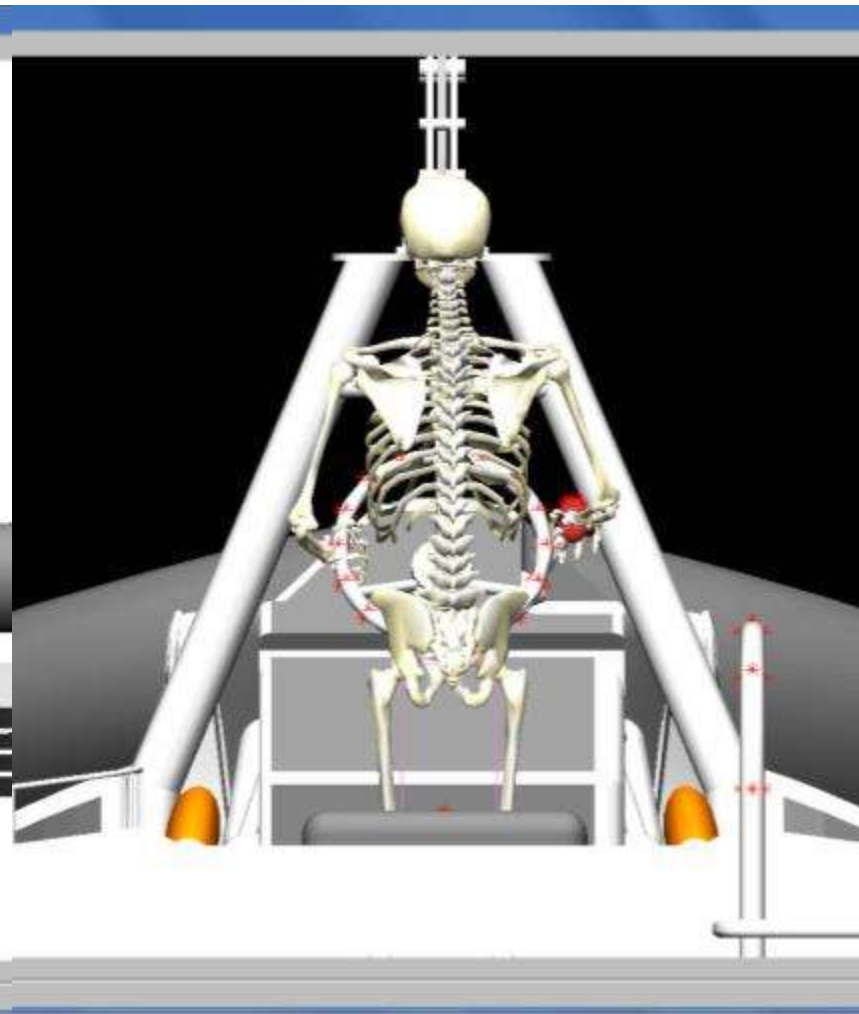
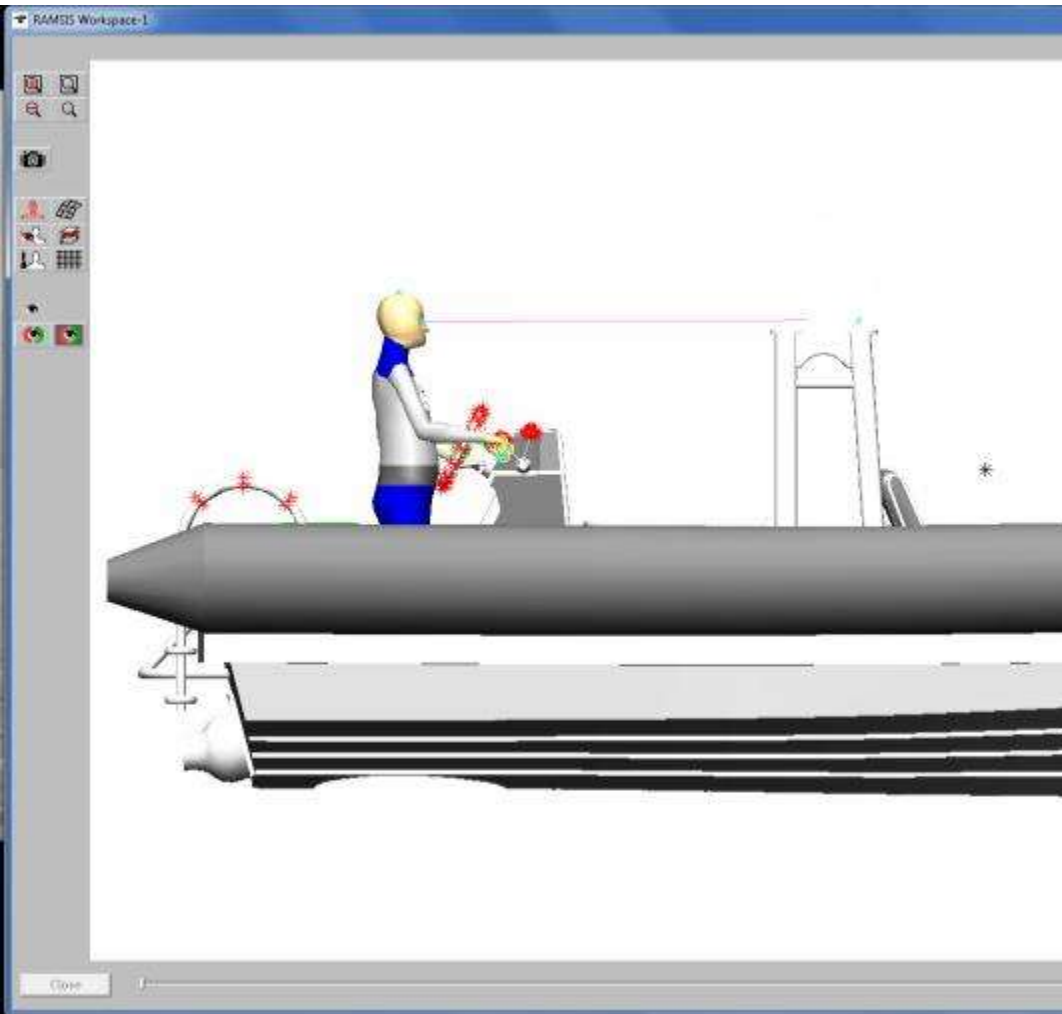
This image shows a screen capture of the model inside Ramsis with the ergonome positioned. From this view everything looks to be ok. All of the H point planes and interaction points have been added in the external CAD package and imported into Ramsis ready for evaluation.

Rigid Inflatable Project Ramsis Ergonomic Evaluation



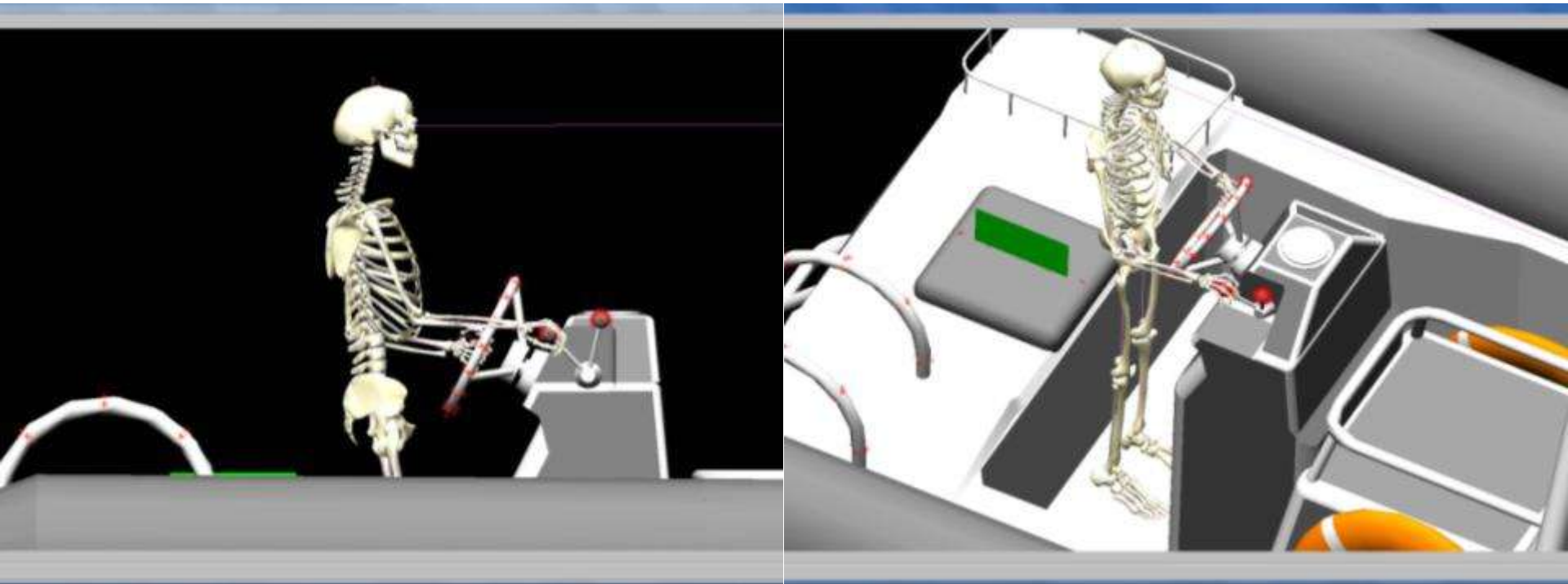
This image shows that the ergonome has a comfortable standing position and can easily use the controls in different positions. The red star marks on the controls represent all the testing points that the manikin is manipulated to grasp.

Rigid Inflatable Project Ramsis Ergonomic Evaluation



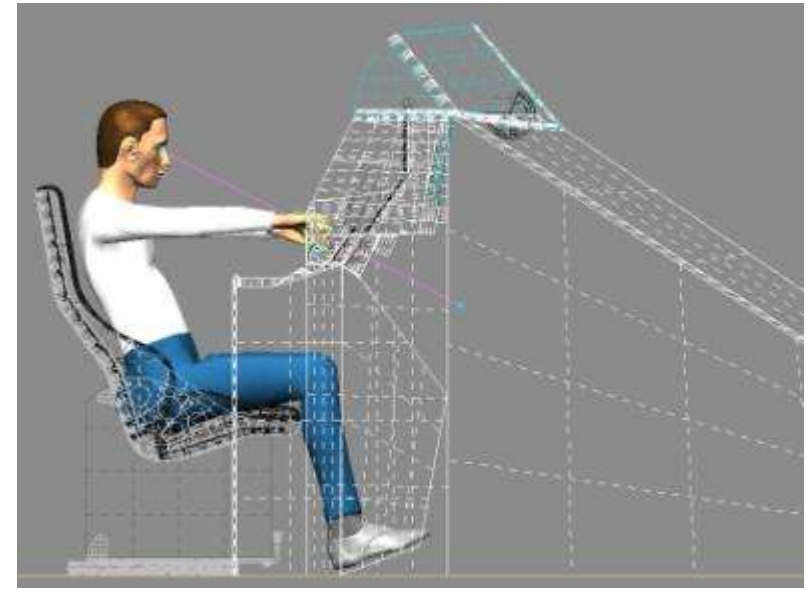
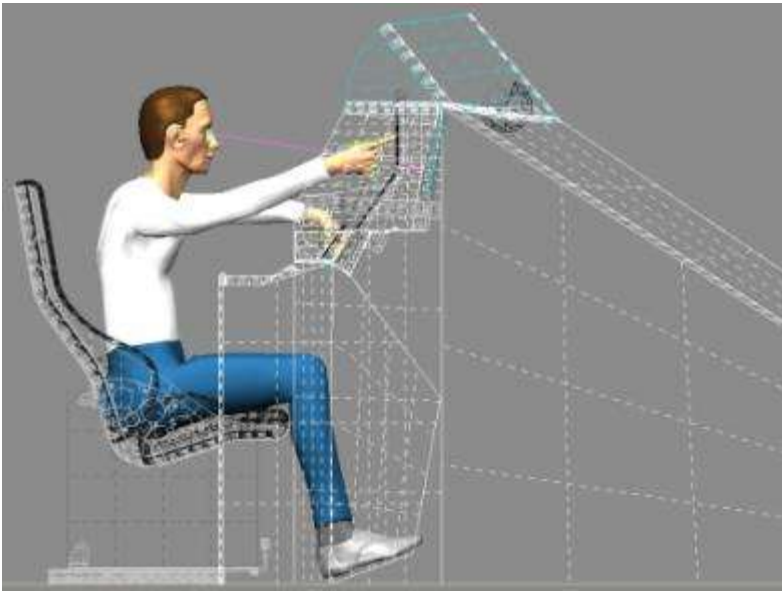
This image shows that the ergonomist will have difficulty seeing around the davit fixture.

Rigid Inflatable Project Ramsis Ergonomic Evaluation



This image shows the very useful Ramsis skeleton tool which helps you to better visualise the comfort of the ergonomics joints and posture in the spine.

CP30 Console Ramsis Ergonomic Evaluation



This image show the initial stages in the ergonomic evaluation of the CP30 console using an industry level suspension seat. These initial images show that the seat is not close enough to the console to allow for slightly bent arms whilst holding the steering and throttle controls.

CP30 Console Ramsis Ergonomic Evaluation

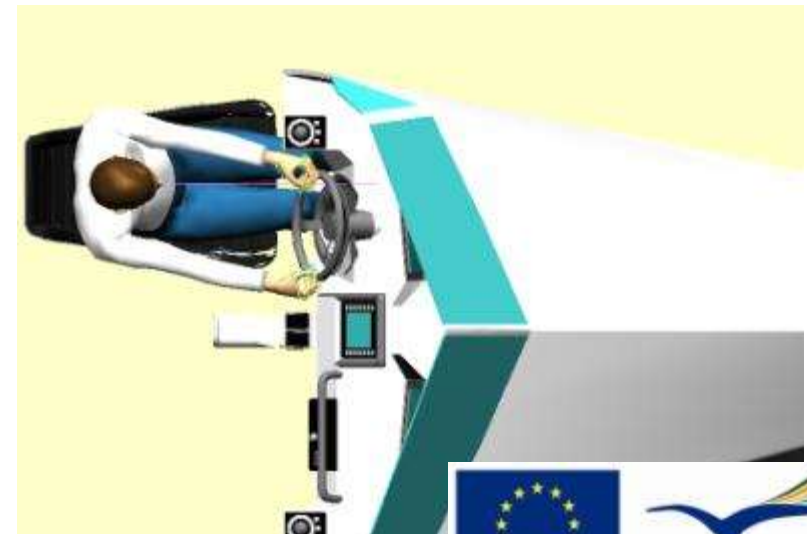


This images show the evaluation of the ergonomes ability to reach and use the other controls, buttons and screens that are located on the console to make sure that they are all within a comfortable reach envelope.

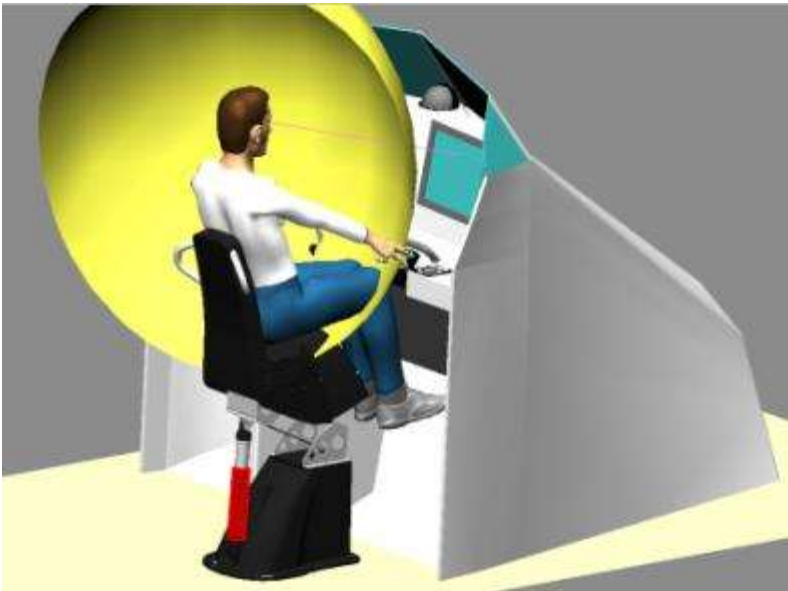
CP30 Console Ramsis Ergonomic Evaluation



This image show the evaluation of the drivers ability to reach and comfortably use the steering and throttle controls. These images show that for this size of person the seat needs to be further forward and higher up.



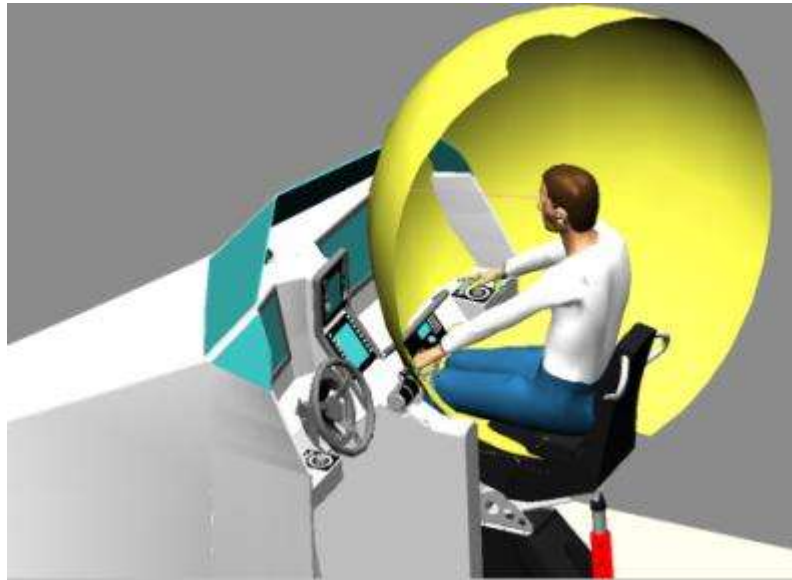
CP30 Console Ramsis Ergonomic Evaluation



The top two images show the reach envelopes for this 5th percentile male who is using an industry style straddle jockey seat. These images clearly show that the user cannot comfortably reach the controls on the passenger side of the helm. The bottom image shows the vision cones of the user who can see over the top of the console.



CP30 Console Ramsis Ergonomic Evaluation



The top two images show the reach envelopes for this 97.5th percentile male who is using an industry style straddle jockey seat. These images clearly show that the user can comfortably reach the controls on the passenger side of the helm. The bottom image shows the vision cones of the user who can easily see over the top of the console.

50ft Motoryacht Evaluation



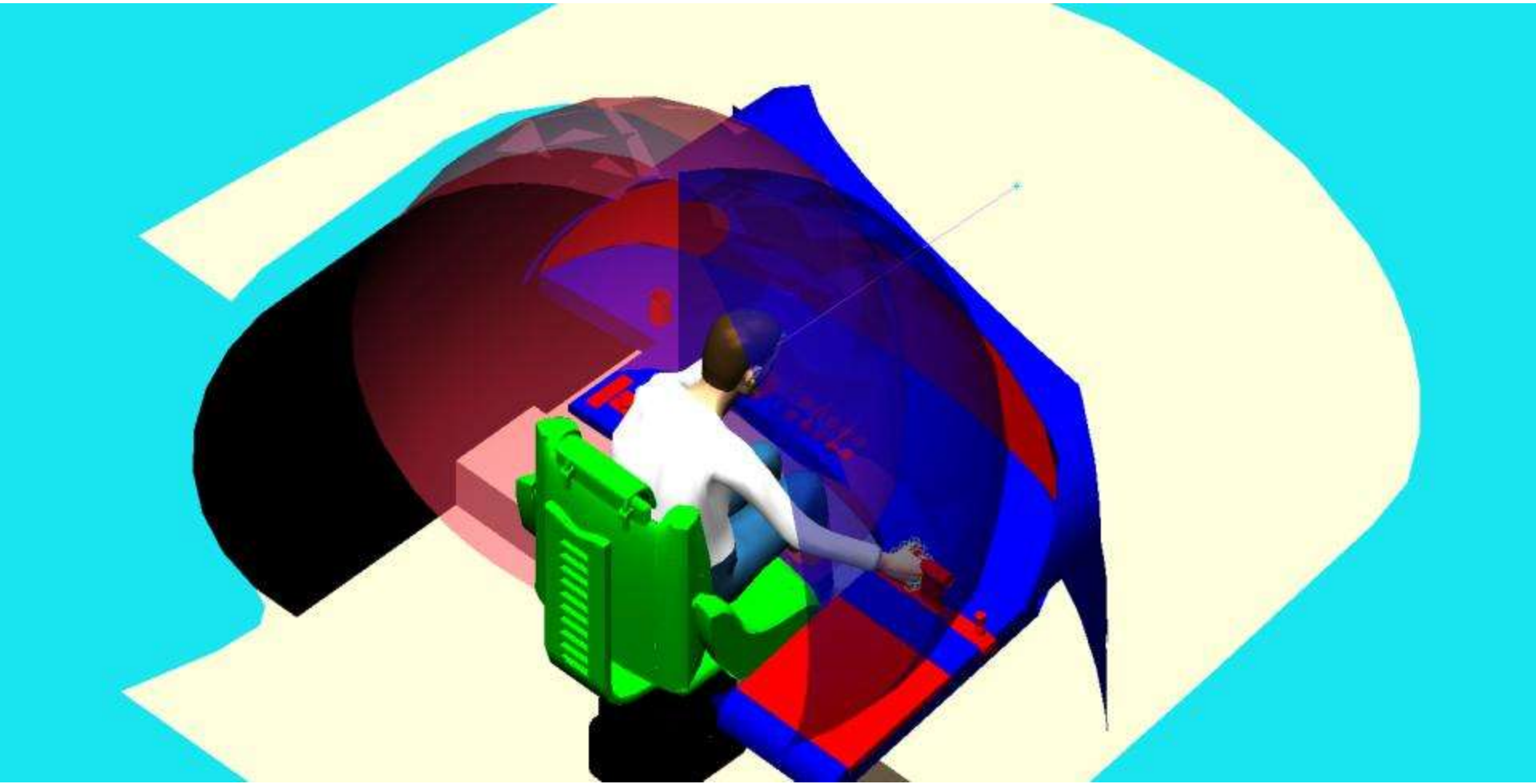
EBDIG
European Boat Design Innovation Group



Education and Culture DG

Lifelong Learning Programme

50ft Motor yacht Helm Original Helm Position



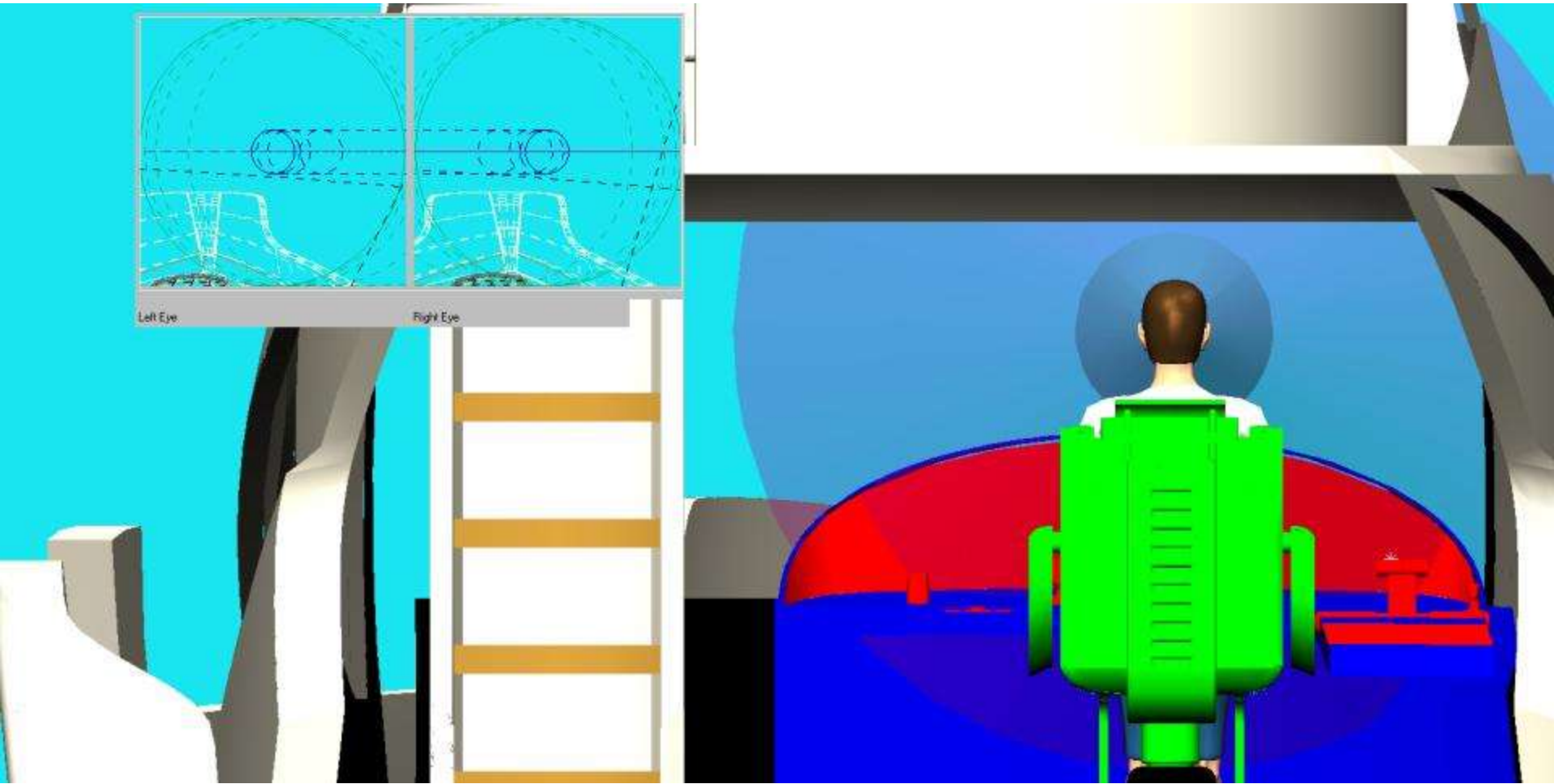
This initial evaluation of the helm controls in Ramsis shows that in its current configuration the controls are too far away from the user and the seat is not close enough to the desk.

50ft Motor yacht Helm Original Helm Position



This initial evaluation of the helm controls in Ramsis shows that in its current configuration the controls are too far away from the user and the seat is not close enough to the desk but the seating height for the vision cone is almost correct.

50ft Motor yacht Helm Original Helm Position



This image shows the view down the vision cone from each of the ergonomes eyes.

50ft Motor yacht Helm Original Helm Position



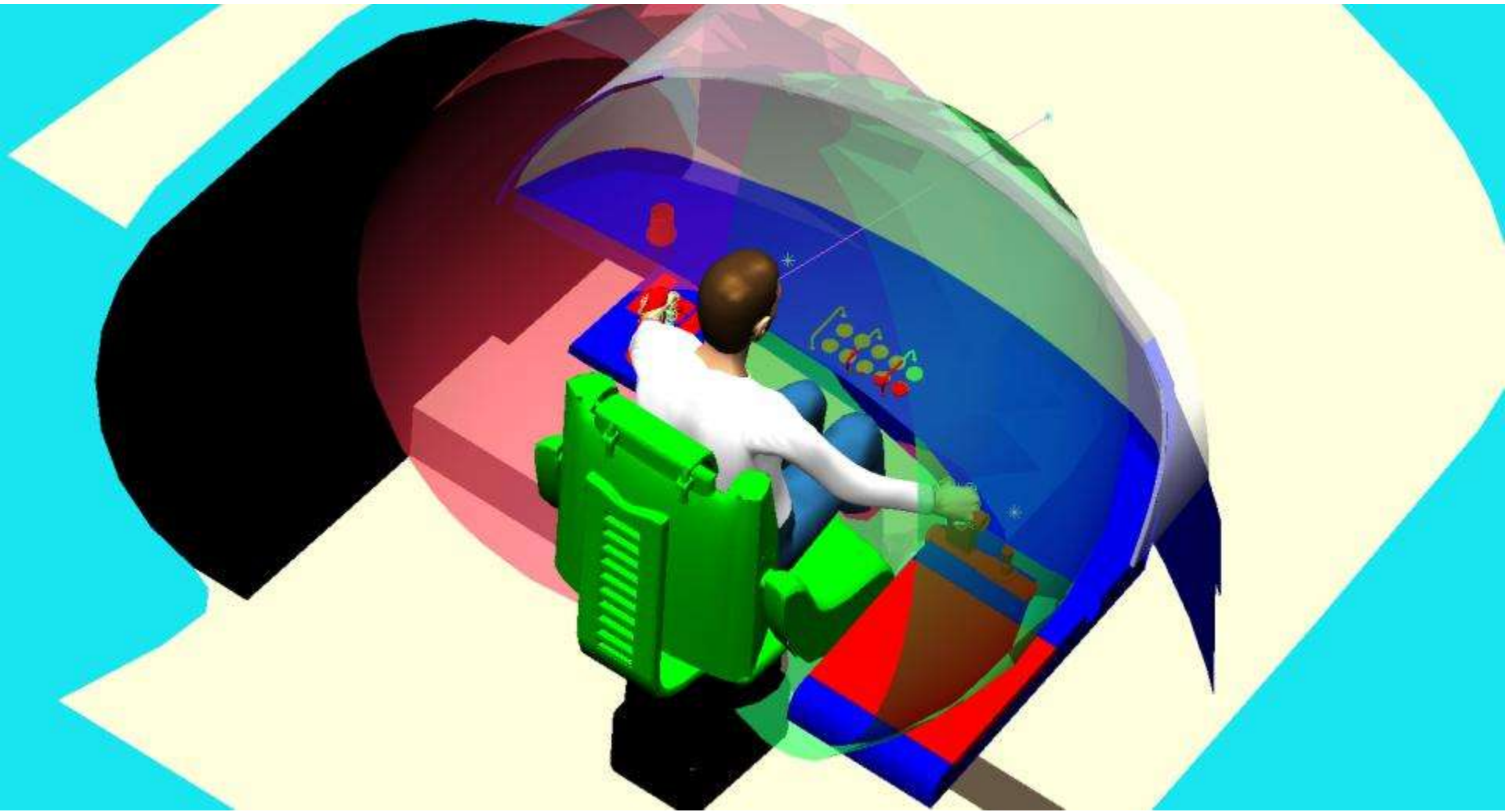
This image shows the side and top elevations of the vision cones from each of the ergonomes eyes.

50ft Motor yacht Helm Control Modification



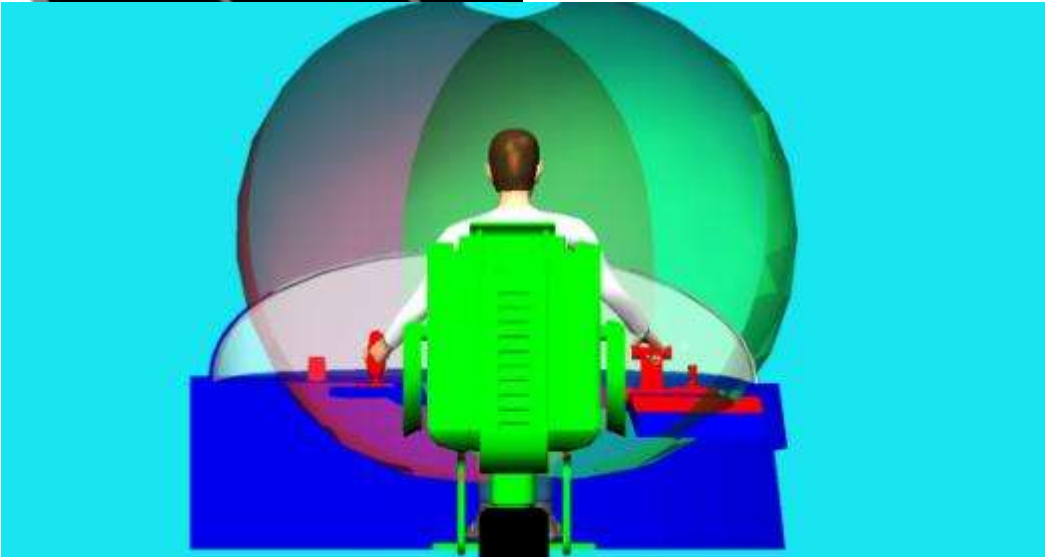
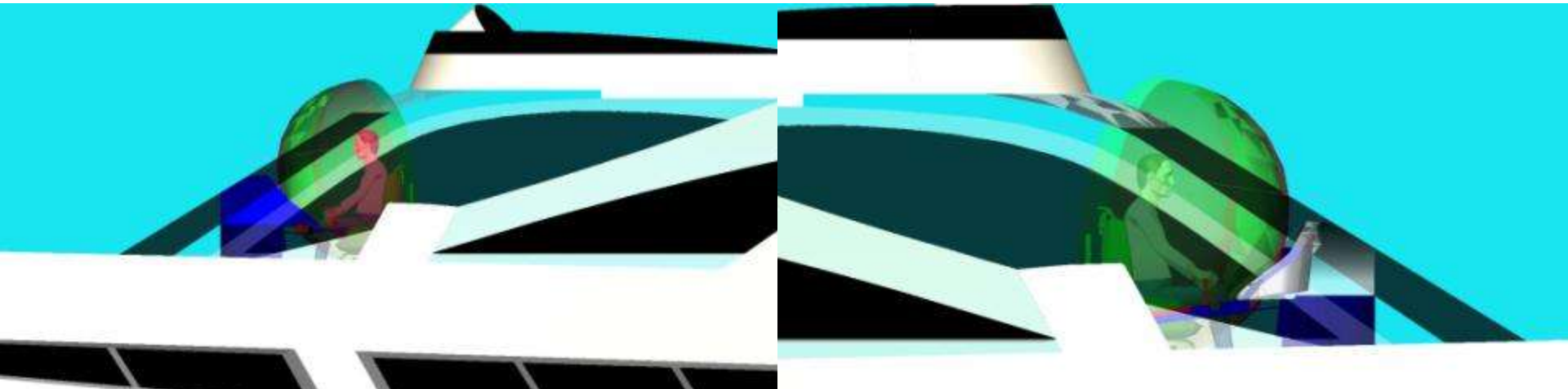
This image shows the helm with the controls relocated to the arms of the seat. This refinement clearly improves the posture and comfort of the ergonomist within the environment.

50ft Motor yacht Helm Control Modification



This image shows how the posture of the ergonomist can be greatly improved simply by moving the controls closer to the ergonomist.

50ft Motor yacht Helm Control Modification

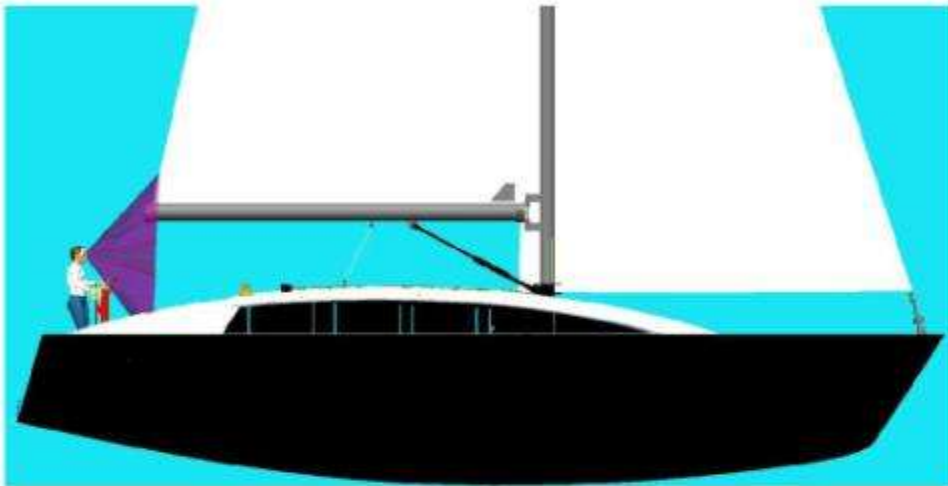


This image shows how the posture of the ergonomist can be greatly improved simply by moving the controls closer to the ergonomist.

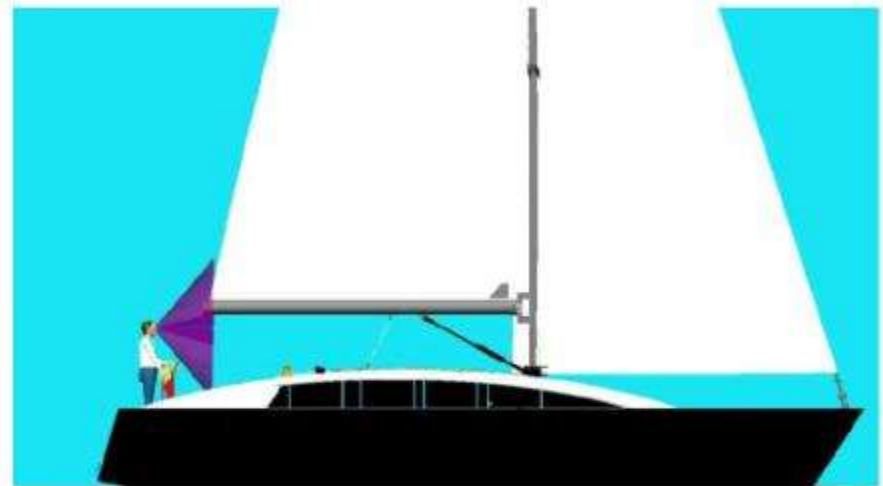
40ft Sailing yacht Evaluation



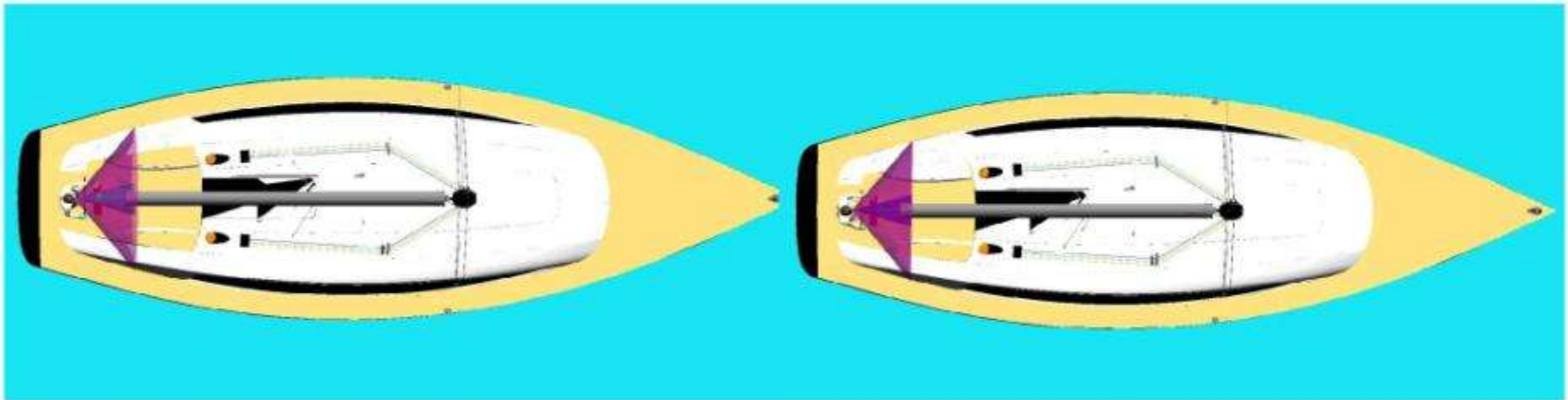
Ramsis vision cone analysis



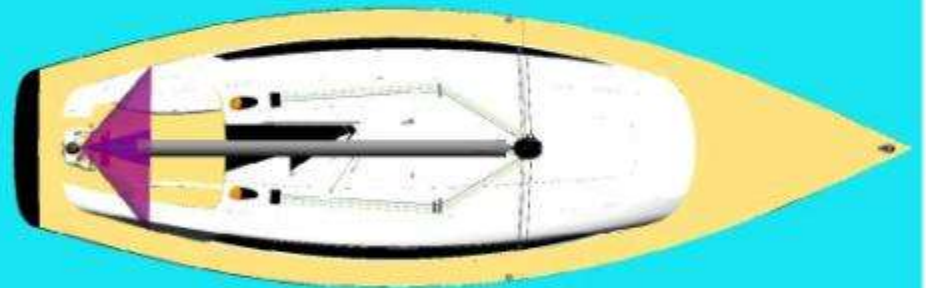
Side profile of 5th percentile male vision cone.



Side profile of 95th percentile male vision cone.

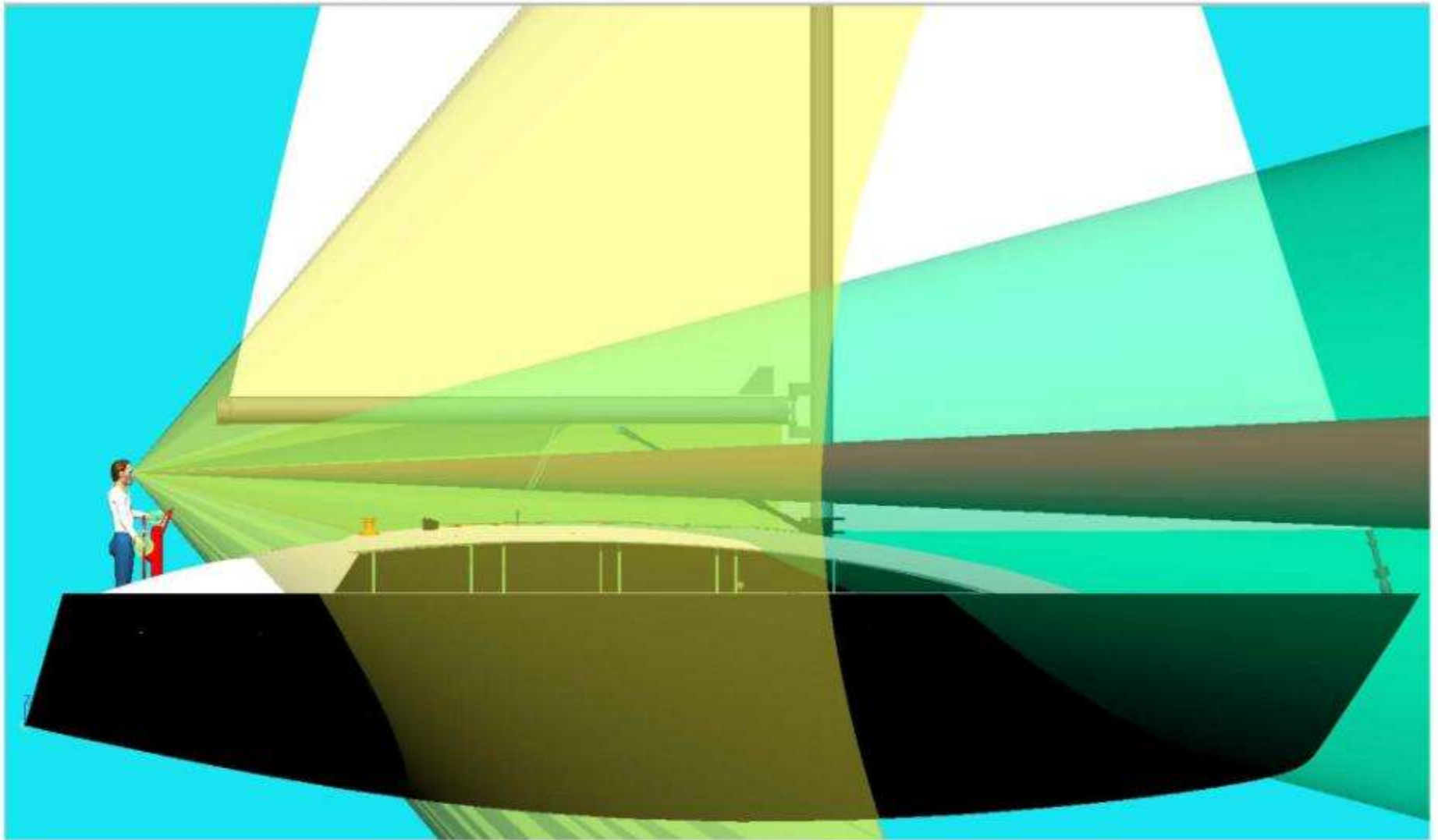


Top profile of 5th percentile male vision cone.



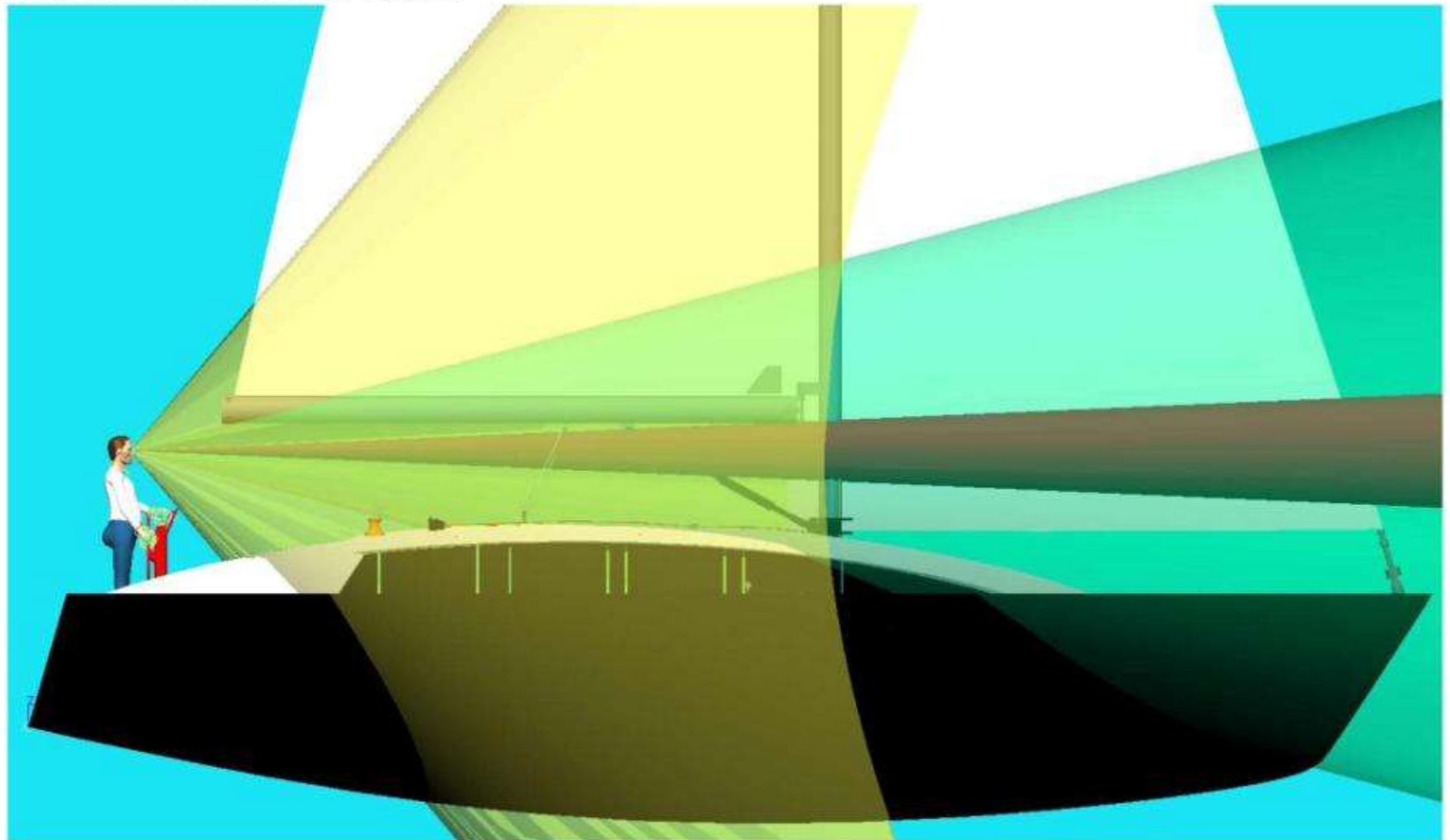
Top profile of 95th percentile male vision cone.

Ramsis vision cone analysis



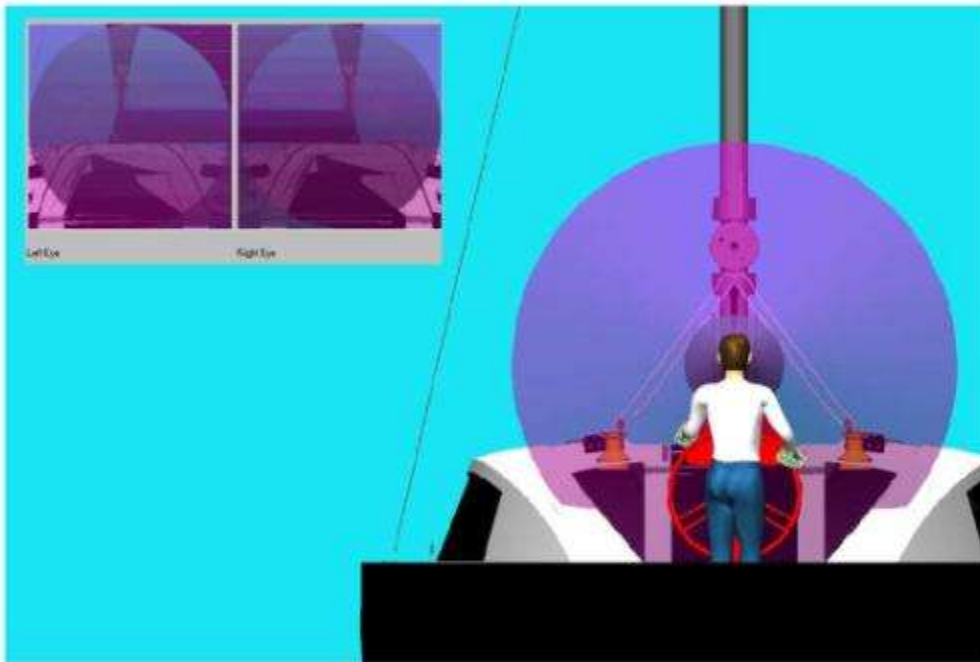
Side profile of 5th percentile male vision cones.

Ramsis vision cone analysis

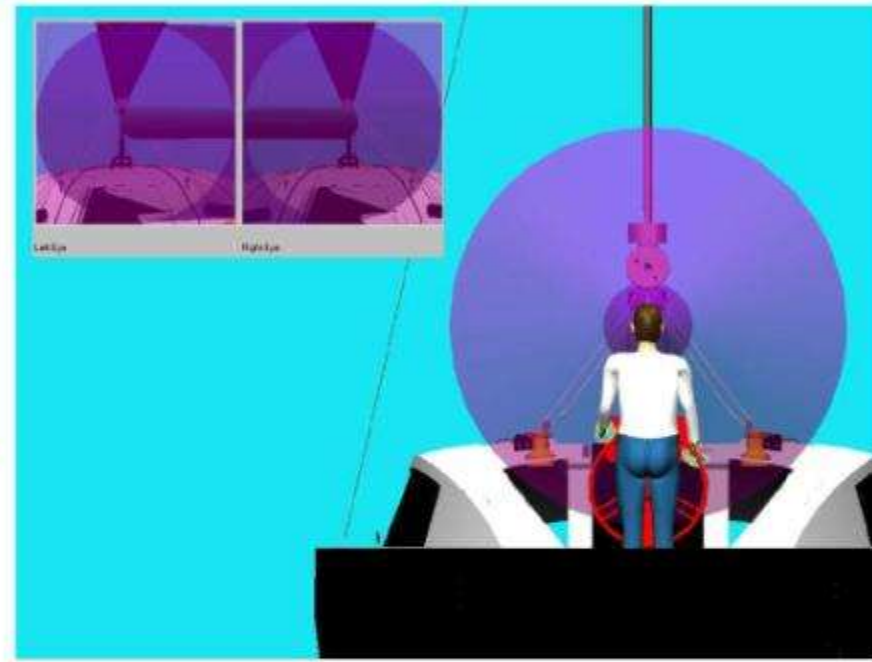


Side profile of 95th percentile male vision cones.

Ramsis vision cone analysis

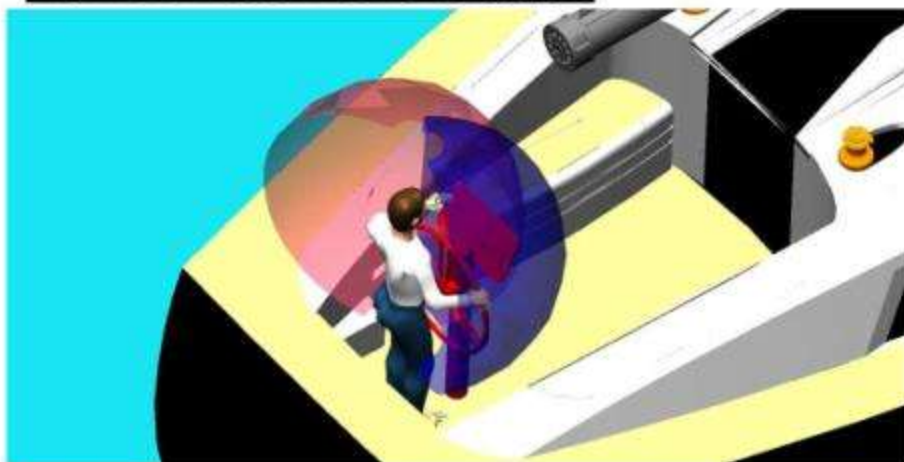


Rear view of 5th percentile male vision cone.

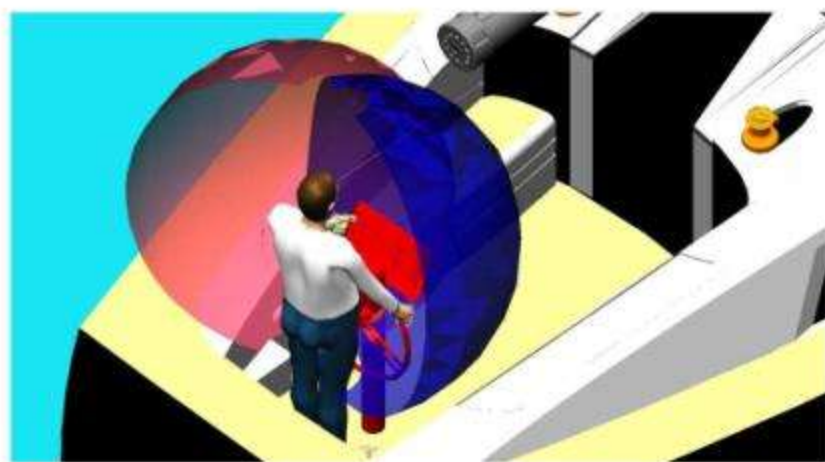


Rear view of 95th percentile male vision cone.

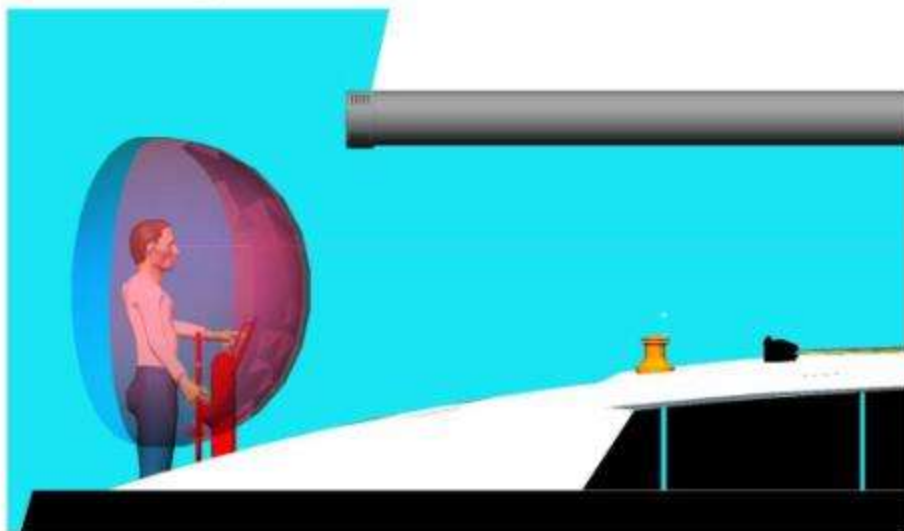
Ramsis Reach cone analysis



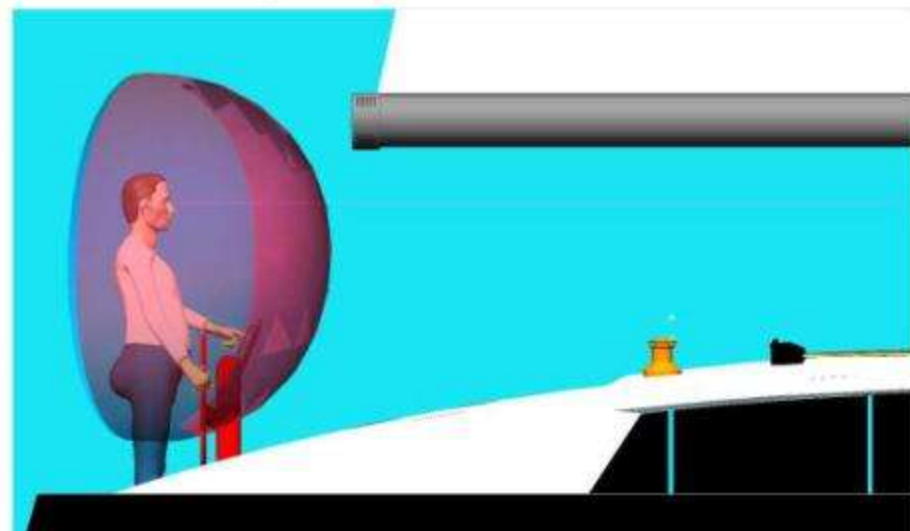
View of 5th percentile male reach cone.



View of 95th percentile male reach cone.

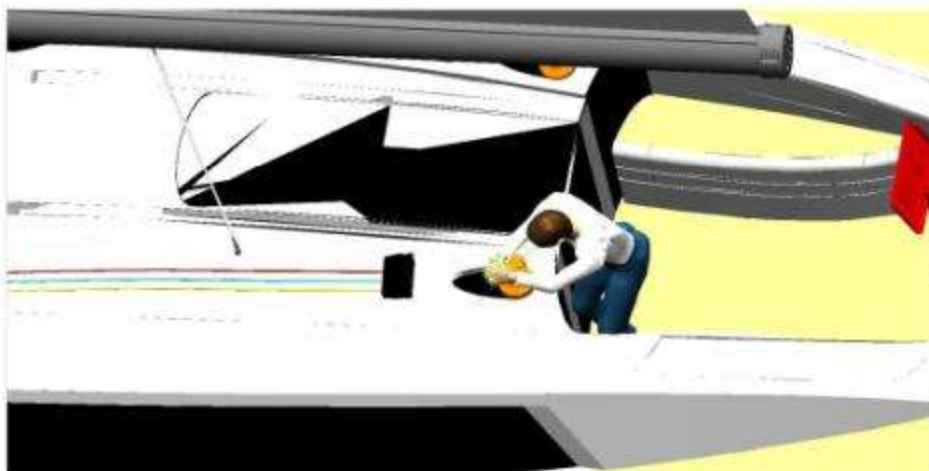


Side view of 5th percentile male reach cone.



Side view of 95th percentile male reach cone.

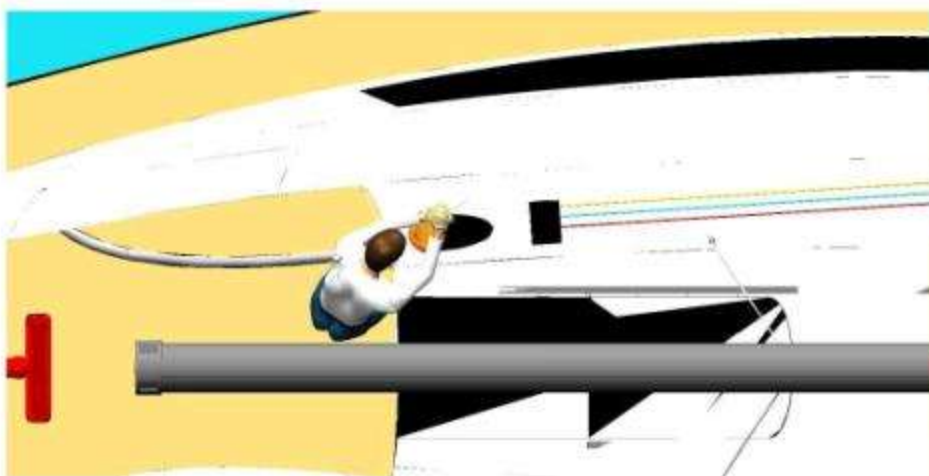
Ramsis equipment analysis



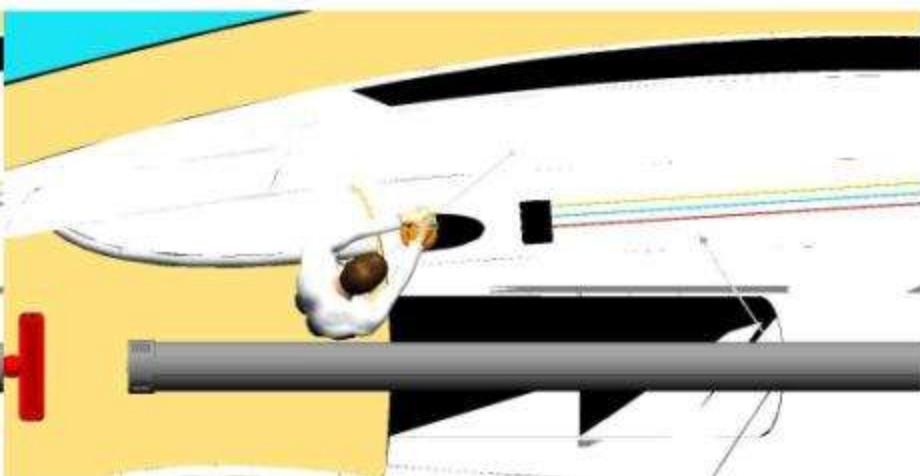
Perspective view of 5th percentile male using winch.



Perspective view of 95th percentile male using winch.

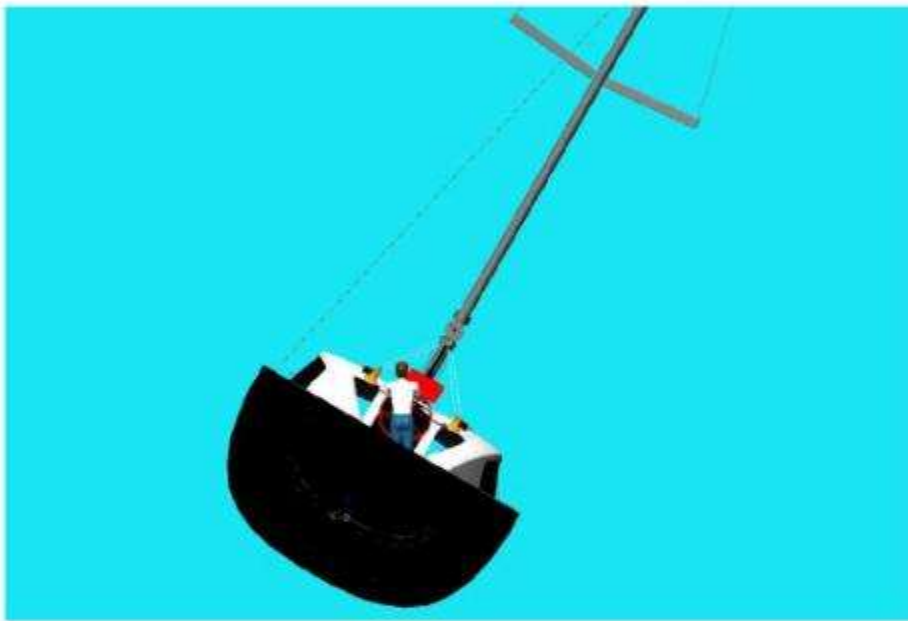


Top profile of 5th percentile male using winch.

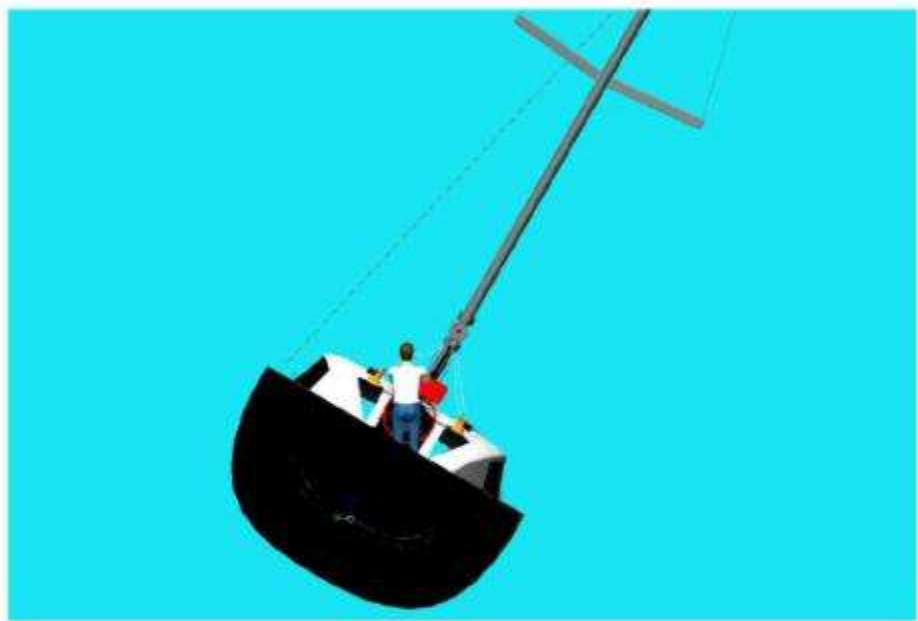


Top profile of 95th percentile male using winch.

Ramsis heeling analysis

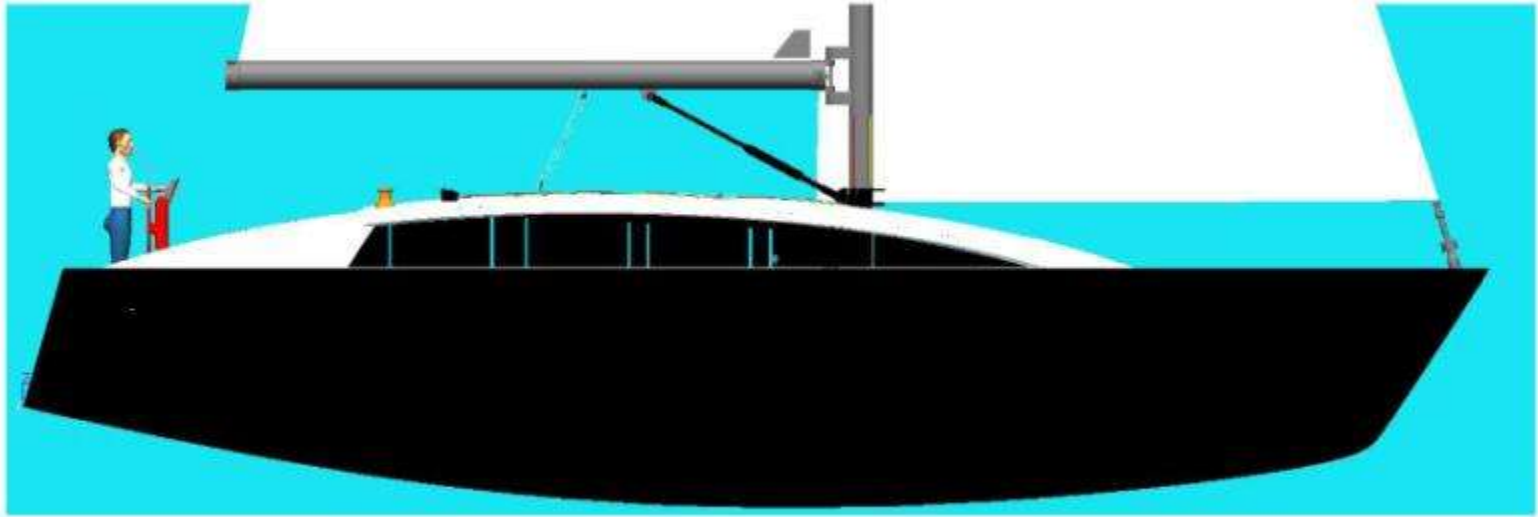


Rear view of 5th percentile male heeling angle view.

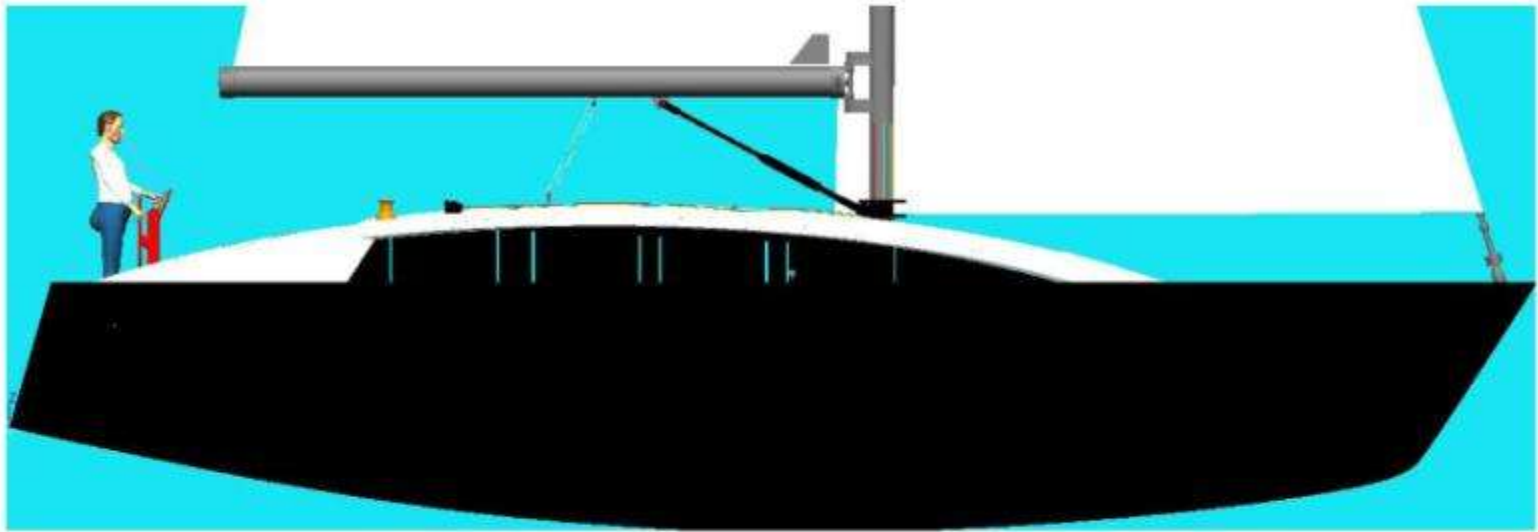


Rear view of 95th percentile male heeling angle view.

Ramsis helm control adjustments – original height

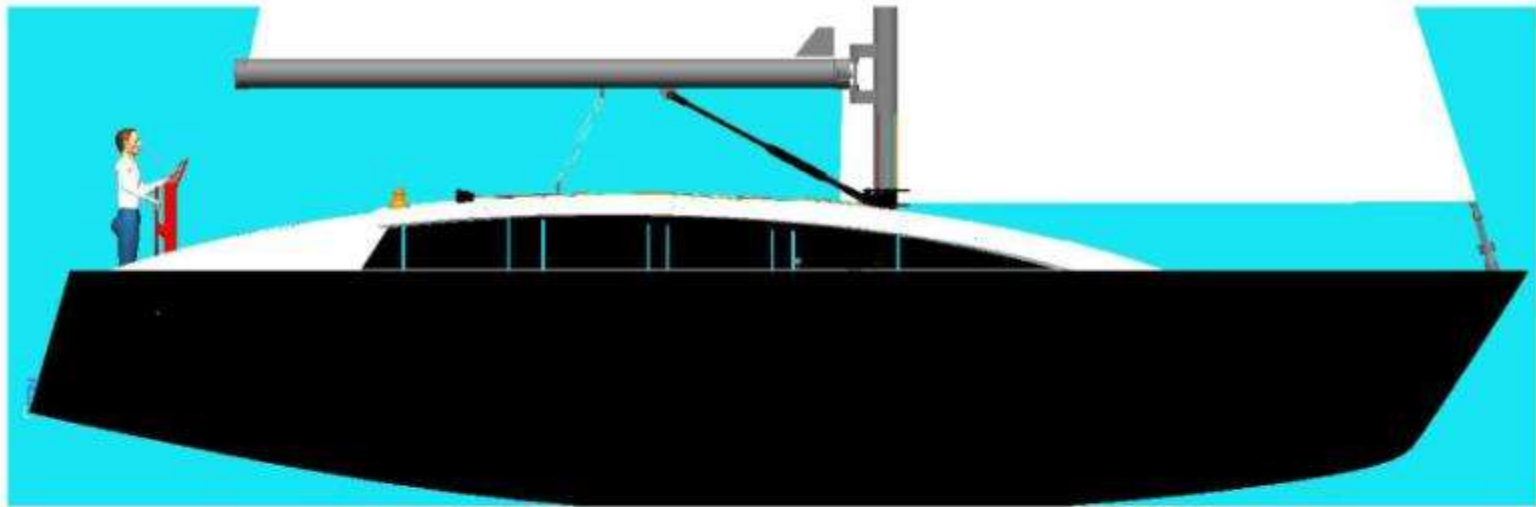


Side view of 5th percentile male original control heights.

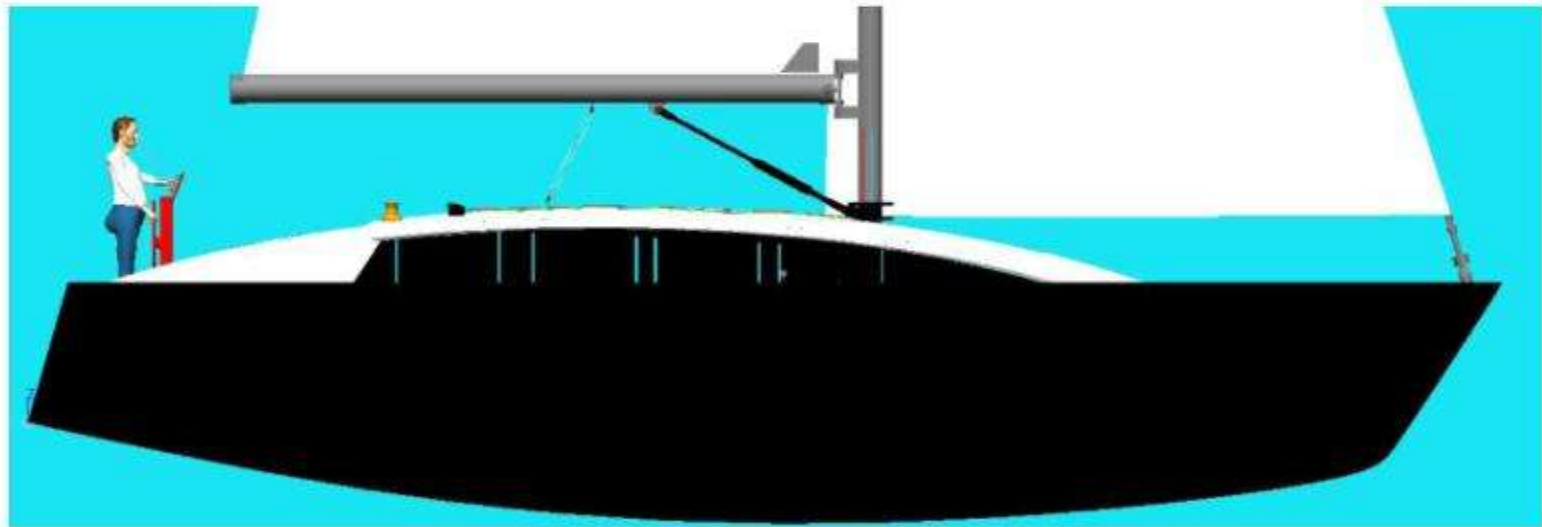


Side view of 95th percentile male original control heights.

Ramsis helm control adjustments – 20cm Raise

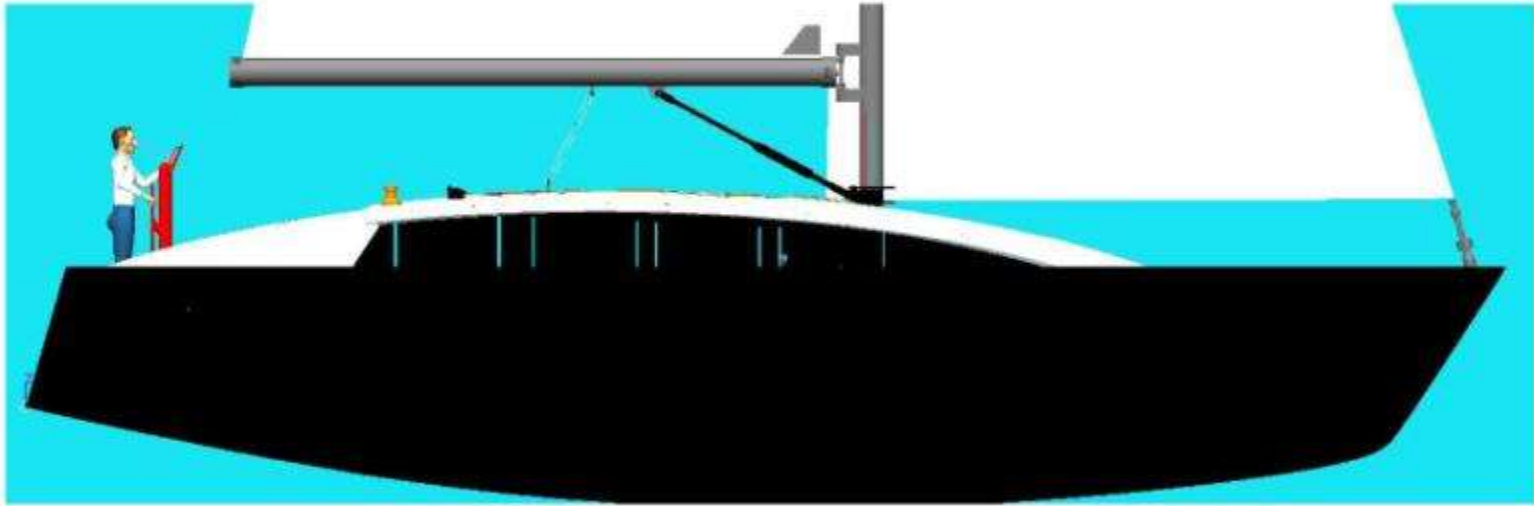


Side view of 5th percentile male raised control heights.

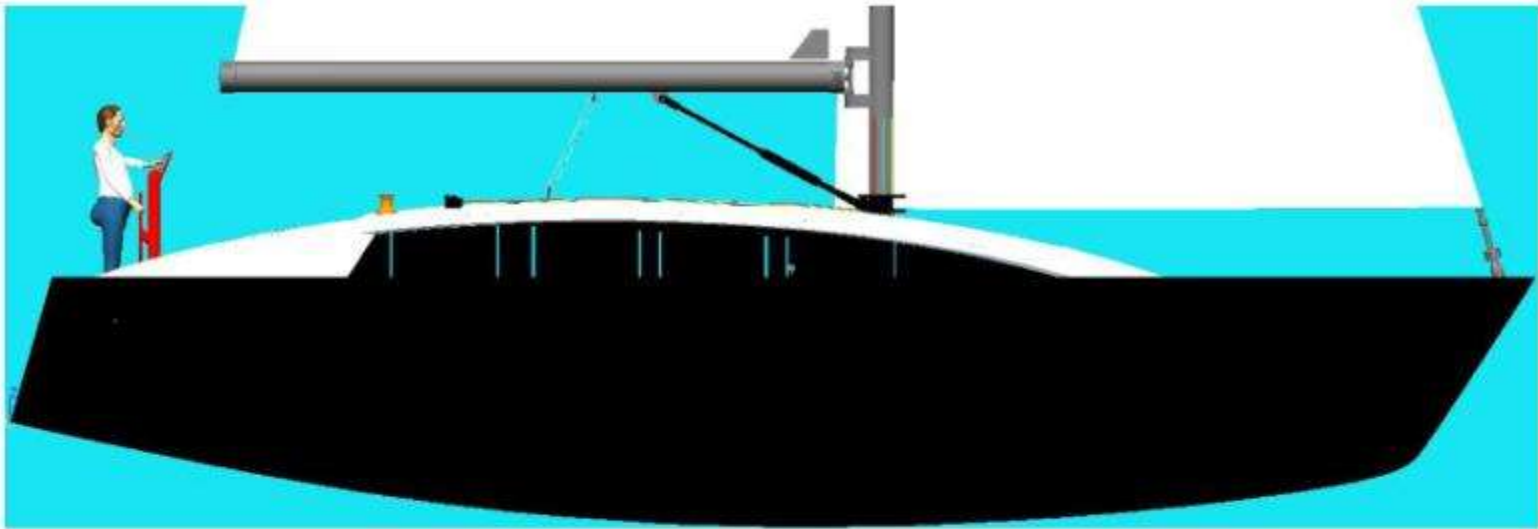


Side view of 95th percentile male raised control heights.

Ramsis helm control adjustments – 30cm Raise



Side view of 5th percentile male raised control heights.

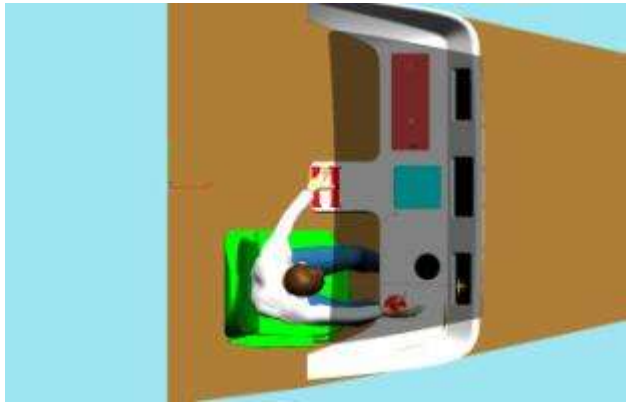


Side view of 95th percentile male raised control heights.

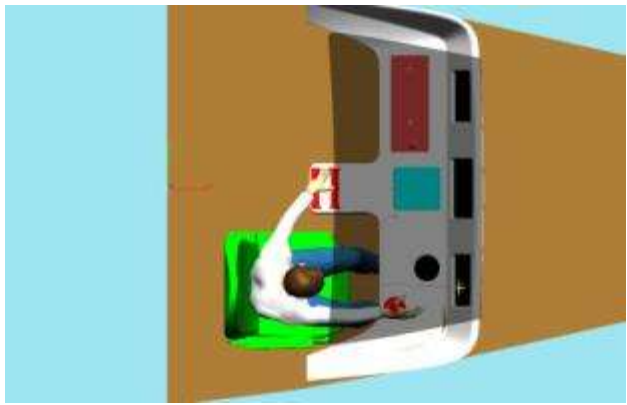
Hovercraft Evaluation



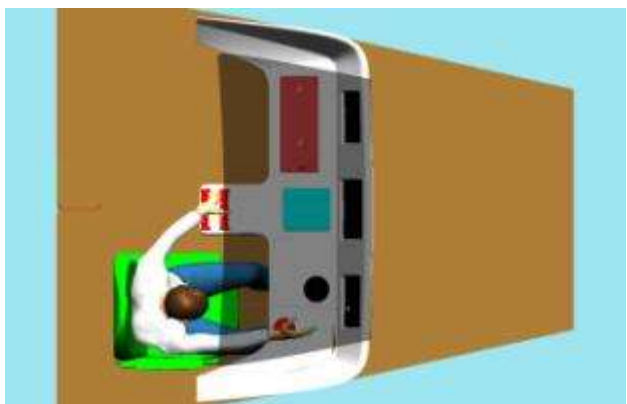
5th Percentile



50th Percentile



95th Percentile

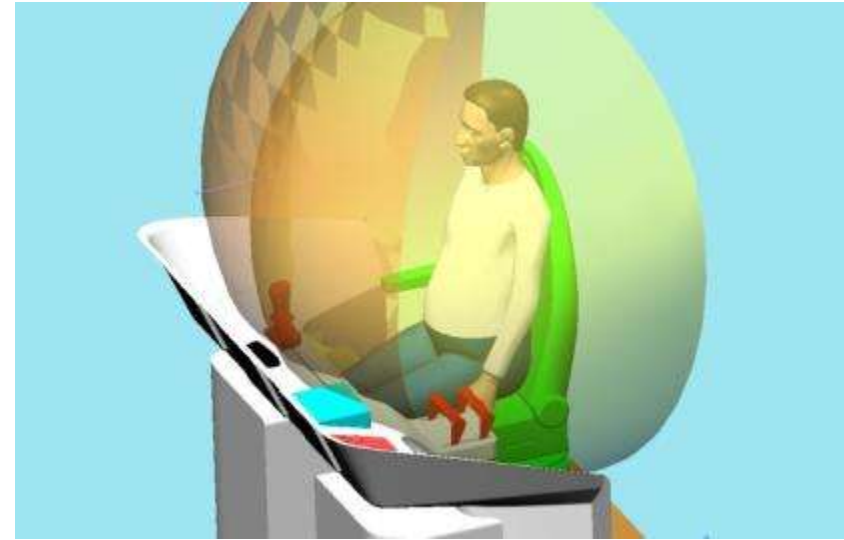


The images on this slide show the differences for the control reach for the different percentile ergonomes. The most noticeable difference here is the curvature of the spine in the seating position and also the lateral reach angle difference meaning that seat adjustment both forward and backwards and also laterally would be required in the next design phase in order for the control system to better cater for the different percentile ergonomes.

5th Percentile



95th Percentile

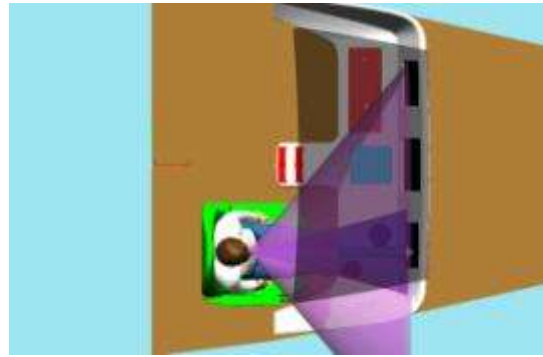


50th Percentile

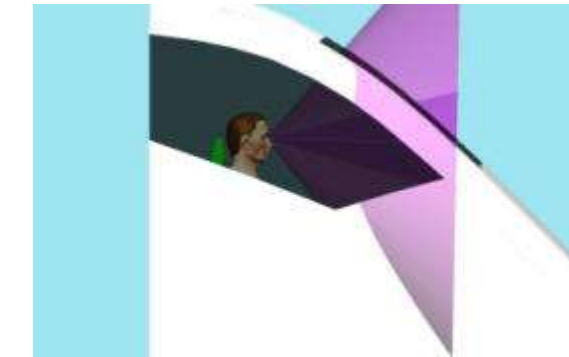
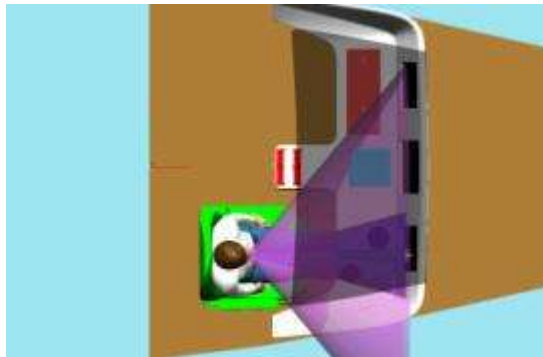


The images on this slide once again show the need for seat and control position adjustment to better accommodate the lower percentile users. These images also show how the size of the main throttle and joystick directional controls may need to be evaluated in terms of size and construction to better allow a more comfortable grip and operation of these tools by the ergonomes.

5th Percentile



50th Percentile



95th Percentile



The images on this slide show the differences for the vision angles of each percentile. Due to the current design height of the operators seat it is clearly visible that a height adjustment facility needs to be built in to accommodate the lower percentile users as nearly half of their vision cone is obscured by the dashboard and cockpit structure. With the height adjustment a foot rest may also need to be integrated to maintain maximum comfort for the user over long periods of operation.

Conclusion

- RAMSIS has significantly informed human factors considerations within the marine design process by:
 - Allowing reach of controls to be evaluated for a range of user centiles
 - Allowing user vision to be evaluated for a range of user centiles
- The use of reach surface and user eye camera views enables the designer to resolve anthropometric issues from an immersive perspective
- RAMSIS has the potential to be game changing in terms of the design workflow and associated development costs in the marine industry