

## Introduction:

All of our current in water ranges within QinetiQ require permanent deployment sites and divers to lay them. There are a lot more requests for ranges coming in that require a rapid deployment. The best way to reduce the lead time on a ranging is to make the system diverless, this will allow it to be rapidly deployable in any suitable location on the sea bed.

To make this a reality I was given the task for this project of designing and developing a sensor housing that could be chained together in numbers of 16 whilst being diverless.

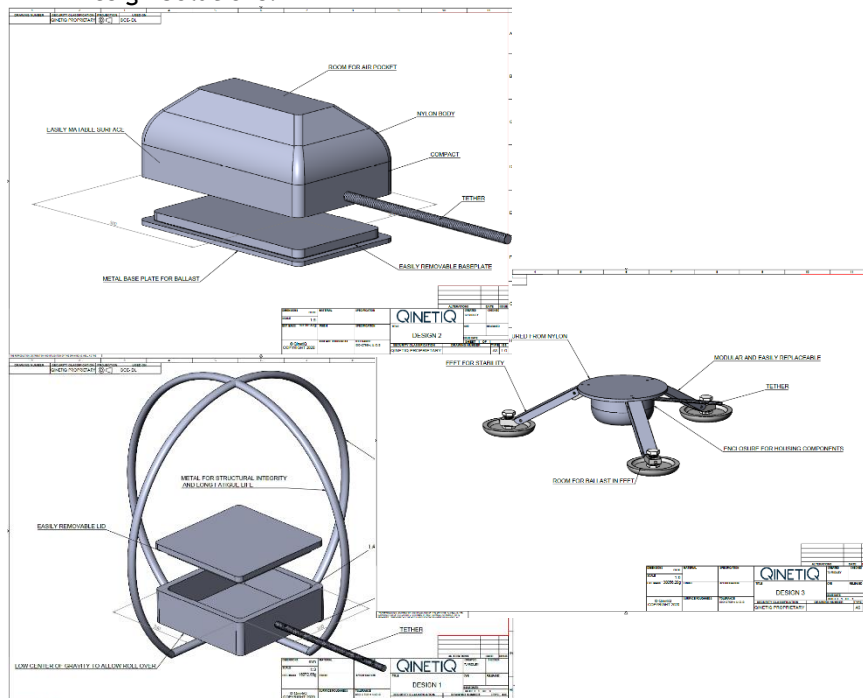
### Aims and Objectives:

The aim of the project was to research, design, develop, prototype, test and evaluate a diver-less underwater electromagnetic (EM) sensor housing.

### Objectives:

- To understand the business need surrounding the diver-less sensor housing to gain all the relevant requirements.
- To propose new designs for the diver-less EM underwater sensor housing
- To produce a conceptual design for the new sensor housing
- To design and develop the new sensor housing.
- To prototype, test and evaluate the new sensor housing.
- To document the thesis

### Design Solutions:

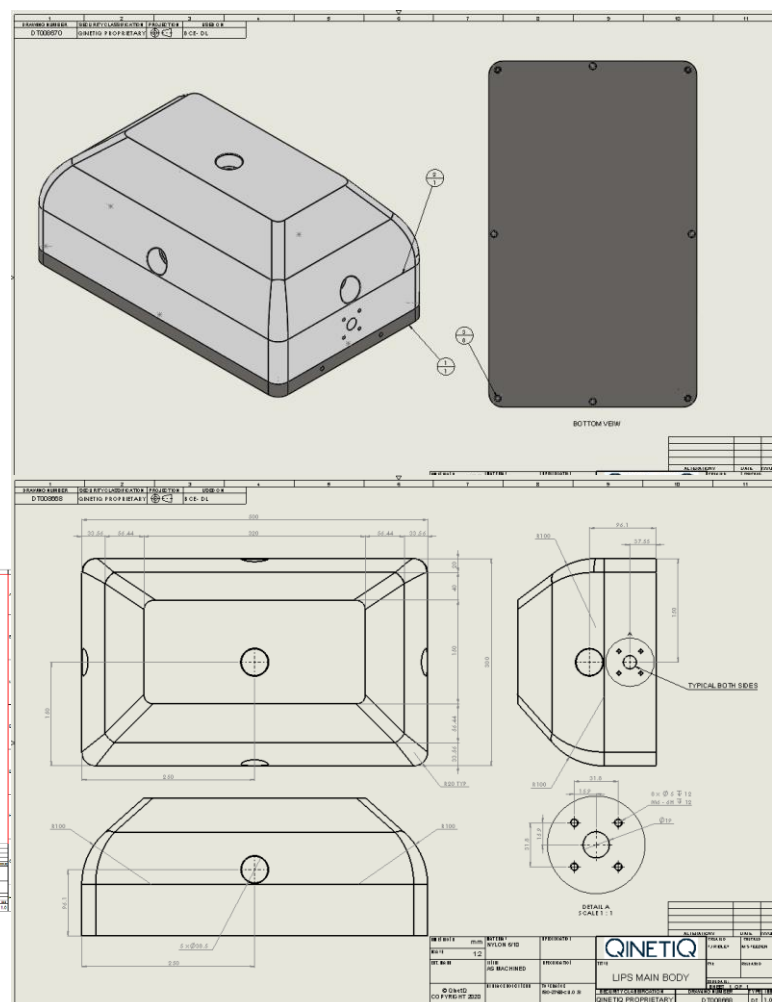


### Design Selection:

To select the most appropriate design solution to take forward AHP was used. AHP, Analytical Hierarchy Process, is a selection method that is criterion based. It used pairwise comparisons alongside rating given by the user to provide an extensive comparison of designs giving a prioritised design at the end.

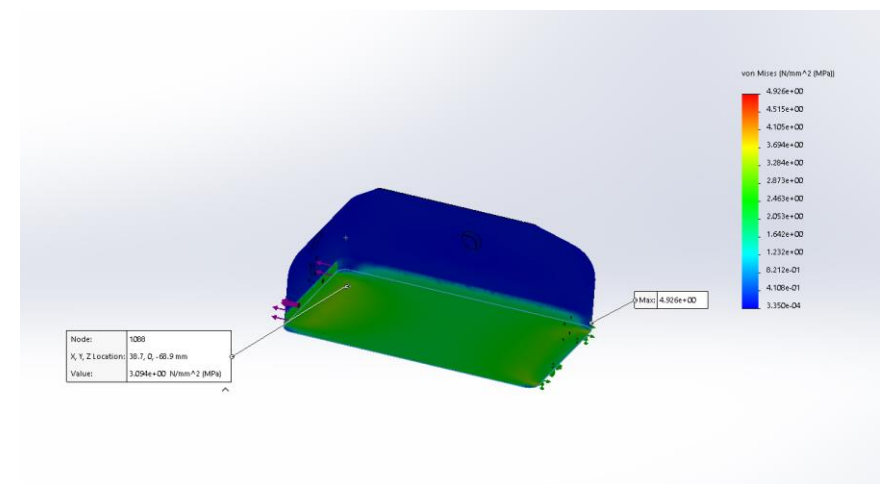
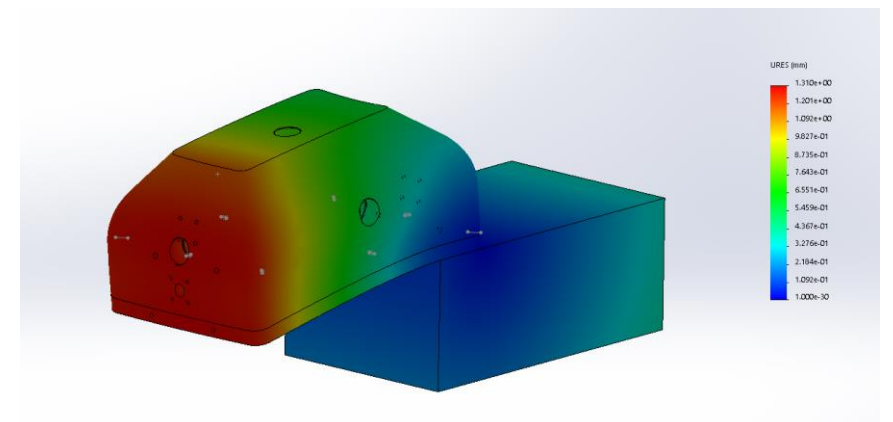
Criteria	% Weighting	Solution 1	S1 (Normalised)	Solution 2	S2 (Normalised)	Solution 3	S3 (Normalised)
Functionality 1	25	0.480	12.000	0.405	10.125	0.115	2.875
Functionality 2	25	0.429	10.725	0.429	10.725	0.143	3.571
Ergonomics	20	0.143	2.860	0.714	14.280	0.143	2.860
Mechanical	20	0.333	6.660	0.333	6.660	0.333	6.660
Maintenance	10	0.200	2.000	0.600	6.000	0.200	2.000
Total	100		34.245		47.790		17.975

**Chosen Design Finalised (Self Righting Solution):**



Evaluation:

Due to the time constraints on the project and the Covid-19 pandemic it wasn't possible to produce a physical prototype so FEA was used to evaluate and test the design.



### Future Work:

- Production of Prototype
- Test prototype in test tank
- Populate Finalised design with electronic components
- Roll out system to UK Ranges

Conclusion:

At the start of this project I set out ‘To research, design, develop, prototype, test and evaluate a diver-less underwater electromagnetic (EM) sensor housing.’ And I feel that this has been achieved as well as it could have been with the circumstances. All of the objectives for the project have been met with the exception of the production of a prototype. It will be exciting to continue to follow the life of this project beyond the report and evolve it into a fully functioning system that QinetiQ will use all round the world.