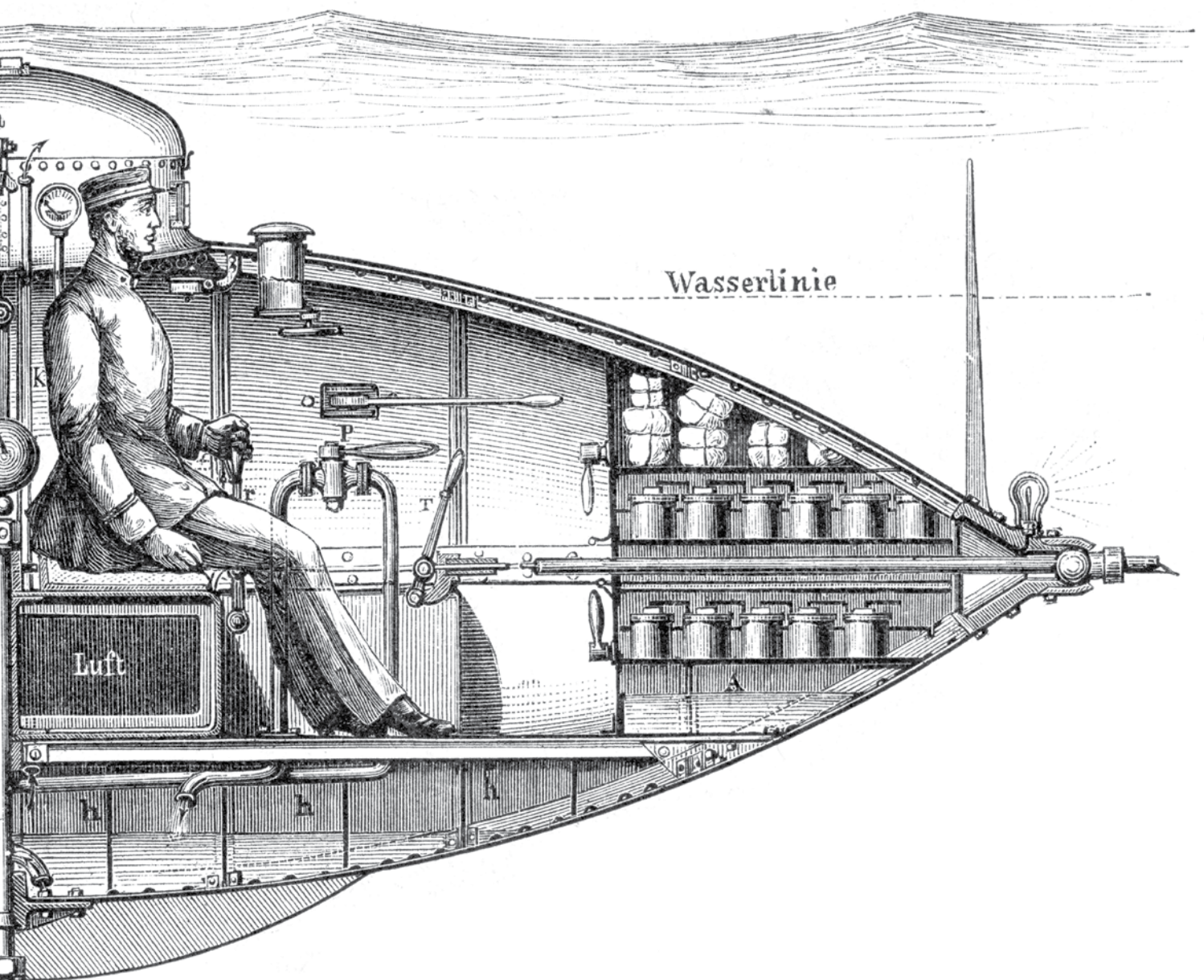


MATRIX UUV BUOYANCY

A PATHWAY TO MASS MANUFACTURE



LIGHTER · STRONGER · SMARTER

SCALING UP

TRANSITION TO MASS DEPLOYMENT



There are some very elegant Unmanned, Underwater Vehicles (UUV) systems out there. They do their job very well, but there are not very many of them. They are akin to a Formula 1 car – exquisitely engineered, but rather rare and each one supported by a big team of engineers.



As autonomous systems are trusted for longer, more complex missions, the human-in-the-loop will become increasingly remote, with less direct engagement in the mission. More UUVs will be deployed. Lots more. The work will become like that of a shepherd – one person controlling a flock of semi-automatons.

The transition to mass deployment of UUV systems will need a similar transition to mass manufacture. The Matrix manufacturing process enables the use of existing oil field technologies to mass produce the 'body in white' for the UUV platform.

POTENTIAL FOR DISRUPTION



The current generation of UUVs are exquisitely tailored. As mentioned, they are akin to a Formula 1 car, with perhaps a dozen hand crafted units produced per season by a team.



To provide a meaningful capability something low cost, effective, and eminently practical will be required, more akin to the Volkswagen Beetle (21 million units total production).

We are not suggesting the outright replacement of existing methods – there are some applications where a Formula 1 car is both appropriate and necessary for the job to be done. For most applications, however, the job to be done would be wildly overserved.

COMPOSITE SYNTACTIC STRUCTURES

The Matrix automated process enables the integration of system buoyancy, the hydrodynamic fairings and the underlying structural chassis into a single, buoyant monocoque design, eliminating the need for entire production systems and their associated costs.

With care – and some discipline on the part of the design team – the remaining systems are then simply bolted into place and the platform is ready to go.

In the illustrations shown, a pair of buoyant structural elements are moulded to form the flanks of the platform. These would provide both the structure and the hydrodynamic form. Ample space remains in the interior for other systems, with moulded pockets provided for internal and external systems whenever necessary.

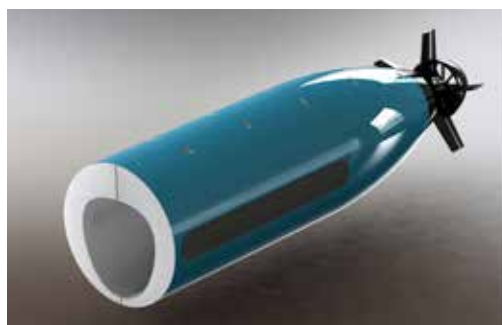


UUV - MASS MANUFACTURED BUOYANT STRUCTURE

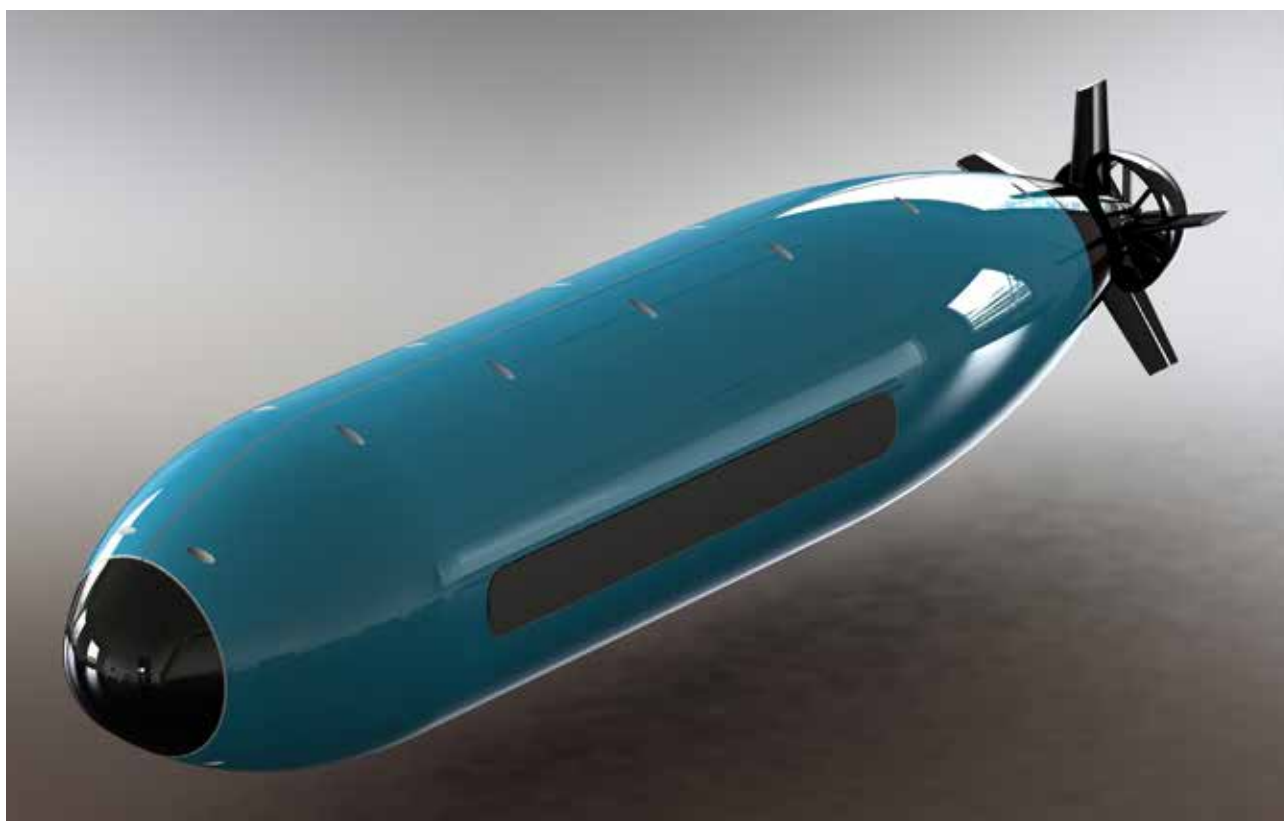
SYNTACTIC APPLICATIONS AT SCALE

The Matrix production system is not new. It has been developed over the last two decades to provide deep water buoyancy at scale for the subsea oil and gas industry. These fields are typically at a depth of 2-3 km, well beyond where you are likely to find submarines.

A typical Matrix project is big, with a single application requiring perhaps 10 MN of uplift (2000 tonnes). This represents roughly 20 days of production at full capacity.



UUV - THE SYNTACTIC CORE



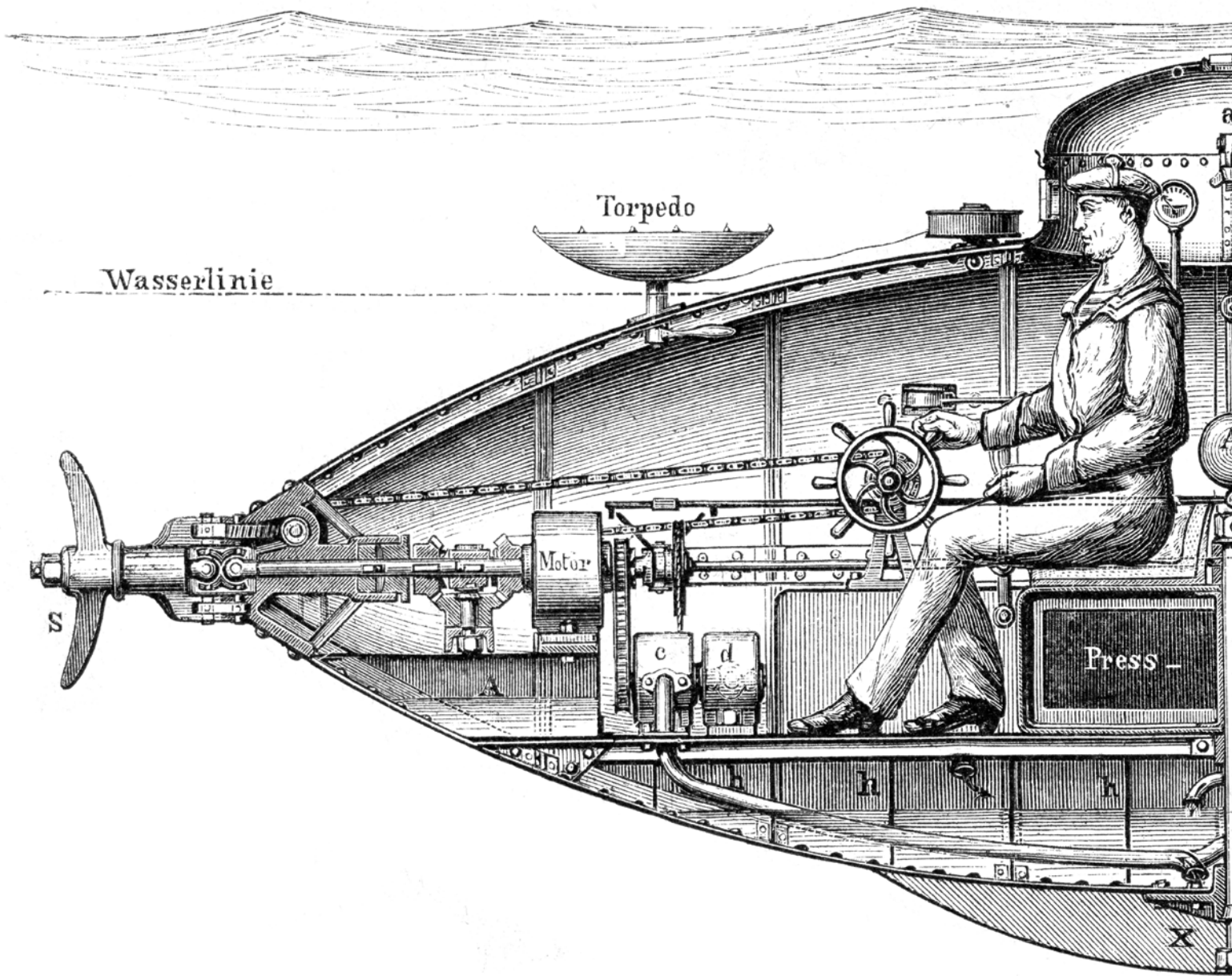
MODULAR UUV SYSTEM

READY TO DELIVER

As UUV platforms get bigger and more numerous, the costs and timescales of current methods will become a barrier. We encourage you to come and talk to us and understand what we have to offer your design teams.

Some of your competitors already have!

**MATRIX -
WORLD'S LARGEST
MANUFACTURER
OF SYNTACTIC
FOAM.**



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MATRIX COMPOSITES & ENGINEERING LTD

AUSTRALIA +61 8 9412 1200

matrix@matrixengineered.com • MATRIXENGINEERED.COM

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