

## Advanced Forming Research Centre Scottish Fisheries Museum

### Project Background

Established in 1967, the Scottish Fisheries Museum, located in Anstruther, Fife, showcases the history, stories and memorabilia from Scotland's fishing communities and welcomes thousands of visitors from around the world each year.

Museum curators approached the AFRC to help revitalize an exhibit of the Kelvin L4, four cylinder semi-diesel engine, which was built in the 1940s and fitted in the popular sailing herring drifter, Reaper. The exhibit needed a modern make-over to bring the assembly of the engine to life in a dynamic, interactive display.

As documentation on its design was absent, the Scottish Fisheries Museum had to start from the digital drawing board to model hundreds of individual parts of the engine. The AFRC assisted the museum by scanning the three main parts: the crank case, cylinder and cylinder head, which were core to the whole project.

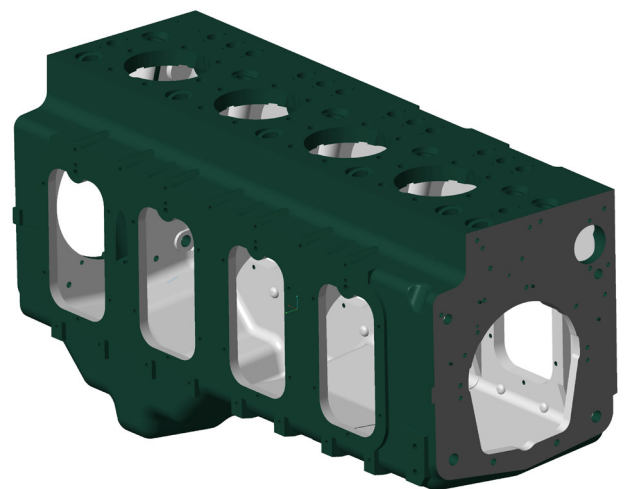
### Problem

The Kelvin L4 engine was the main propulsion unit for full-sized fishing boats, motor boats or vessels converted from sail power. The engine had been on show in the museum for more than 20 years and had started to look tired and uninteresting.

There were no models or CAD drawings available of the engine to inform the design and engineering processes of the main components.



Close up of the Kelvin L4 engine



Four cylinder crank case

## What We Did

Engineers and researchers from the AFRC used 'reverse engineering' processes to digitise the crank case, cylinder and cylinder head into a 3D model, in order to help generate a digital demonstration of the fully assembled engine. Other similar type engine parts were also used to build up an accurate picture of its construction.

The AFRC's state-of-the-art GOM ATOS III Triple Scan 3D scanner was used to capture high resolution point cloud data to create a full-field, 3D scan of the internal workings of the engine. This captures the detail of the full geometry to precisely recreate the individual component's surface, depth and structure into a dense point cloud. This technology can measure objects ranging from around 30mm to several metres in size.

Some of the data was then sent to South Korea where the information was converted into a useable CAD file for use by the museum.



## Result

The Scottish Fisheries Museum is in the process of building a virtual replica of the Kelvin L4 engine which will allow visitors to explore its individual parts and learn more about its intricate workings in a lively, interactive screen display.

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“I was struggling to measure and accurately recreate the larger, more complex parts of the engine. There are no engineering drawings available, and manually measuring a part weighing half a ton was impossible. I needed 3D scanned images to import into my software to be able to create the complex 3D models.

“I couldn't have made these without the ingenuity and technical skills of the AFRC whose fantastic advanced blue light scanner system created incredibly precise images that made the modelling of the engine's major components possible. The quality of the scans was so good that allowance had to be made during file conversion for the thickness of the paint. This was a truly international, inter-agency, collaborative effort and the virtual exhibit will hopefully bring much joy and education to engineering and Scottish fishing history enthusiasts alike.”

John Forth, volunteer with the Scottish Fisheries Museum

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