



## Case study

### Vibration Measurement, Modelling and Prevention – RNLI Seat

#### VOLUNTEER CREWS

The lifeboat crews of the RNLI risk life and limb to save the lives of people at sea. Often operating at night and in poor weather conditions, the Institute realised that the wheelhouse seats on their All-Weather Lifeboats (ALBs) did not provide sufficient protection from wave impact and vibration.

#### PROBLEM SPECIFICATION

Our initial requirement was to establish the nature of the environment. With a specially assembled set of test equipment, capable of withstanding the marine environment and the shock loads, we were able to collect a mass of vibration and shock data. Dynamic models of the boat and the seating system were then created and validated against the data.

#### INJURY EFFECTS

However, the relative effects of these motions on the human spine were not readily understood. In a subsequent modelling stage a bio-fidelic human spine model was created and subjected to the loads. Using classic fatigue prediction methods and data for human tissue we were able to predict the relative rates of injury for different suspension seat concepts.

#### A NEW SEAT DESIGN

It soon became clear that the existing design of seat was inadequate, and a new concept was drawn up for a suspension system that maximised the possible protection to the crew. A prototype of this concept was then rigorously tested by the RNLI, and vibration measurements demonstrated that the design was much more effective.

#### SUCCESSFUL IMPLEMENTATION

The seat is now in production and being installed in the new RNLI Tamar Class lifeboats, as well as some other rescue craft. The programme shows how advanced engineering analysis can inform and support the development of higher performance systems.

#### Client

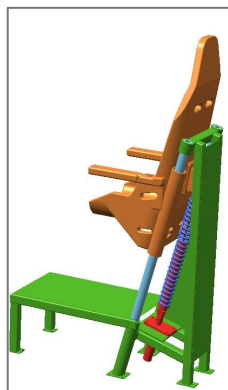
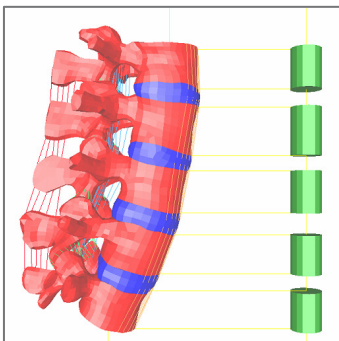
Royal National Lifeboat Institution

#### Business need

Investigation into alternative power supplies to keep moored boats warm in order to minimise response time

#### Why Frazer-Nash?

Frazer-Nash has a great expertise in mechanical and structural design using CAD tools and innovative design concept.



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