



# Case Study

## Additive manufacturing high integrity parts

### THE CHALLENGE

Frazer-Nash undertook a feasibility study to investigate how Additive Manufacturing (AM) could be used to improve Caterham's existing design for the de-dion tube, an integral component of the rear suspension assembly. The primary objective was to reduce the mass whilst maintaining structural performance.

### OUR SOLUTION

Frazer-Nash was able to use expertise from across the business covering requirements capture, design, structural analysis and material selection:

- ▶ We undertook a rigorous requirements capture approach ensuring the benefits of additive manufacture were not lost to preconceived ideas.
- ▶ Structural analysis was carried out of the existing solution to understand the system behavior.
- ▶ A range of different concepts were developed to identify the best approach. This process involved close cooperation between our mechanical design and structural analysis engineers. AM specific solutions such as the use of lattice structures were investigated.
- ▶ Using a range of software tools enabled an end-to-end process
- ▶ Numerical methods were used to calculate the optimal material layout for the design space providing a lightweight solution.
- ▶ By applying design for additive manufacture (DfAM) techniques and applying a material selection process we reached the final design which satisfied the original objectives.
- ▶ Finally we applied our understanding of AM technologies to refine the final solution.

### BENEFITS

The case study demonstrated the need to consider the bigger picture and not just the detailed design to capture the benefits AM can provide. Frazer-Nash was able to improve the existing design:

- ▶ Reduced the mass by 30% (total of 1.2kg saved across the rear suspension assembly)
- ▶ Integrated six components
- ▶ Maintained structural performance

Original design



**Client**  
Caterham

**Business need**  
Feasibility study to investigate how additive manufacturing could be used to lightweight metallic components

**Why Frazer-Nash?**  
Frazer-Nash is a multi-disciplinary engineering consultancy with expertise in design, structural analysis, material performance and systems engineering. By using expertise from a range of backgrounds Frazer-Nash can offer an end-to-end additive manufacturing solution.

**Find out more**  
To find out more about our work and how we can add value to your business visit our website.