

Developing products with CALM

How Additive Manufacturing adds value



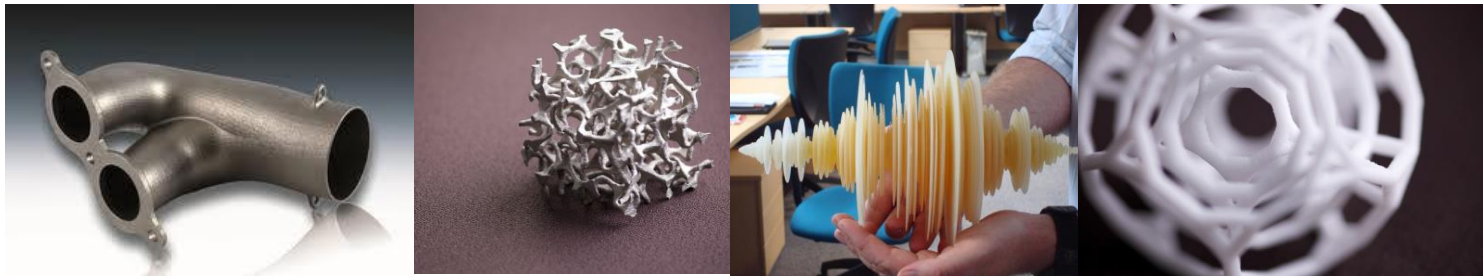
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What is Additive Layer Manufacturing (ALM)?

Additive Manufacturing (AM) – “Is the process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies”

(Source: ASTM international committee F42 on Additive Manufacturing technologies)



What are the benefits of ALM?

- Freedom of design
- No tooling required
 - Reduce time to market
 - Reduce cost
- Bespoke products at no extra cost
- Prototypes win business
- Test out design





Short video of the ALM process. Please download copies from:

http://www.eos.info/press/press_material?category=videos_and_animationen

Video courtesy of



e-Manufacturing Solutions



CALM BTC Case Study 1



Background:

- Ashwoods are researching into low cost, plug and play Complete Electric Drive systems for next generation electric vehicles
- Ashwoods have built a test rig was built incorporating the motor, gearbox and motor controller.

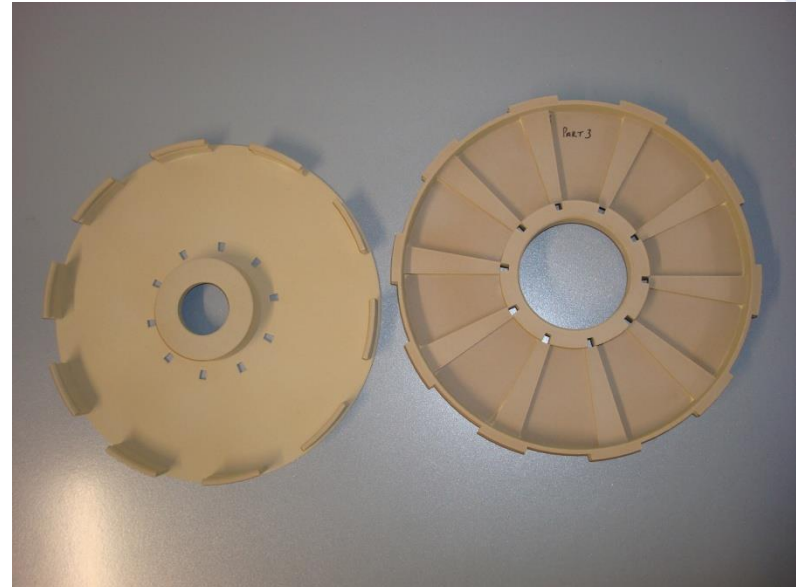


CALM BTC Case Study 1



Work with CALM, the results:

- All parts manufactured within Specification
- Tolerances obtained for critical features +/-0.2mm
- Delivered parts within 4 weeks



Working with **TANGIBLE fx**

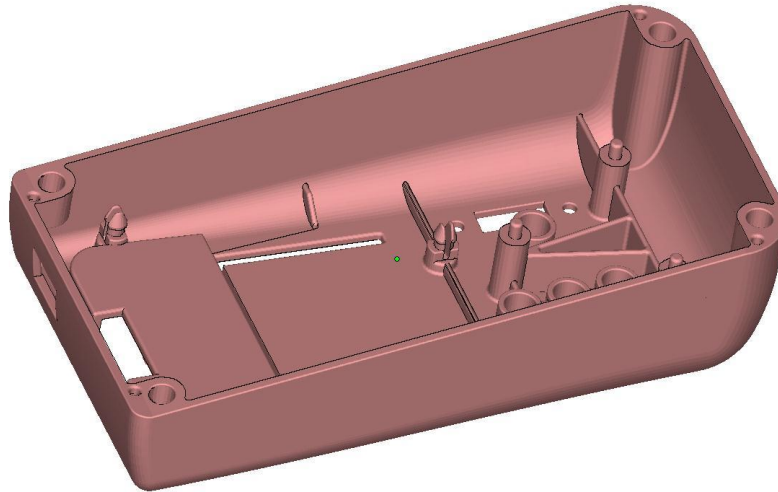
- Bristol based musician / designer Lee Arromba had an early stage prototype of a new electric guitar effects switch



Using smartphone technology the first prototype was housed in a cardboard box....

Working with **TANGIBLE fx**

After a session with CALM engineers, Tangible FX created new CAD models of the Midi Moov ready for building using Laser Sintering



Working with **TANGIBLE fx**

- The first Midi Moov's were created by CALM, enabling Tangible FX to market their product to musicians and investors



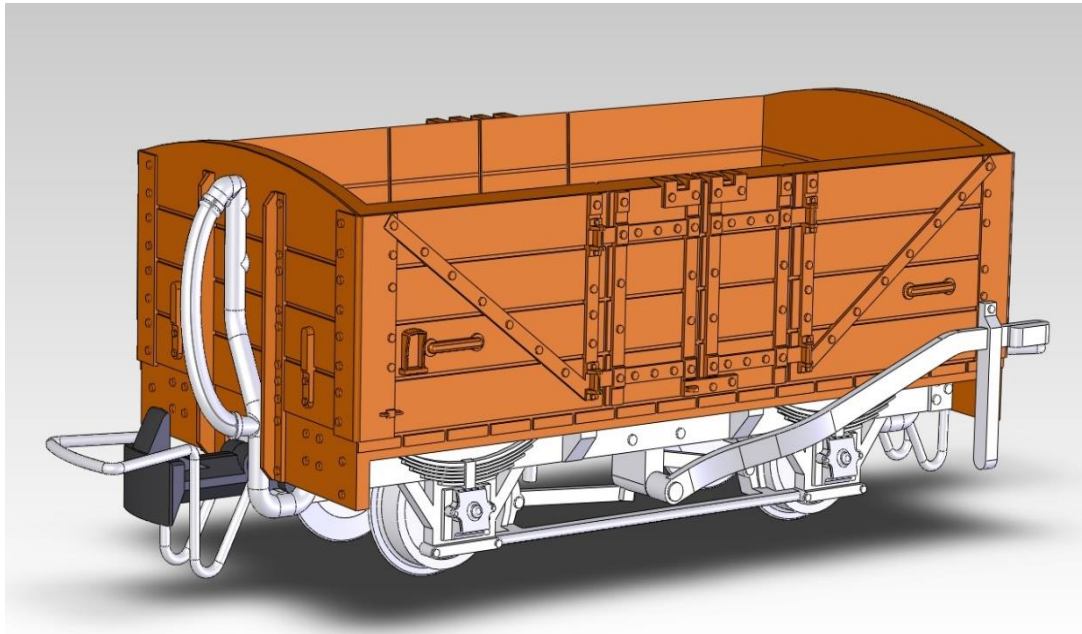
Working with **PECO**

- PECO staff attended a CALM introduction workshop



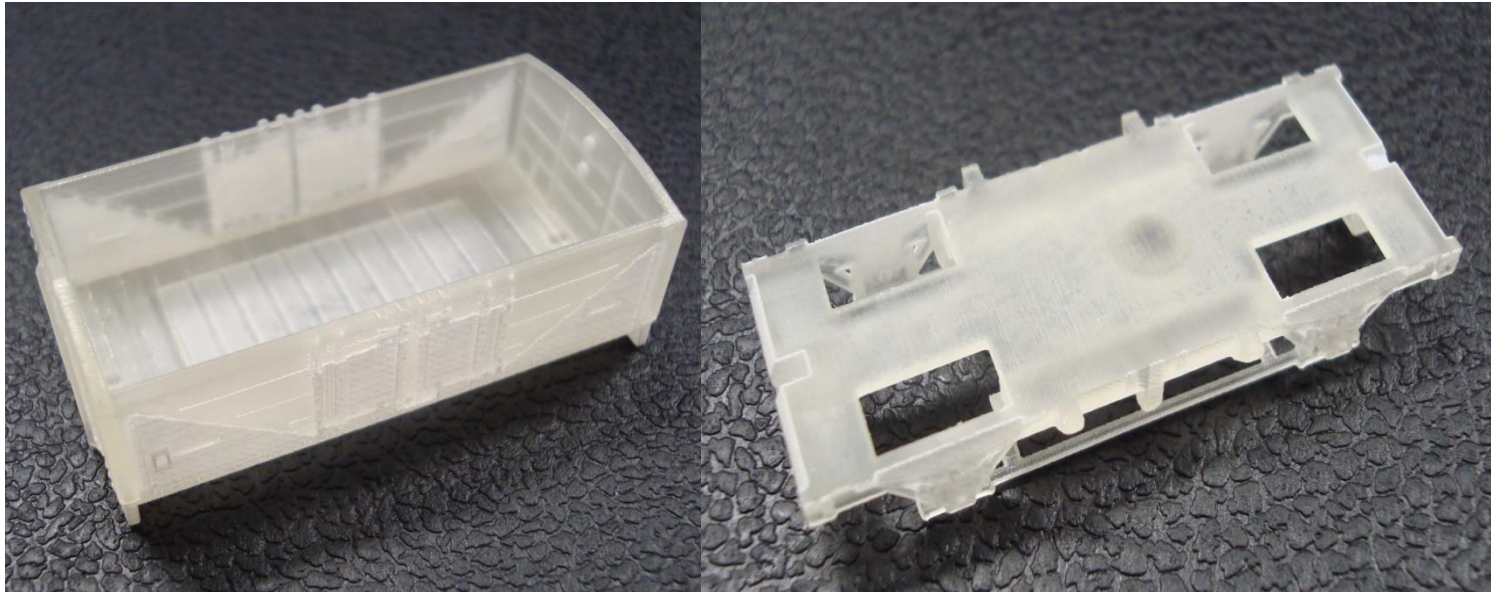
Working with **PECO**

- Using the knowledge gained from CALM, PECO sent through CAD models of a totally new product



Working with **PECO**

- CALM engineers selected the acrylic resin based, high resolution 3D Systems Projet HD to manufacture the components

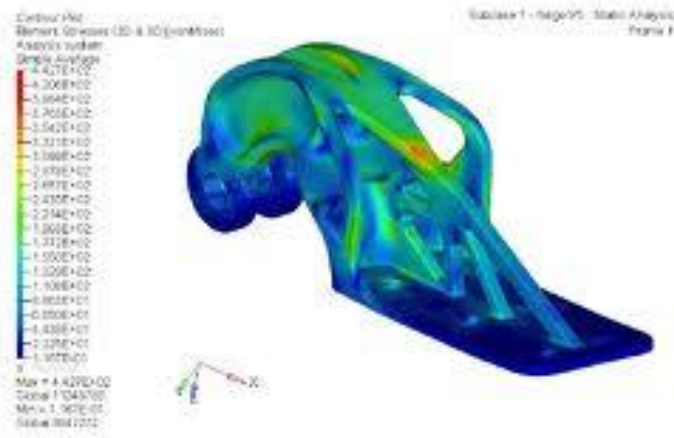


Working with **PECO**

- At the 2012 Warley National Model Railway Exhibition, PECO launched the brand new 00-9 scale wagons and coaches in the Linton & Barnstaple livery



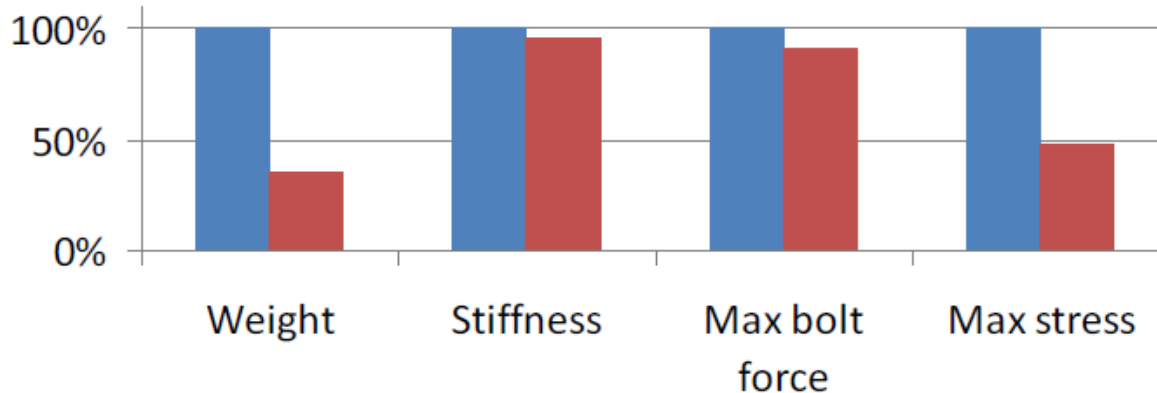
FEA - Topology Optimisation



FEA of new optimised design

Comparison of designs

FEA - Topology Optimisation



Results:

The new design weighs 326g compared to the original 918g, a reduction of 64% (25% material change + 39% design optimisation)

Benefits:

“For every 1kg reduction in weight, airlines can save around \$3,500 of fuel over an aircraft’s life” – Airbus UK Ltd