

CAAHS (Carbon Aluminium Automotive Hybrid Structures)

M. Ben Tahar, E. Beslin, R. Darlington, G. Scamans, A. Den Bakker, E. Hinton, Z. Li and A. Miranda

The CAAHS project is a 24 month Innovate UK programme in which Brunel University London is directly involved in collaboration with Bentley Motor Company, Constellium, Gordon Murray Design (GMD) and Innoval Technology.



FIGURE 1. Baseline frames (carbon fibre iPanel® + Constellium HSA6™ extrusions) produced in 2017 for dynamic crash testing.



FIGURE 2. Baseline frames produced in 2017 for testing adhesive bonding.



FIGURE 3. CAAHS 3D extruded tubes bent in 2017.



FIGURE 4. CAAHS automotive frame that will be manufactured at scale 1:1 in 2018.

The project is focused on the opportunity to significantly reduce body structure weight by utilising an aluminium frame structure. This will use a novel high strength extrusion alloy based on the Constellium HSA6™ product, in conjunction with advanced composite panels which are based on recycled carbon fibre, whilst maintaining the high volume, low cost benefits of the original iStream® technology. The target is to develop a frame that is 40 % lighter than the incumbent steel frame.

In 2017 the team worked on designing the new frame using aluminium and recycled carbon fibre panels. Aluminium alloys, extrusion shapes, cutting edge joining and manufacturing techniques were trialled at scale in Brunel University London's Advanced Metal Casting Centre (AMCC) and at GMD. Information collected through the first year of the project allowed

for development of a new advanced frame that will be manufactured in 2018 within the AMCC and at GMD.

Future work will lead to the completion and manufacture of two new frames. Before this task can be completed, the frame design will be released in early 2018 so extrusion dies can be sourced for the AMCC. Meanwhile, billets will be prepared using the BCAST DC caster, and extrusions will be produced using the BCAST 6" press. Tubes will then be shaped using the BCAST freeform bender, before being assembled together at GMD. One of the two frames will undergo crash tests to assess performance, while the second will be kept intact for showcasing at public events.