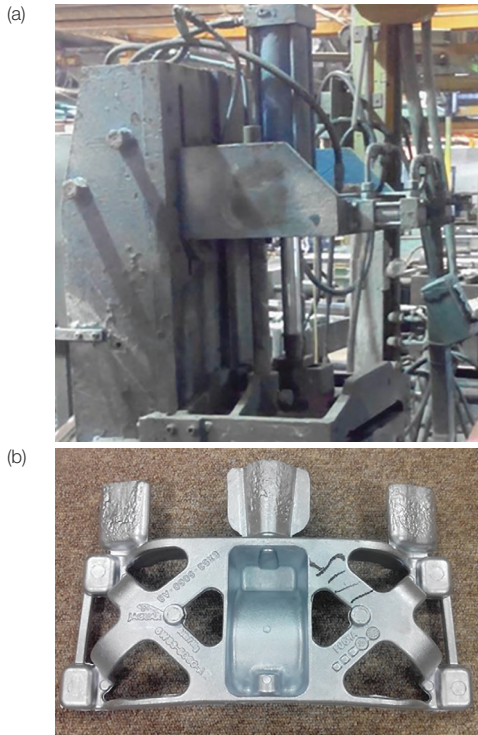


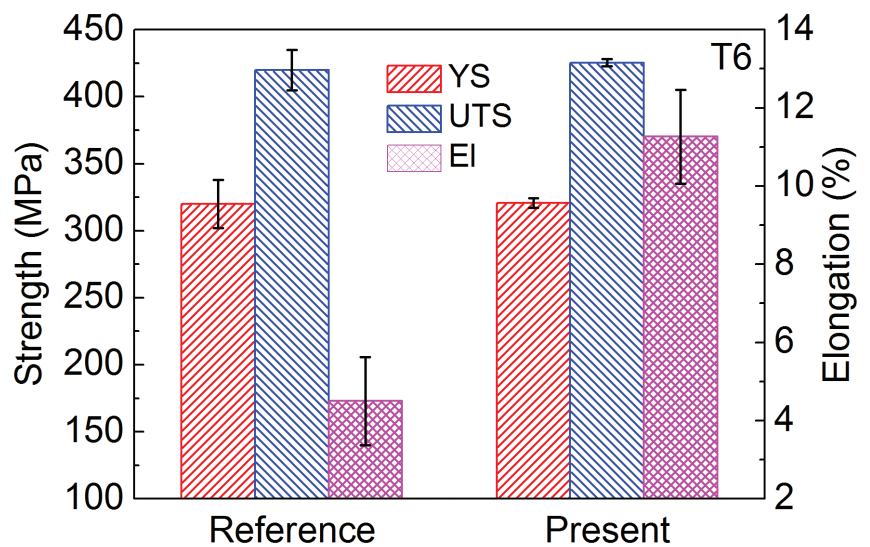
# High strength and ductility cast aluminium alloys

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The increasing demand for lightweight structures in automotive and other transport applications has driven the need for thin-walled castings with improved mechanical properties.



**FIGURE 1.** (a) Industrial tilting gravity casting trial and (b) trial gravity casting component of the developed aluminium alloy.



**FIGURE 2.** Mechanical properties of the developed aluminium alloy produced by high pressure die casting.

Supported by Innovate UK through the LEAST project, a high strength and ductility aluminium alloy has been developed for gravity casting, low pressure die casting and high pressure die casting manufacturing processes. The industrial gravity casting scale trials (Figure 1) of the newly developed aluminium alloy have successfully demonstrated improvement in strength and ductility properties of the castings.

The gravity castings of the developed aluminium alloy exhibit an excellent combination of strength and ductility, with a yield strength of 310 MPa, an ultimate tensile strength of 365 MPa, and an elongation of 11 % at ambient temperature. The newly developed aluminium alloy outperforms commercially available gravity cast aluminium alloys with 25 % increase in strength and 85 % increase in ductility.

Similarly, the high pressure die castings of the developed aluminium alloy exhibit a yield strength of 320 MPa, an ultimate tensile strength of 425 MPa, and an elongation of 11 %. Although the strengths of the developed aluminium alloy are comparable with the most advanced die cast aluminium alloys, there is a significant increase in ductility, as shown in Figure 2.

Further to the excellent mechanical properties, the developed alloy offers additional benefits such as relatively low material cost, good castability and corrosion resistance. The research work on the development of the high strength and ductility aluminium alloy has been recognised with a CMF 2017 Innovation Award in the UK. Future work will focus on the exploitation of this developed aluminium alloy for lightweight structures in other industrial applications.