



FLAMINGO

Fabrication of Lightweight Aluminium Metal matrix composites and validation In Green vehicles

Deliverable D 6.1 Report on the preparation of extrusion billets

Lead Beneficiary

Brunel University London (BUL)

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Publishable Executive Summary

This report addresses the experimental activities carried out as part of Task 6.1 (Preparation of extrusion master batches) of the FLAMINGo project. The main aim of this task is to produce pilotscale Direct Chill (DC) cast aluminium metal matrix composite (Al MMC) billets for the purpose of extrusion. These billets should contain a homogenous distribution of the reinforcement ceramic particles. A small proportion of particle clusters and limited amount of fine particle agglomeration is acceptable, as these clusters are typically found to be re-distributed by extrusion, resulting in a good dispersion in the extruded profiles. This will allow for elevated mechanical properties of the aluminium alloy.

In order to achieve the previously mentioned aim, the following four steps were performed:

- 1- Preliminary laboratory scale experiments with different particle types (Al_2O_3 , SiC, TiC) and sizes (nano, sub-micron) for the purpose of determining the most optimum particles and concentrations to be incorporated in the billet.
- 2- Production of 80mm diameter (laboratory scale, $\approx 30\text{kg}$) DC cast billets incorporating reinforcement nanoparticles for the purpose of flow-stress testing.
- 3- Flow-stress testing of the 80mm reference alloy and composite billets, as well as comparing the results of these two types of materials.
- 4- Production of 150mm diameter (pilot scale, $\approx 250\text{kg}$) DC billets incorporating reinforcement nanoparticles for the purpose of extrusion.