

Melt conditioned direct chill (MC-DC) casting of large scale 7xxx series Al-alloy at Arconics, USA

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An employee from Arconic (formerly known as Alcoa Inc.) first heard a BCAST member presenting on MC-DC casting at the TMS conference in the USA, after which he soon approached BCAST to enquire and learn more about the MC-DC casting technology and to review the status of the technology in terms of readiness for industrial application.



FIGURE 1. Typical large-scale slab casting of aluminium for aerospace applications.



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In the past few years, MC-DC casting of Al has had previous large-scale casting opportunities, which meant that our in-house development of the HSMC equipment was almost at technology readiness for the industrial trials at one of Arconic's DC casting facilities. This trial is currently in the process of planning to first ship the HSMC equipment (Model: HSMC-AI-90) to a nominated Arconic facility to perform MC-DC casting of a 7xxx series Al-alloy on a 0.55 m diameter 4-strand table, and secondly, for the first time, perform a MC-DC casting trial on a rectangular single strand table to cast a large slab of 0.61 m thickness, 1.67 m wide and 2.54 m length. The motivation behind these large-scale trials is to reduce the severe chemical segregation that is prominent in this type of casting, where current Al-Ti-B based grainers are not able to control the chemical segregation as required to avoid large crack formation upon final solidification and facilitate the thermomechanical processing generated with extrusion and forging.