From Prototype to Production

Aluminium Sand Casting with Production-Ready Integrity

- At Alucast, we manufacture high-quality aluminium sand cast prototypes designed for seamless compatibility with our aluminium high-pressure die casting (HPDC) processes. Our approach allows customers to validate component geometry, performance, and manufacturability early in the development cycle - while ensuring a smooth, confident transition to full-scale production.
- Unlike many rapid prototyping methods, aluminium sand casting produces components using production-grade alloys. The result is mechanical properties that closely mirror those of our final HPDC parts - an essential factor for applications where strength, durability, and thermal performance must be accurately assessed before committing to tooling investment.

Alucast's sand casting process provides distinct advantages:

- **Authentic Material Properties:** Sand cast prototypes are produced in real aluminium alloys, delivering representative strength, ductility, and thermal conductivity. In contrast, many 3D printed parts - particularly polymer-based or indirectly metal-printed components - cannot accurately match the mechanical behaviour of production materials.
- **Reliable Functional Testing:** Because sand cast parts behave like production components, they support meaningful structural, thermal, and pressure testing. This significantly reduces the risk of design failure later in the development cycle.
- **Design Validation for HPDC:** Prototypes are created with HPDC design considerations in mind, enabling engineers to validate wall thicknesses, draft angles, and critical features before investing in expensive die casting tooling.
- **Cost-Effective Iteration:** Compared to HPDC tooling, sand casting offers a lower-cost route for design iteration, allowing refinements without significant capital expenditure.
- **Reduced Development Risk:** By bridging the gap between concept and production, sand cast prototypes help identify and resolve potential issues early, improving confidence ahead of full-scale manufacturing.

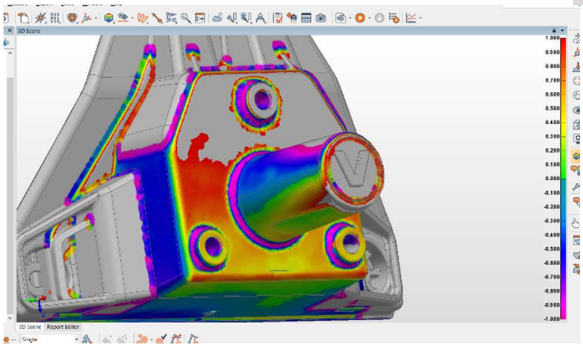
Supporting a Smooth Transition to Production

- By combining the flexibility of sand casting with deep expertise in high-pressure die casting requirements, Alucast delivers a robust prototyping solution that supports faster development timelines, reduces risk, and ensures production readiness from the outset.

Case Studies: Functional validation of Automotive Heat Sinks and Spare Wheel Carrier Brackets

Automotive OEM'S approached Alucast to support the development of complex aluminium components intended for high-pressure die casting. Initially, the customer used 3D printed prototypes to assess fit and basic geometry. However, on both occasions these parts failed during early-stage functional testing due to insufficient mechanical strength and poor thermal performance - limiting usefulness validation.





To overcome this, Alucast produced a series of aluminium sand cast prototypes using a production equivalent alloy. These components were manufactured with design features aligned to future HPDC requirements, including appropriate wall sections and draft angles.

The results delivered immediate value:

- **Successful Functional Testing:** The sand cast parts withstood structural and thermal testing conditions, providing accurate, reliable performance data.
- **Design Optimisation Prior to Tooling:** Minor design adjustments were identified and implemented before committing to expensive die casting tooling - avoiding costly late-stage changes.
- **Reduced Development Time:** By eliminating multiple rounds of unsuitable prototypes, the customer accelerated the validation phase and maintained project momentum.
- **Cost Savings:** Early issue detection prevented expensive modifications to HPDC tooling, saving both time and capital investment.

Ultimately, the project transitioned smoothly into our high-pressure die casting, with full confidence that the design had already been proven under real-world conditions.

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