

Casting Process: Lost Foam Casting

Lost foam casting is a relatively recent innovation that exhibits characteristics of both investment casting and sand casting. It is a form of evaporative pattern casting where the pattern is of foam rather than wax. The foam pattern is covered in refractory material, as in investment casting, but the 'shell' is then surrounded by compacted un-bonded sand to give it strength. When molten metal is poured into the shell the foam pattern vaporises on contact. The result is a process that delivers the quality and accuracy of investment casting with the lower costs and greater flexibility of sand casting.

This process data sheet describes the basic steps involved in the lost foam casting process as well as the benefits and limitations of the process:

- 1** A foam pattern is made using expanded Polystyrene (2.5% Polystyrene, 97.5% air). This can be formed by closed-die moulding, machining or assembly from multiple parts. Risers and gates are included at this stage.
- 2** Multiple finished patterns (including gating system) are glued together to form a cluster.
- 3** Cluster is coated with a permeable refractory slurry, usually by dipping. Once dry, the refractory coating forms a hard shell around the foam pattern. Refractory coatings vary depending on the surface finish required.
- 4** The cluster is placed in a foundry flask or box and surrounded by loose, un-bonded sand which is vibrated to aid compaction.
- 5** Molten metal is poured into the mould. The foam pattern instantly vaporises and metal fills the void left within the refractory shell.
- 6** Once cooling and solidification has taken place, the sand and shell are broken away, the risers and gates are removed and the finished casting remains.
- 7** The cast product or component can then be finished, treated or machined as with any other casting.



Lost Foam Casting

Why Use NovaCast Lost Foam Casting?

Lost Foam Casting delivers many benefits, including:

- Dimensionally accurate with typical linear tolerances of just $\pm 0.005\text{mm/mm}$
- Excellent surface finish (2.5 to $25\mu\text{m}$)
- Requires no draft to aid removal from the mould
Has no parting lines and no flash is formed
- Less need or further machining
Cheap and simple unbonded sand
- Fewer steps are involved than with investment casting so costs are lower
- Minimum wall thicknesses just 2.5mm, no upper limit
- Risers not normally needed: less metal and finishing
- Natural directional solidification takes place, so casting is more predictable with fewer defects
- Foam patterns are easy to manipulate, carve, glue and handle
- Multiple parts can be joined in a single complex casting, reducing the need for post casting assembly
- Suitable for Aluminium and Nickel alloys, Steels and Cast Iron, Stainless Steels and Copper alloys.
- Cast parts can range from 0.5kg to several tonnes

Limitations of the process

There are some disadvantages including:

- Pattern costs can be high for low-volume applications
- Patterns can be easily damaged or distorted
- If closed-die moulding is used to create the pattern then the cost of the die can be high

About NovaCast

NovaCast has over 40 years of ferrous and non-ferrous metal casting experience extending into markets as diverse as transport, utilities, offshore and general engineering. Our non-ferrous foundry, in Melksham, England, is supported by a fully risk-managed supply chain that extends out to the Far East allowing us to provide a single source solution for precision cast and machined components.

To find out more, get a quote or just to discuss your project, give us a call on +44 (0)1225 707466 or email sales@novacast.co.uk