Enable your designs with
Additive casting

A guide to success

Enable has developed a new manufacturing process combining traditional metal casting with additive manufacturing. We call this Additive Casting. The benefits of this new process are plenty and include a reduction in lead-time, improved quality and casting definition as well as significant cost saving. With Additive Casting, parts can be cast in the endless array of metals available for traditional casting, making sure you don’t have to compromise.

This guide has been designed to help you optimise your design for the Additive Casting process. It includes the most frequently used optimisation techniques but is by no means exhaustive. Please contact us if you need help with your part.

The right process for your part

Fine Detail
15 x 10 x 5mm to 250 x 250 x 250mm
0.005 to 6kg

Additive Investment Casting
We recommend switching to the Large process for parts heavier than 4kg for greater cost effectiveness. If your part is greater than 4kg but your part requires fine part detail, please contact us.

Large
> 50 x 50 x 50mm
No size or weight limit.

Additive Sand Casting
Online Pricing via the Enable Pricing Platform is available up to 550 x 550 x 550mm. For larger parts, please contact us and one of our engineers will get in touch.

Instant quotations
.STL
.OBJ
.WRL
.STEP
.STP
.IGES
.IGS
.3MF
.DXF
.ZIP

up to 200mb

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# The good design guide

## Minimum Wall Thickness

| Tmin > 2mm (Fine Process) | Tmin > 3mm (Large Process) |

Minimum wall thickness is influenced by the aspect ratio (depth to thickness) and by the span of the wall. Wall thickness is required to ensure molten metal can flow through the space uniformly. The span of the wall surface area also impacts the minimum wall thickness, as thin walls spanning a large surface area can inhibit metal flow and cause defects.

## Corner Fillet and Radii

| Inner radii > 0.2T or ≥0.5mm | External radii > 1.5T or <0.5mm |

As with all engineering processes, sharp corners are not recommended as they create stress raisers and inhibit the flow of molten metal through the mold. Cast metal will naturally form a small radius on sharp corners. A radius is recommended to ensure that corners are correctly formed. When in doubt, use 0.5mm radii on all corners.

## Blind Hole Size

| Diameter to be equal or less than hole width |

Maximum hole depth is equivalent to the hole diameter. Blind holes are limited by the shelling stage in our fine detail process, which sees a ceramic slurry coating the entire part’s surface prior to casting. Deep and narrow blind holes can inhibit shelling at the bottom of these which can lead to the shell cracking during casting. We recommend adding deep blind holes in the post machining process.

## Machining Stock Allowance

| A minimum stock allowance of 0.5-1.5% of wall thickness (1.5-6mm) |

Stock should be added to any faces requiring post-machining at the design stage. This is recommended on any critical dimensions, mating surfaces, tapped and clearance holes. If in doubt, use 2mm for machining stock or contact one of our engineers to discuss your requirements.

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Embossed or engraved details should be raised/recessed by at least 2mm with no sharp corners. For any specific requirements please contact our engineers.

Hollow components are possible, but they must be created with features that will allow the removal of sand or shell after casting. Long and narrow cavities could require special treatment. Please check with our engineers for advice.

For best performance, threads and other high surface requirement features should be machined after Additive Casting. Be sure to add machining stock to any of the features that will require a thread during post processing. For any specific requirements please contact our engineers.

Super fine lattice structures are best directly metal printed. However, we can process complex structures as long as we can print the shape and the metal can flow through it. This generally means wall thicknesses greater than 2mm and gaps between walls greater than 3mm.
Don’t worry about...

Orientation

Unlike direct metal printing, the orientation that the part will be printed in doesn’t matter. Mechanical properties are not directional, and we don’t have support structures to remove. As with any additive process, build lines may be visible on some surfaces. However, they do not affect the mechanical properties.

Draft Angles

Not required with additive casting as we 3D print the casting mould, removing this limitation on part geometry and creating significantly more freedom in design.

Support Structures

Additive casting utilises a binder jet 3D print process which does not require supporting structures to print any sized part.

Gating and Vents

Integrating gates and vents for casting in your design is not a requirement. We work closely with our foundry experts who can advise the best gating and venting design for your part based on their own experience.

Undercuts

Since parts do not need to be ejected from a mould, there is no need to eliminate undercuts from your design.
We are here for you.

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