# DESIGN GUIDE

Helpful tips for successfully designing for Additive Casting®



### Designing for ADDITIVE CASTING®

E nable Manufacturing 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 leadtime, 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.



### **Benefits of Additive Casting**



**Range of sizes** From 10 mm to 60 tonnes



*Short lead-times* Metal parts delivered within 4 weeks



**Design flexibility** Highly complex parts are now castable



**Cost competitive** No investment in tooling and inventory



*High quality* Scale production at high quality



**Choice of metals** Choose from 130+ metals



# The right **PROCESS FOR YOUR PART**

Depending on the part requirement, Enable Manufacturing uses three processes for its Additive Casting service:

- Vacuum Additive Casting for ultra-fine detail (up to 190 x 160 x 160mm)
- Investment Additive Casting for fine detail (up to 250 x 250 x 250mm)
- Sand Additive Casting for large parts (up to 60 tonnes)

We will determine the right printing technology and casting process for your part, depending on criteria such as metal, quantity, scale, and quality standards.

#### Contact us today for help with your part at <u>office@enable.parts</u>

### Vacuum Additive Casting



**Ultra-fine detail** Ideal for small and highly intricate parts, suitable for rapid prototypes or volumes up to 100,000 per year.

Choose your metal from the **Material Table** at <u>enable.parts/downloads.</u>

#### Maximum component sizes are:



Investment Additive Casting



Fine detail

Suitable for rapid prototypes and medium production volumes of complex parts.

Choose your metal from the **Material Table** at <u>enable.parts/downloads.</u>

### Sand Additive Casting



#### Large parts

Ideal for very large and heavy parts, suitable for rapid prototyping and production volumes up to 100,000 per year.

Choose your metal from the **Material Table** at <u>enable.parts/downloads.</u>





### **DESIGN GUIDE**

### Please get in touch with us at <u>office@enable.parts</u> if any of your part's features fall outside the scope of this design guide.

Internal and External Corner Radius



Vacuum Additive Casting	1 mm Contact us for parts <1 mm	Vacuum Additive Casting	0.2 mm (both internal and external)
Investment Additive Casting	2 mm	Investment Additive Casting	Internal Radii ≥ 2 mm External Radii ≥ 0.5 mm
Sand Additive Casting	4 mm	Sand Additive Casting	3 mm (both internal and external)



We recommend deep holes or holes under 10mm in diameter requiring a tap or tolerance fit should be filled in and machined post-casting.

Minimum Wall Thickness

We recommend deep holes or holes under 10mm in diameter requiring a tap or tolerance fit should be filled in and machined post-casting.

Depending on the part and its design, specifications may vary from those referenced in this guide. To get specific guidance for a particular part, please contact us at office@enable.parts.



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#### Machining Stock Allowance

Taps, Threads, Clearance Holes, and Other Performing Surfaces





Suitable for logos, letting, numbering, etc as both raised or sunken details.

Custom ceramic cores can be used for narrow cavity spaces and internal channels. Get in touch with us if your part contains these features. All cavities will require exit hole(s) to support the mould cores during casting.

Depending on the part and its design, specifications may vary from those referenced in this guide. To get specific guidance for a particular part, please contact us at office@enable.parts.





### Don't WORRY ABOUT...

### 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.

### Orientation

Unlike direct metal printing, the orientation that the part will be printed in doesn't matter. As with any additive process, build lines may be visible on some surfaces. However, they do not affect the mechanical properties.

### Undercuts

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



# Parts made with **ADDITIVE CASTING**

To see more parts, resources and case studies, please visit our website at www.enable.parts.



In October 2020, we were granted funding by Innovate UK that we have used to create complex metal parts. <u>Follow us on LinkedIn</u> to keep up-to-date.

### Investment Additive Casting





**Complex metal parts have just become castable!** <u>Find out more</u> about this lattice structure, manufactured in collaboration with Gen3D.

### Vacuum Additive Casting

Small parts with complex surface structures and lots of detail can now be cast and scaled at low cost.





Watch the video and learn more about these parts and how we can help you with your prototype and manufacturing needs.

#### Sand Additive Casting





Using sand castings, we can cast large parts with a weight of up to 60 tonnes.



## We are here for you.

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