



Pros & Cons of Sand Castings



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What is Sand Casting

Sand casting is the most widely used **metal casting** process accounting for a major percentage of total cast in weight. During sand casting process, material is heated to the correct temperature to melt and sometimes treated to modify the chemical composition to achieve the required material properties. Then the molten metal is poured into a mould which has the desired shape cavity to cool down and solidify.



To be able to understand any manufacturing process, first careful consideration must be given not only for its advantages but importantly for its potential limitations and process difficulties.

To produce the best quality sand castings at the lowest possible cost, it is important that the designers give careful attention to several process requirements and understand the limitation of sand casting.

There are 8 key elements of sand casting, viz., draft angle, parting line, undercuts & cores, cross sections, wall thickness, corners & angles, junction design, casting allowance that need to be taken into considerations to avoid the common pitfalls mechanical engineers face during the sand casting process.

Defects or the disadvantages will be an issue only if it affects the functionality of the part. So selection of the suitable manufacturing process is vital to satisfy the part functional requirement.

Advantages of Sand casting

- **Design flexibility** – The size and weight of parts can range from few millimetre & grams to meters & many tons. The size and weight of the cast are only limited by the restriction imposed by molten metal handling and supply.
- **High complexity shapes** – No other process offers the same range of possibilities for the shaping of complex features than casting that can produce near net shape components.
- **Wider material choice** – Virtually all types of engineering alloys can be cast as long as it can be melted.
- **Low cost tooling** – Tooling and equipment costs are low compared to some other metal manufacturing processes. Hence making it one of the cheapest method to achieve near net shape components
- **Short lead time** – Short lead time compared to others and hence ideal for short production runs.













Disadvantages of Sand casting

- **Low strength** – Low material strength due to high porosity compared to a machined part.
- **Low dimensional accuracy** – Because of shrinking and the surface finish dimensional accuracy is very poor.
- **Poor surface finish** – Due to internal sand mould wall surface texture.
- **Defects unavoidable** – Like any other metallurgical process, defects or quality variations such as shrinkage, porosity, pouring metal defects, surface defects are unavoidable
- **Post processing** – Secondary machining operation often required if tighter tolerance needed to interface with other mating parts

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<p>Good design flexibility</p> <p>The size & weight of parts can range from few millimetre & grams to meters & many tons</p>	<p>Low strength</p> <p>Low material strength due to high porosity compared to a machined part</p>
	
<p>High complexity shapes</p> <p>No other process offers the same range of possibilities for the shaping of complex features than casting</p>	<p>Poor surface finish</p> <p>This is due to internal sand mould wall surface finish</p>
	
<p>Wider material choice</p> <p>Virtually all types of engineering alloys can be cast</p>	<p>Low accuracy</p> <p>Low dimensional accuracy due to poor surface quality and shrinkage</p>
	
<p>Low cost tooling</p> <p>Tooling and equipment costs are low compared to some other metal manufacturing processes</p>	<p>Defects unavoidable</p> <p>Defects such as shrinkage, porosity, pouring metal defects, surface defects are unavoidable</p>
	
<p>Short lead time</p> <p>Short lead time compared to others and hence ideal for short production runs</p>	<p>Post processing</p> <p>Secondary machining operation often required if tighter tolerance needed</p>

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About engineeringproductdesign.com

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