

A large industrial vacuum molding machine is the central focus of the image. It is a massive, dark-colored structure with numerous circular ports and flanges. The machine is situated in a large, well-lit industrial facility with a high ceiling and visible structural beams. In the background, three people are standing and observing the machine. The overall scene conveys a sense of large-scale industrial manufacturing.

Vacuum Molding Process

- **BETAL FOUNDRY SOLUTIONS**
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Needs for today's foundries:

- Environmentally friendly processes
- Near net shape castings
- Immediate response to customer
- Lower labor cost
- Less raw material consumption

BETAL

No metal casting process is suitable
for all parts

FOUNDRY SOLUTIONS

- What is the V-PROCESS and how it works
 - V-PROCESS produces castings with a smooth surface, and excellent detail. They may be machined, painted and used as a production part



What is the V-PROCESS

One of the newest casting processes; the “**V-PROCESS**” in which un bonded sand is held in place in the mold by a vacuum. In this process the pattern is covered by a tightly conforming thin sheet of plastic which is applied with vacuum after being heated. A flask is placed over the plastic coated pattern, and is filled with free-flowing sand. Another sheet of plastic is placed over the top of the sand in the flask and the flask is evacuated. The vacuum “hardens” the sand so the pattern can be withdrawn. The other half of the mold is made the same way. After cores are put in place, the mold is closed and poured while still under vacuum. When the metal has solidified, the vacuum is turned off and the sand runs out freely, releasing the casting.



Advantages of V-Process

- 1. No Draft**
- 2. No Sand Resin**
- 3. No Sand Use**
- 4. Accurate Tolerances**
- 5. Unlimited Pattern Life**
- 6. Smooth Surface Finish 125 RMS**
- 7. Thin Wall Thickness**
- 8. Low Labor Cost**
- 9. Less Shot Blast**
- 10. Easy Part removal from mold**
- 11. Low investment for automation**
- 12. Production of heavy castings**

Process	Description	Typical Size Range	Tolerances	Surface Finish	Min. Draft Required	Min. Section Thickness	Typical Order Quantities	Typical Tooling Costs	Nominal Lead Times
V-PROCESS Castings	Extremely fine sand is "vacuum packed" around pattern halves. The pattern is removed and metal poured into cavity. The vacuum is released and the casting removed.	Up to 150 lbs	$\pm .010"$ for the first 1", then add $\pm .002"$ inches/inch. Add $\pm .020"$ across parting line	125-150 RMS	None	.125"	All	\$3,000 to \$14,000	Samples: 2 to 6 weeks Production: 2 to 6 weeks after approval
Sand Castings	Treated sand is molded around a wood or metal pattern. The mold halves are opened and the pattern removed. Metal is poured into the cavity. The mold is broken and the casting removed.	Ounces to tons	$\pm 1/32"$ to 6", then add $\pm .003"$ inches/inch. Add $\pm .020"$ to .090" across parting line	200-550 RMS	1 to 5 degrees	.25"	All	\$800 to \$4,000	Samples: 2 to 6 weeks Production: 2 to 6 weeks after approval
Investment (Lost Wax)	A metal mold makes wax replicas. These are joined and surrounded by an investment material. Wax is melted out and metal is poured into the cavity. The molds are broken and the casting removed.	Ounces to 20 lbs	$\pm .003"$ to 1/4" $\pm .004"$ to 1/2" $\pm .005"$ to 3", then add $\pm .003"$ inches/inch.	63-125 RMS	None	.060"	Under 1000	\$3,000 to \$20,000	Samples: 8 to 10 weeks Production: 5 to 12 weeks after approval
Permanent Mold	Molten metal is poured into a steel mold. The mold is opened and the casting is ejected.	Ounces to 100 lbs	$\pm .015"$ to 1", then add $\pm .002"$ inches/inch. Add $\pm .010"$ to .030" across parting line	150-300 RMS	2 to 5 degrees	.1875"	500+	\$5,000 to \$25,000	Samples: 8 to 20 weeks Production: 10 to 12 weeks after approval
Plaster Mold	A plaster slurry is poured into the pattern halves. After setting, the mold is removed from pattern, baked, assembled and metal poured into the cavity. The mold is broken and the casting removed.	Ounces to 50 lbs	$\pm .005"$ to 2", then add $\pm .002"$ inches/inch. Add $\pm .010"$ across parting line	63-125 RMS	1/2 to 2 degrees	.070"	Prototypes up to 250 pcs	\$3,000 to \$15,000	Samples: 2 to 10 weeks Production: 4 to 8 weeks after approval
Die Casting	Steel dies, sometimes water cooled, are filled with molten aluminum. The metal solidifies, the die is opened and the casting ejected.	Ounces to 15 lbs	$\pm .002"$ inches/inch. Add $\pm .015"$ across parting line	32-63 RMS	1 to 3 degrees	.030" to .060"	2500+	\$10,000 to \$100,000	Samples: 12 to 22 weeks Production: 8 to 14 weeks after approval

Tolerance Comparison

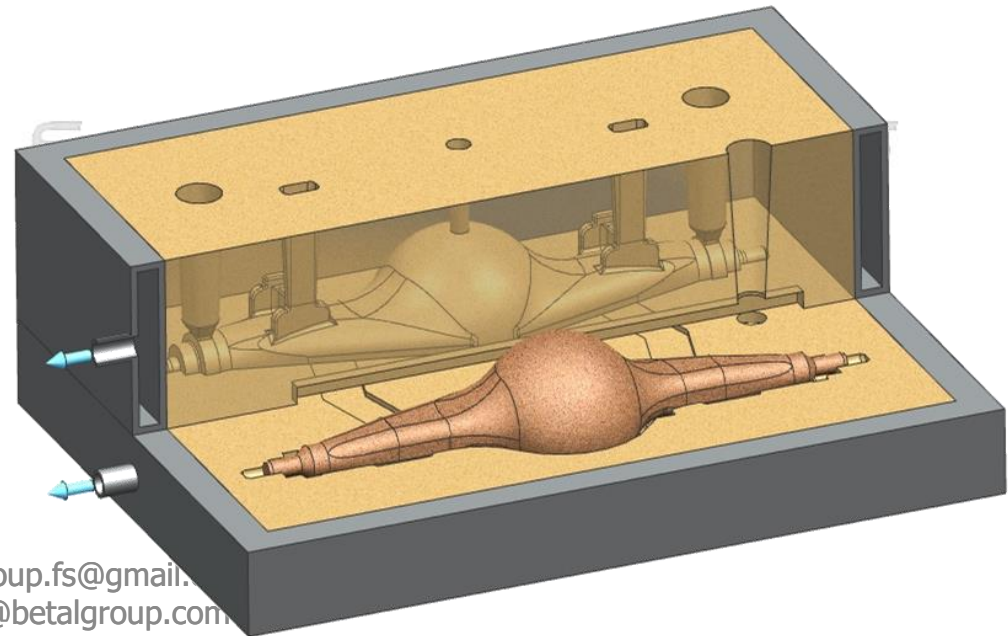
<u>Casting Method</u>	<u>3 Inches</u>	<u>6 Inches</u>	<u>12 Inches</u>	<u>24 Inches</u>	<u>Parting Line Shift Requires an Additional</u>	<u>As Cast Surface Finish (RMS)</u>
V-Process	±.014	±.020	±.032	±.056	±.020	125-150
Sand Cast	±.030	±.035	±.060	±.125	±.020-.060	250-500
Permanent Mold	±.019	±.025	±.037	±.061	±.010-.025	50-200
Plaster Mold	±.015	±.024	±.042	±.078	±.015	90-125
Die Cast	±.006	±.009	±.015	±.027	±.015	30-60
Investment Cast	±.009	±.015	±.027	±.051	N/A	90-125

NOTE:

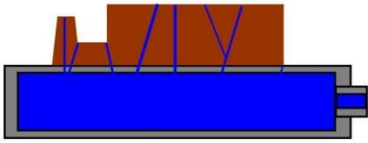
1. FOR EACH PROCESS LISTED, CORED AREAS OR SLIDES, REQUIRE INCREASED TOLERANCES.
2. LISTED TOLERANCES ARE FOR CASTING, PRIOR TO MACHINING.
3. "RMS" FOR CORED AREAS WILL VARY.
4. FLATNESS DEPENDS ON SIZE AND GEOMETRY OF THE PART.

Vacuum Molding Steps

= O U N D R Y

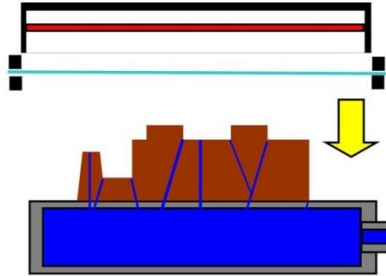


Step 1



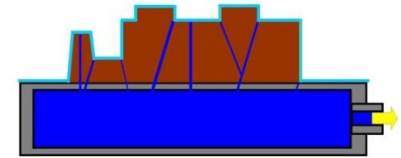
Pattern is placed in a hollow pattern carrier

Step 2



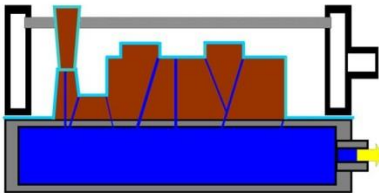
A thin sheet of plastic film is heated and vacuum fitted to the pattern

Step 3



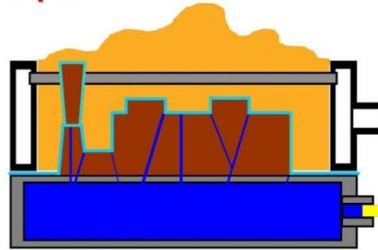
Pattern is now covered (shrink-wrapped) with a thin sheet of plastic film

Step 4



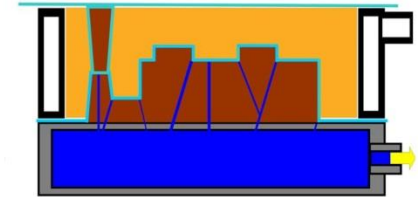
Flask is placed around the film-covered pattern

Step 5



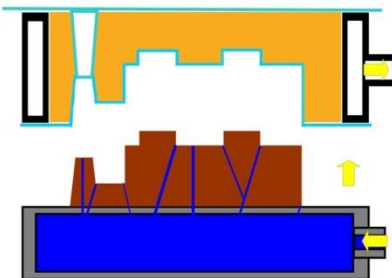
Flask is filled with a fine, dry un-bonded sand. A slight vibration compacts the sand to maximum bulk density

Step 6



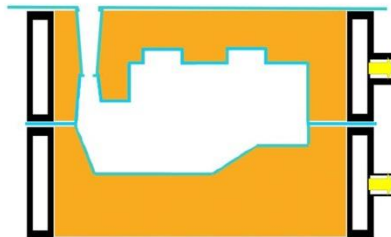
A second sheet of plastic film is placed on top of the mold and vacuum is applied to the flask and released from the pattern

Step 7



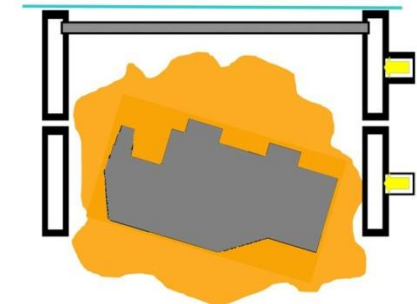
The flask is stripped off the pattern and placed on the pouring line

Step 8



The cope and drag assembly form a plastic-lined cavity ready to be filled with molten metal

Step 9



After the metal has solidified the vacuum is released

How the V-PROCESS Works

Step #1

- Pattern is placed in a hollow pattern carrier



How the V-PROCESS Works

Step #2

- A thin sheet of plastic film is heated and vacuum fitted to the pattern



How the V-PROCESS Works

Step #3

- Pattern is now covered (shrink-wrapped) with a thin sheet of plastic film



How the V-PROCESS Works

Step #4

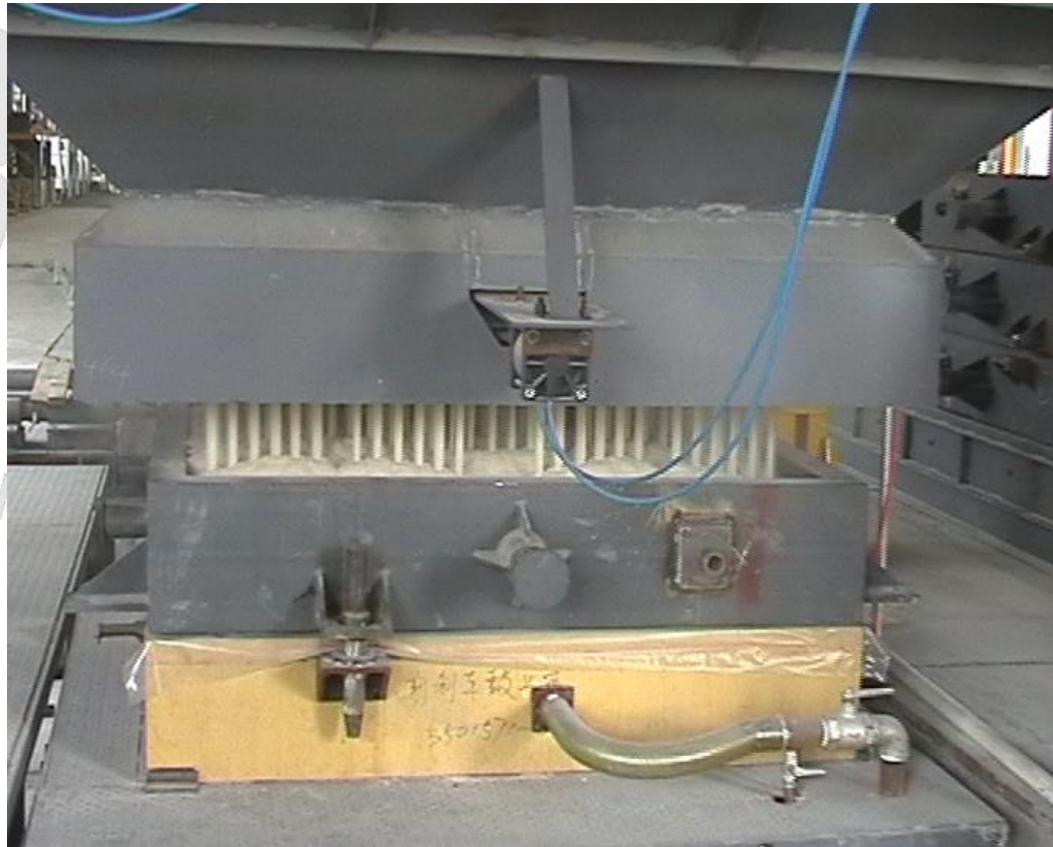
- Flask is placed around the film-covered pattern



How the V-PROCESS Works

Step #5

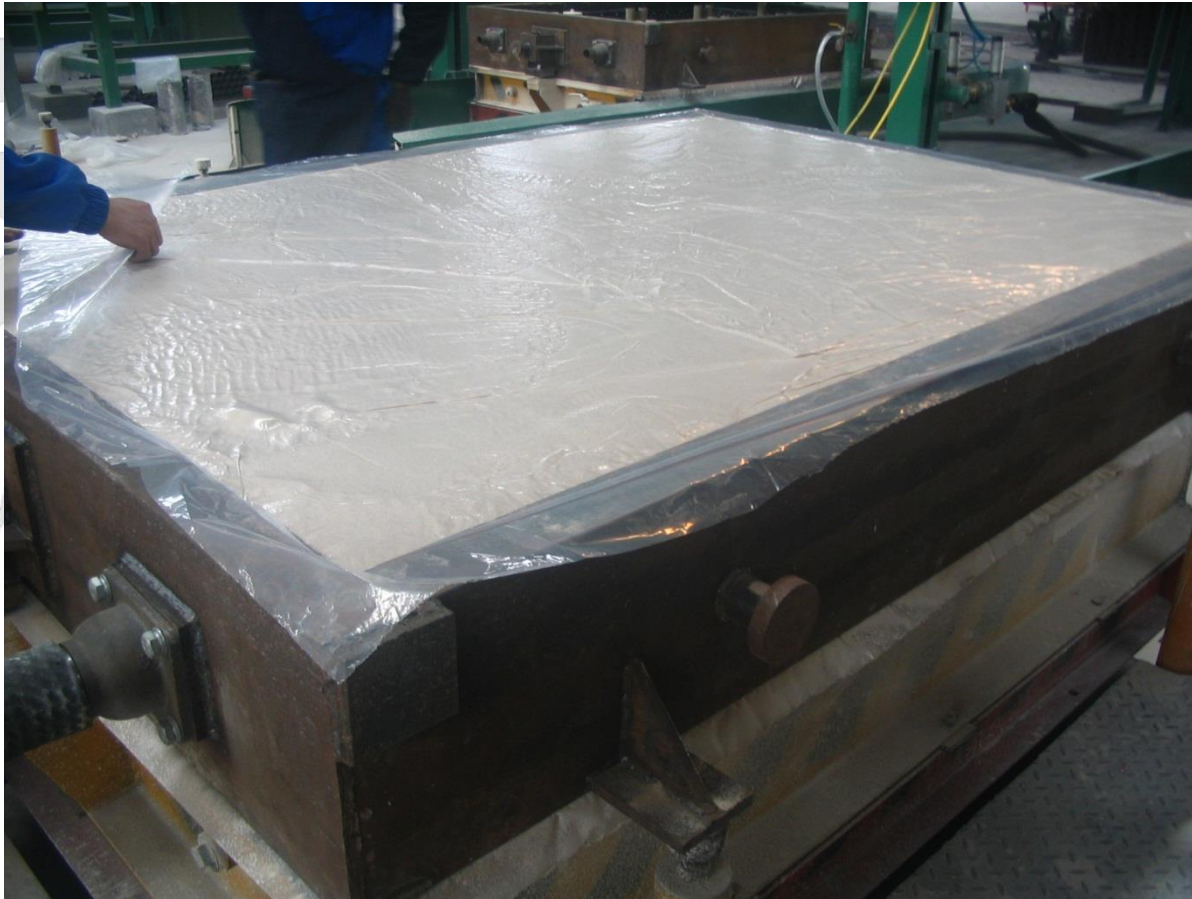
- Flask is filled with a fine, dry un-bonded sand. A slight vibration compacts the sand to maximum bulk density



How the V-PROCESS Works

Step #6

- A second sheet of plastic film is placed on top of the mold and vacuum is applied to the flask and released from the pattern



How the V-PROCESS Works

Step #7

- The flask is stripped off the pattern and placed on the pouring line



How the V-PROCESS Works

The other half of the mold is produced in a •
similar manner (steps 1 to 7) and aligned to
the first half

How the V-PROCESS Works

Step #8

- The cope and drag assembly form a plastic-lined cavity ready to be filled with melt



How the V-PROCESS Works

Step #9

- The cope and drag assembly while remaining under vacuum are poured



How the V-PROCESS Works

Step #10

- After the metal has solidified the vacuum is released



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***EXAMPLES OF
Parts Produced***

= O U N D R Y S O L U T I O N S



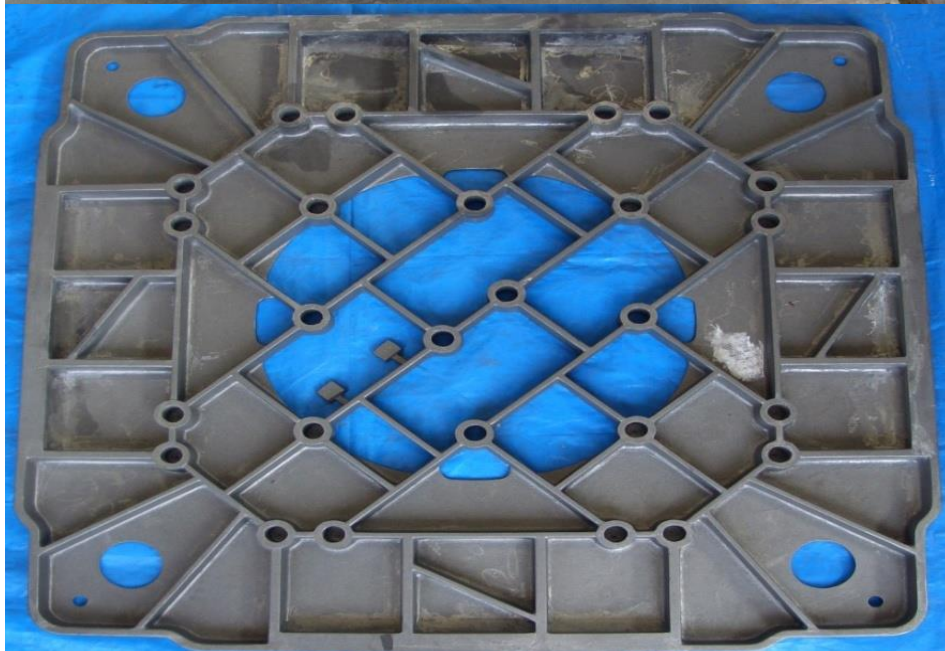
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info@betalgroup.com



= O U

T I O N S

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工番 YG8203 材質 SCH13B
尺寸 1700×1550×60mm 重量 235.5kg

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880 Kg

F O U N D R Y

480 Kg



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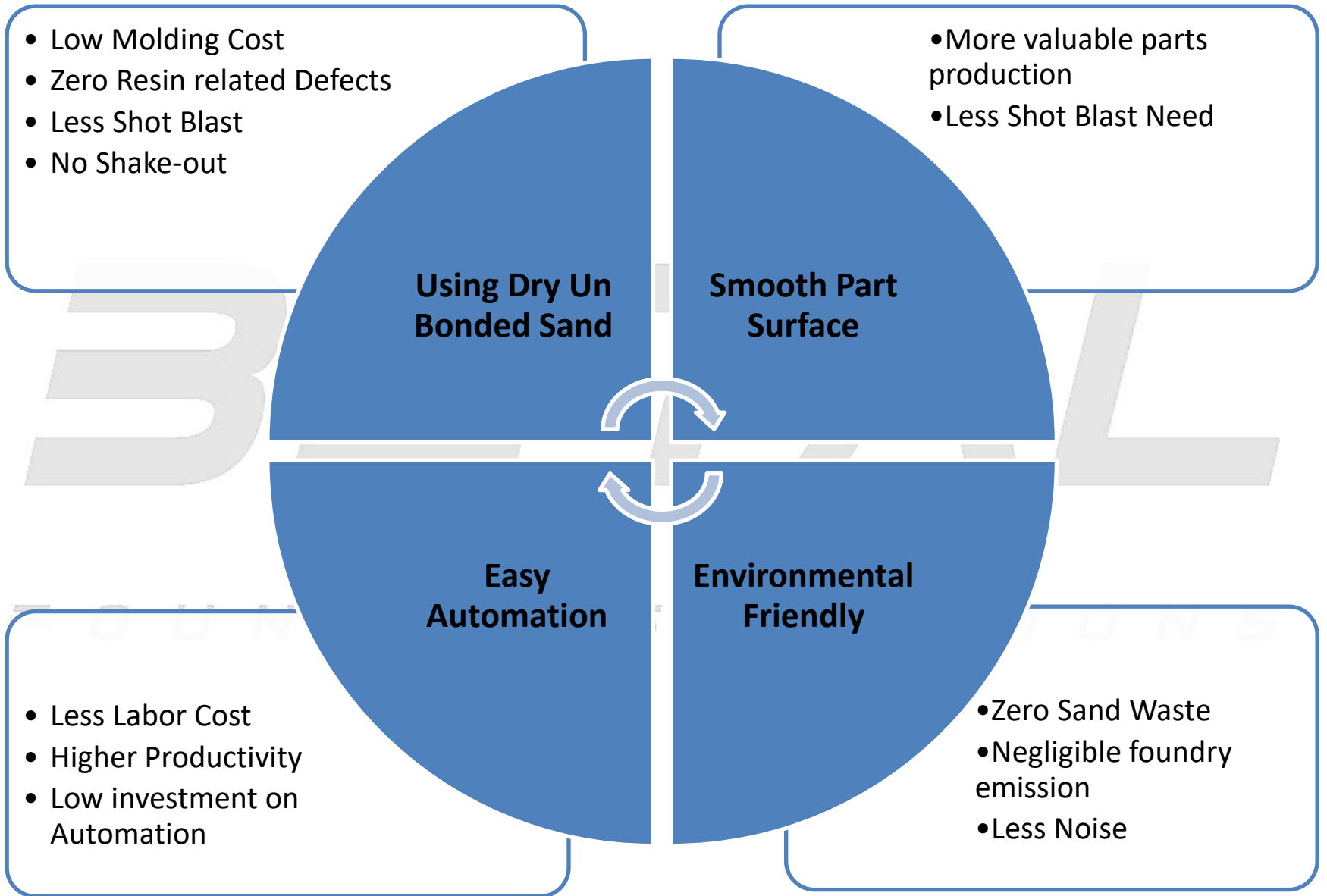


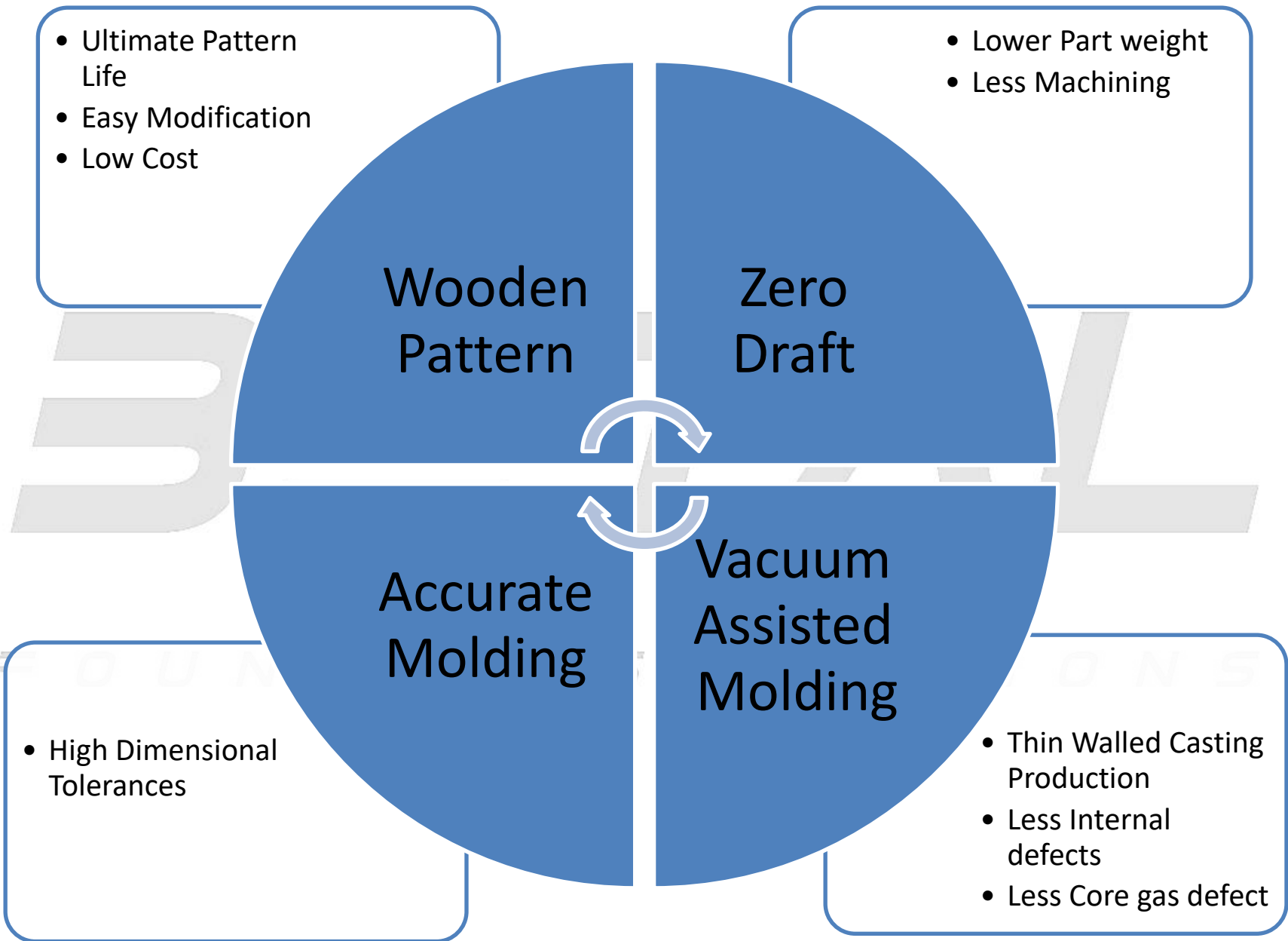
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BETAL **ADVANTAGES**

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Comparison of the Volume of Waste Materials Generated

1 ton Cast Iron Product Generates ...

