Spec Sheet

BRIGHTORB™ ENGINEERING

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for Sustainable Molding

Taking advantage of its features such as high fire resistance, high definition, and inorganic materials, the 3D printer produces free molds from a single shape. This eliminates the need for wooden molds or metal molds in the prototyping and development of cast parts, contributing to shorter prototyping and development time and cost reduction.

The main raw material used is artificial sand (FINE-Bz™), which is a recycled by-product of the refractory manufacturing process for glass kilns. By using a 3D printer to produce only the molds, we have succeeded in eliminating the need for wooden or metal molds, which were formerly essential in conventional production.

Only the necessary quantity is produced when it is needed. From the molding method, we will realize a sustainable future.

Material Properties

The main raw material for Brightorb is our own product, FINE-Bz, which is mixed with an inorganic binder that causes a hydration reaction to form Brightorb, a molding material for 3D printers.

Brightorb

①FINE-Bz™

FINE-Bz is a ceramic spherical particle produced by electric melting. High refractoriness, high thermal conductivity and high hardness.

Chemical composition: Al_2O_3 80%, ZrO_2 10%, SiO_2 9%
Crystal structure: Corundum, Baddeleyite
Median particle size: Approx. 50μm

②Inorganic binder

An inorganic binder composed mainly of Al_2O_3 and CaO.
When mixed with water, it causes a hydration reaction and cures.

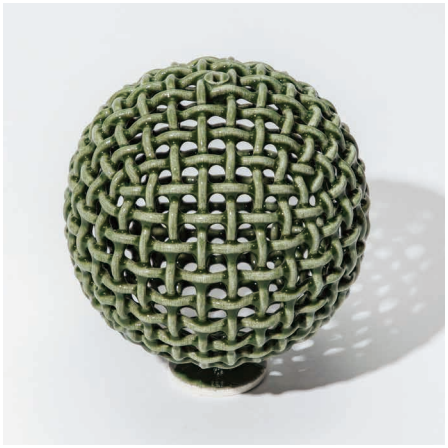
FINE-Bz™

Build size

X-axis movement: 1,000 mm
Y-axis movement: 600 mm
Z-axis movement: 500 mm
Build pitch: 0.1 mm

Free design of modelling

While conventional ceramic materials shrink and distort by 10% or more during firing, Brightorb's firing shrinkage is only about 1%. In addition, the high-precision binder-jet 3D printing method achieves high dimensional accuracy. This makes it possible to combine ceramics with other materials, which was difficult in the past.

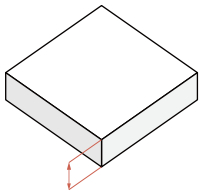
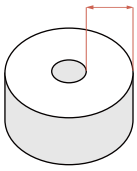
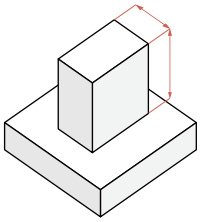
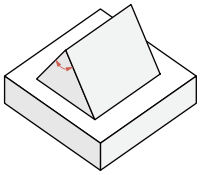
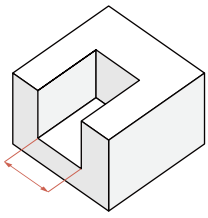
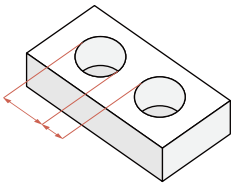
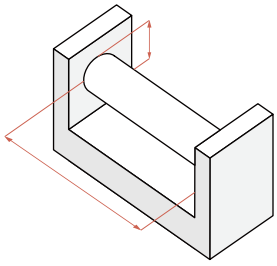
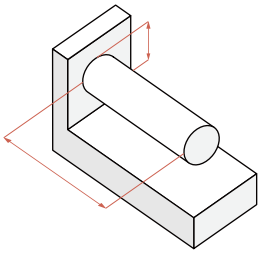


Hollow and complex shaped spheres can be shaped.

Multiple ceramic boards can be lined up perfectly. By arranging them in succession, you can express yourself without being restricted by size.

You can create any shape you like, such as openwork carving.

Guide to design

 Plate square 100 mm: thickness ≧ 4 mm square 200 mm: thickness ≧ 6 mm	 Cylinder When the outer diameter ≦ 100 mm, Thickness ≧ 3 mm	 Convex $\frac{\text{height}}{\text{width}} \leqq 3$	 Convex (sharp) angle ≧ 60°
 Concave groove width ≧ 1 mm groove width 2 mm: depth ≦ 5 mm	 Recessed Hole diameter ≧ 3 mm multi-hole: Wall thickness ≧ 1 mm	 Beam (double fixed) length ≦ 50 mm: diameter ≧ 5 mm length ≦ 100 mm: diameter ≧ 10 mm	 Beam (cantilever) length ≦ 25 mm: diameter ≧ 10 mm

Features of molds made by Brightorb

- The main raw material consists of fine spherical particles with a small lamination pitch, resulting in high-precision surface properties.
- Since it does not contain any organic content, it does not generate gas during casting.
- Hardened by inorganic binder, it can be cast by heating the mold.
- High refractoriness alumina-zirconia fused artificial sand is used as raw material, so high temperature molten metals such as stainless steel can be cast, and high thermal conductivity improves casting quality.

Material		Brightorb	Chromite	Zircon	Silica sand
Specific gravity	-	1.8	-	-	-
Compressive strength	MPa	20	-	-	-
Thermal Expansion	%, at 1000°C	0.6	0.7	0.4	1.5
Thermal Conductivity	$Wm^{-1}K^{-1}$	0.6	0.4	0.4	0.3
Specific heat	$Jkg^{-1}K^{-1}$	1000	890	1000	1120

Test results of physical properties of shaped parts

	forced water absorption rate (%)	bulk density (g/m^2)	bending fracture load (N)	bending strength (MPa)
glazed parts	16.0	2.12	648	26
unglazed parts	18.1	2.07	423	19

Note 1: Glazed products are glazed with a glossy glaze and fired. (Test results using 200mm x 100mm x 6mm size tiles)
Note 2: The above values are experimental and not guaranteed.

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