INTRODUCING PORCERAX II

Pre-Hardened
(35/38 HRC)
Sintered, Porous Metal
7 or 20 Micron Pore Size

PLASTIC INJECTION MOLDING

OTHERS...

Benefits

- Prevention of gas burning
- Eliminates visibility & strengthens weld lines
- Eliminates gas build up
- Reduces scrap and reject rates
- Lowers cycle times
- Prevention of short shots
- Reduction of injection pressure
- Reduction of gloss levels

Sintokogio, LTD
Porcerax II is distributed by International Mold Steel, Inc.

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INTERNATIONAL MOLD STEEL, INC.

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Quality Characteristics I - Physical Properties

Microphotograph of Porcerax II Material Surface

Fig. 1 Porcerax II is a sintered, porous material with porosity in the range of 20 to 30% by volume. A system of interconnected pores with an average of 7 or 20 microns is dispersed throughout the material.

<table>
<thead>
<tr>
<th>Properties</th>
<th>Type</th>
<th>PM35</th>
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<tbody>
<tr>
<td>Average Pore Diameter</td>
<td>20µm, 7µm depending on use</td>
<td></td>
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<tr>
<td>Porosity</td>
<td>About 25%</td>
<td></td>
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<tr>
<td>Density</td>
<td>6.0 ~ 6.2 x 10^3 kg/m^3</td>
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<tr>
<td>Coefficient of Linear Expansion</td>
<td>12 ~ 12.5 x 10^-6</td>
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<tr>
<td>Thermal Conductivity</td>
<td>30 ~ 33 W/(m+k)</td>
<td></td>
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<tr>
<td>Bending Strength (MPa)</td>
<td>700 ~ 750</td>
<td></td>
</tr>
<tr>
<td>Tensile Strength (MPa)</td>
<td>450 ~ 500</td>
<td></td>
</tr>
<tr>
<td>Base Hardness (HRC)</td>
<td>35 ~ 38</td>
<td></td>
</tr>
<tr>
<td>Machinability by High Speed Steel</td>
<td>Good</td>
<td></td>
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</tbody>
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Mechanical Properties of Porcerax II

Fig. 2 Porcerax II is supplied at 35/38 HRC. It can be heat treated, but is only recommended for extreme cases. The thermal conductivity of Porcerax II is similar to a 400 Series stainless material.

Quality Characteristics II - Design Issues

Resin Being Molded
Size of Problem Area
Cooling Considerations
Proximity of Water Lines
Surface Finish Required
Slide/Lifter Applications
Ease of Removal
Reverse-Blow Considerations

Design Considerations

"Friendly"
- Polypropylene
- PVC (Soft Type)
- Nylon (-6, -66, etc.)
- Polystyrene
- Biodegradable Polymer
- ABS
- NPPE
- Polyethylene
- Acrylic
- Polyurethane

"Resins to Watch"
- Phenol *
- PVC (Drain Pipe, etc.)
- Polycarbonate (clear)
- Natural Rubber *
- Liquid Silicone
- Tale Filled Resins**
- Foaming Urethanes

* indicates may be used with reverse blow system
** indicates that some resins will work depending on manufacturer

Fig. 3 When inserting Porcerax II these design conditions need to be followed. By applying these design guidelines they will greatly enhance Porcerax II’s ability to vent properly over the life of the mold.

"Friendly" resins are types that work well with Porcerax II, whereas the “Resins to Watch” will need more evaluation and design considerations before working with Porcerax II. Contact IMS for more information.

Fig. 4 Depending on the emissions or gas residue given off during the molding process, the molder will have to evaluate whether to use a 7 or 20 micron pore size. The “Friendly” resins are types that work well with Porcerax II, whereas the “Resins to Watch” will need more evaluation and design considerations before working with Porcerax II. Contact IMS for more information.
Innovation in Injection Molding Technology

High Quality Productivity

Cost Reduction

Die Design

Prevention of Gas Burning

Strengthening of Weld Line

Prevention of Gas Shrinkage

Reduction of Undesired Gloss

Improvement of Pattern Transferability

Prevention of Short Shot

Reduction of Injection Pressure

Prevention of Burr

Simplification of Die Structure and Gating System

Advantages of Porcerax II

Over 10% of the total cavity area

Recommended Contact Area

Fig. 5 The Mill recommends that at least 10% of the core and cavity area be Porcerax II to insure proper venting. It is important to remember that the larger the insert, the lower the back pressure will be in the cavity. Also, due to the larger surface area, the insert will not require as much cleaning as a smaller piece.

Fig. 6 Installing Porcerax II into your mold can have far reaching affects. Scrap, molding pressure and secondary operations can all be affected by using Porcerax II. The important affect seen by using Porcerax II is “Cost Reduction”.

Quality Characteristics III - Permeability

Fig. 7 Porcerax II can be machined like any other stainless material. However, to achieve maximum venting, EDM is recommended for 7 micron material and machining is recommended for 20 micron material.

Blasting and Etching

Pores on The Surface Layer after Blasting and Etching

a) Blasting

b) Etching

Fig. 8 Porcerax II (7 micron) can be textured. It is imperative that the chosen texturing source understands that they are working with Porcerax II. Contact IMS for more information. Any type of blasting will close the surface porosity.
Polishing by Sand Paper

**Permeability After Polishing**

**Fig. 9** Porcerax II (7 Micron) can be polished to achieve a #800 – #1000 Grit Finish. Porcerax II (20 Micron) can be polished to achieve a #400 – #600 Grit Finish.

**Permeability after Electric Discharge Machining**

**Fig. 10** EDM is the best way to open the pores of Porcerax II. The finer the surface finish of the EDM’d surface the more airflow through the Porcerax II material.

**Summary of the Relationship between the Permeability of Porcerax II material and the Machining Methods**

**Fig. 11** The chart shows the relationship between permeability and machining methods. EDM and polishing are the most widely used methods of achieving permeability in Porcerax II.

**Permeability after Grinding**

**Fig. 12** All types of grinding will close the pores of Porcerax II, both on 7 and 20 micron materials.
Fig. 13 During the EDM process, the pores will fill up with EDM Fluid. This fluid must be removed before inserting Porcerax into the mold. It is very important that the insert be cooled to room temperature before ultrasonic cleaning. The ultrasonic cleaning unit must be built for flammable solvents.

Fig. 14 Back flushing during the molding process is an excellent method for cleaning any resin residue that might build up on the surface of Porcerax II insert. This will also extend the cycle of removing the insert and cleaning it ultrasonically.

Fig. 15 The preferred way to clean Porcerax II is to place the insert in an ultrasonic cleaning unit filled with acetone. The ultrasonic cleaning unit must be built for flammable solvents and is the only recommended type of cleaning for Porcerax II.

Fig. 16 Checking permeability of the Porcerax II insert can be done using compressed air and a few drops of acetone on the surface of the material.
Fig. 17 Making sure the Porcerax II insert is large enough for an air fitting is critical for cleaning and checking permeability after EDM and when material is about to be replaced in the mold.

Fig. 18 Measuring instrument used for measuring airflow through the Porcerax II Material.

For more Porcerax II information, please visit www.imsteel.com