BINDERLESS NPD10 / DA90

PCD tool for Carbide & hard brittle material turning

BINDERLESS NPD10
Ultimate High Precision Machining

DA90
For Carbide & Hard brittle material Roughing
Nano-polycrystalline Diamond

Adopts Nano-polycrystalline Diamond for the cutting edge, which is binder-less, isotropic and harder than single crystal diamond. Achieves long tool life and improved machining accuracy for carbide and hard brittle material machining compared to conventional diamond tools.

Best suited for finish machining of carbide and hard brittle material

Achieves high precision machining of carbide with nano-polycrystalline diamond, which has excellent wear resistance.

Maintains excellent dimensional accuracy over long periods

Greatly reduces the number of times that the tool must be indexed compared to previous diamond tools, improving work efficiency and reducing total cost.

Nano-polycrystalline Diamond

Nano-polycrystalline Diamond is a polycrystalline diamond that directly binds nanometer-level diamond particles at high strength without using binders. It is harder than single-crystal diamond and has no cleavability. Therefore, it enables machining of hard brittle materials such as carbides and enables new machining methods.

Hardness

No Anisotropy and Ultra Hard
DA90

A grade made by sintering rough-grained diamond which contains the highest amount of diamond, has excellent wear resistance for rough machining of carbide and hard brittle material. Achieves high cost performance as same performance as before through optimal design and development of mass production technology.

Best suited for rough machining of carbide and hard brittle material

Achives stable tool life for rough machining of carbide and hard brittle material by the excellent wear resistance of rough-grained polycrystalline diamond.

Adopting NF Inserts

Achives high cost performance as same performance as before through optimal design and development of mass production technology.

Expand stock items for carbide and hard brittle materials machining

Grade line up

<table>
<thead>
<tr>
<th>Grade</th>
<th>NPD10</th>
<th>DA1000</th>
<th>DA2200</th>
<th>DA150</th>
<th>DA90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microstructure</td>
<td><img src="image" alt="Diamond grain" /></td>
<td><img src="image" alt="Cavity" /></td>
<td><img src="image" alt="Cavity" /></td>
<td><img src="image" alt="Cavity" /></td>
<td><img src="image" alt="Cavity" /></td>
</tr>
<tr>
<td>Diamond grain</td>
<td>0.1µm</td>
<td>5µm</td>
<td>5µm</td>
<td>5µm</td>
<td>5µm</td>
</tr>
<tr>
<td>Cavity which was made by some melted combination materials with acid treatment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonding Material</td>
<td>–</td>
<td>Co</td>
<td>Co</td>
<td>Co</td>
<td>Co</td>
</tr>
<tr>
<td>Grain Size (µm)</td>
<td>less than 0.05</td>
<td>less than 0.5</td>
<td>0.5</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>PCD Content (%)</td>
<td>100</td>
<td>90 to 95</td>
<td>85 to 90</td>
<td>85 to 90</td>
<td>90 to 95</td>
</tr>
</tbody>
</table>
**Wear Resistance of NPD10**
NPD10 shows excellent wear resistance.

NPD10 achieved more 5 times longer tool life than conventional PCD.

**Wear Resistance of DA90**
DA90 shows excellent wear resistance under rough machining conditions.

**Application Examples**

**Carbide Machining VC40 (89HRA) Die Metal Mold**
NPD10 achieved more 5 times longer tool life than conventional PCD.

**Carbide Machining VM30 (91HRA) Die Metal Mold**
Reduced processing costs 33% by applying DA90 for roughing and NPD10 for finishing.

**Processing costs (%)**

<table>
<thead>
<tr>
<th>Insert</th>
<th>No. of Workpiece/piece</th>
<th>Processing costs (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPD10</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Conv. PCD</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

**Insert:** CCMW04X104RH (NPD10) Internal turning
Cutting Conditions: \( v_c = 50 \text{ SFM} \), \( f = 0.0006 \text{ IPR} \), \( a_p = 0.003 \text{ in} \) Dry

**Processing costs (%)**

<table>
<thead>
<tr>
<th>Insert</th>
<th>No. of Workpiece/piece</th>
<th>Processing costs (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA90+</td>
<td>5</td>
<td>33% Reduction</td>
</tr>
<tr>
<td>NPD10</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Insert:** Rough NF-CCMA21.50.5 (DA90) Internal turning
Finishing CCMA21.50.5RH (NPD10) Internal turning
Cutting Conditions: Rough \( v_c = 66 \text{ SFM} \), \( f = 0.004 \text{ IPR} \), \( a_p = 0.004 \text{ in} \) Dry
Finishing \( v_c = 66 \text{ SFM} \), \( f = 0.004 \text{ IPR} \), \( a_p = 0.008 \text{ in} \) Dry
### Stock Items of NPD10

#### Negative Insert

<table>
<thead>
<tr>
<th>Shape</th>
<th>Cat. No.</th>
<th>Stock</th>
<th>Cutting Edge Length</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNMA 432RH</td>
<td>433RH</td>
<td>NPD10</td>
<td>1.8</td>
<td>12.7</td>
</tr>
<tr>
<td>SNMA 432RH</td>
<td>433RH</td>
<td>NPD10</td>
<td>1.7</td>
<td>12.7</td>
</tr>
<tr>
<td>VNMA 432RH</td>
<td>433RH</td>
<td>NPD10</td>
<td>1.8</td>
<td>9.525</td>
</tr>
</tbody>
</table>

#### Positive Insert

<table>
<thead>
<tr>
<th>Shape</th>
<th>Cat. No.</th>
<th>Stock</th>
<th>Cutting Edge Length</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCMA 03X102RH</td>
<td>03X104RH</td>
<td>NPD10</td>
<td>1.3</td>
<td>3.5</td>
</tr>
<tr>
<td>CCMA 04X102RH</td>
<td>04X104RH</td>
<td>NPD10</td>
<td>1.3</td>
<td>4.3</td>
</tr>
<tr>
<td>CCMA 21.50.5RH</td>
<td>21.51RH</td>
<td>NPD10</td>
<td>1.7</td>
<td>6.35</td>
</tr>
<tr>
<td>CCMA 32.50.5RH</td>
<td>32.51RH</td>
<td>NPD10</td>
<td>1.7</td>
<td>9.525</td>
</tr>
</tbody>
</table>

* : Standard Stocked Item

### Stock Items of DA90

#### Negative Insert

<table>
<thead>
<tr>
<th>Shape</th>
<th>Cat. No.</th>
<th>Stock</th>
<th>Cutting Edge Length</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF-DNMA 432</td>
<td>433</td>
<td>DA90</td>
<td>2.0</td>
<td>12.7</td>
</tr>
<tr>
<td>NF-SNMA 432</td>
<td>433</td>
<td>DA90</td>
<td>2.4</td>
<td>12.7</td>
</tr>
<tr>
<td>NF-VNMA 432</td>
<td>433</td>
<td>DA90</td>
<td>1.9</td>
<td>9.525</td>
</tr>
</tbody>
</table>

#### Positive Insert

<table>
<thead>
<tr>
<th>Shape</th>
<th>Cat. No.</th>
<th>Stock</th>
<th>Cutting Edge Length</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF-CCMA 03X102</td>
<td>03X104</td>
<td>DA90</td>
<td>1.1</td>
<td>3.5</td>
</tr>
<tr>
<td>NF-CCMA 04X102</td>
<td>04X104</td>
<td>DA90</td>
<td>1.3</td>
<td>4.3</td>
</tr>
<tr>
<td>NF-CCMA 21.50.5</td>
<td>21.51</td>
<td>DA90</td>
<td>1.7</td>
<td>6.35</td>
</tr>
<tr>
<td>NF-CCMA 32.50.5</td>
<td>32.51</td>
<td>DA90</td>
<td>1.7</td>
<td>9.525</td>
</tr>
</tbody>
</table>

* : Standard Stocked Item

---

**Wear Resistance of NPD10**

NPD10 shows excellent wear resistance. (Frank Wear Width)

- 0.002
- 0.004
- 0.008

**Carbide Machining**

- VC40 (89HRA) Die Metal Mold
- VM30 (91HRA) Die Metal Mold

**Cutting Conditions**

- $v_c = 50$ SFM
- $f = 0.0006$ IPR

**Insert**

- NPD10 achieved more 5 times longer tool life

**Tool Life Comparison**

<table>
<thead>
<tr>
<th>Cutting Distance</th>
<th>No. of Workpieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>660</td>
<td>1300</td>
</tr>
<tr>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

**Shape of a rounded corner is cylindrical.**
Huntsville Branch
1001 Business Center Drive
Mount Prospect, IL 60056-2181
P.O. Box 545, Mt. Prospect, IL 60056-0545
Phone: (800) 950-5202
Phone: (847) 635-0044
Fax: (847) 635-9335
http://www.sumicarbide.com

Detroit Branch
14496 Sheldon Road #230
Plymouth, MI 48170
Phone: (800) 239-5177
Phone: (734) 451-0200
Fax: (734) 451-5338

Sumitomo Electric Carbide, Inc. Headquarters
1001 Business Center Drive
Mount Prospect, IL 60056-2181
P.O. Box 545, Mt. Prospect, IL 60056-0545
Phone: (800) 950-5202
Phone: (847) 635-0044
Fax: (847) 635-9335
http://www.sumicarbide.com

Sumitomo Electric
Tool Engineering Center
5637 S. Westridge Drive
New Berlin, WI 53151
Phone: (800) 950-5202

Indiana Branch
595 S. Emerson Avenue
Suite 100
Greenwood, IN 46143
Phone: (317) 859-1601

Torrance Branch
21241 South Western Avenue
Suite 120
Torrance, CA 90501
Phone: (800) 950-5202
Fax: (310) 782-0211

Sumitomo Carbide Canada, Inc.
150 Research Lane
Unit #210
Guelph, Ontario N1G 4T2
Canada
Phone: (519) 265-6050
Phone: (844) 211-6050

Huntsville Branch
6700 Odyssey Drive
Suite 211
Huntsville, AL 35806
Phone: (256) 971-1203
Fax: (256) 971-1205

For more information log onto:
www.sumicarbide.com

CAT.NPD10DA90.03/19