Ceramic inserts for high speed turning of cast iron
Ceramic grades for **high speed turning** of cast iron
New ceramic inserts for cast iron high speed machining

**APPLICATION RANGE**

**TZ120 (Al₂O₃-ZrO₂)**
- Excellent wear resistance
- High speed continuous turning of cast iron without coolant

**LX21 (Al₂O₃-TiC)**
- High hardness and moderate fracture toughness
- General turning of cast iron

**FX105 (Si₃N₄)**
- Mechanical and thermal shock resistance
- Interrupted & rough machining

**TZ120**
- TZ120 ceramic grade with high strength and excellent wear resistance by adding ZrO₂ to Al₂O₃ with high oxidation resistance
- Each components are well dispersed to improve fracture resistance and boundary wear resistance
- Suitable for dry roughing and finishing of special cast iron (cylinder liner, etc.)

---

**New**

**New**
ACCELERATED MACHINING

STANDARD CUTTING CONDITIONS

<table>
<thead>
<tr>
<th>ISO</th>
<th>Workpiece materials</th>
<th>Cutting mode</th>
<th>Coolant</th>
<th>Grades</th>
<th>Cutting speed Vc (m/min)</th>
<th>Feed f (mm/rev)</th>
<th>Depth of cut ap(mm)</th>
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<tbody>
<tr>
<td></td>
<td>Gray cast iron</td>
<td>Continuous</td>
<td>Dry</td>
<td>TZ120</td>
<td>400 - 850</td>
<td>0.1 - 0.3</td>
<td>0.5 - 2</td>
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<td>Dry</td>
<td>LX21</td>
<td>400 - 800</td>
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<td></td>
<td>interrupted</td>
<td>Dry, Wet</td>
<td>FX105</td>
<td>300 - 600</td>
<td>0.2 - 0.6</td>
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<td>New</td>
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* TZ120 is suitable for dry continuous turning

STANDARD EDGE PREPARATION

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<tr>
<th>Grades</th>
<th>TZ120</th>
<th>LX21</th>
<th>FX105</th>
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<td>0.1</td>
<td>0.2</td>
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<td>30°</td>
<td>25°</td>
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## Insert NEGATIVE TYPE

### CN

**Rhombic, 80° with hole**

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<th>Ceramic</th>
<th>Dimension (mm)</th>
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<td>RE</td>
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<tr>
<td></td>
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<td>1.2</td>
</tr>
<tr>
<td></td>
<td>CNMA120416</td>
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### CN

**Rhombic, 80° without hole**

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<td></td>
<td>CNGN120708</td>
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</table>

- : Continuous cutting  
- : Light interrupted cutting  
- : Heavy interrupted cutting  
- : Line up  
- : New
### Insert NEGATIVE TYPE

<table>
<thead>
<tr>
<th>DN</th>
<th>Steel</th>
<th>Stainless</th>
<th>Cast iron</th>
<th>Non-ferrous</th>
<th>Superalloy</th>
<th>Hard material</th>
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<tbody>
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<td>H</td>
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#### Application

<table>
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<tr>
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<td>IC</td>
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#### Rhombic, 55° with hole

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<th>Hard material</th>
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#### Application

<table>
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#### Rhombic, 55° without hole

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#### Application

<table>
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<tbody>
<tr>
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<td>12.7</td>
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</tbody>
</table>

- : Continuous cutting
- : Light interrupted cutting
* : Heavy interrupted cutting

- : Line up

---

**www.tungaloy.com**
## Insert NEGATIVE TYPE

### RN
- **Round, without hole**
- Chipbreaker Designation
  - **RN**
  - **RNGN120400**
  - **RNGN120700**
- **Dimension (mm)**
  - RE: 12.7
  - IC: 4.76
  - S: -
  - D1: -

### SN
- **Square, 90° with hole**
- Chipbreaker Designation
  - **SN**
  - **SNMA120408**
  - **SNMA120412**
  - **SNGA120408**
  - **SNGA120412**
  - **SNGA120416**
- **Dimension (mm)**
  - RE: 0.8
  - IC: 12.7
  - S: 4.76
  - D1: 5.16
### SN Insert NEGATIVE TYPE

#### Square, 90° without hole

<table>
<thead>
<tr>
<th>Application</th>
<th>Chipbreaker Designation</th>
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<td>0.8 12.7 4.76</td>
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<td>1.6 12.7 7.94</td>
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#### Finishing to medium cutting

<table>
<thead>
<tr>
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<th>Chipbreaker Designation</th>
<th>Ceramic</th>
<th>Dimension (mm)</th>
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<tbody>
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<td>1.6 9.525 4.76</td>
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</tbody>
</table>

#### Chipbreaker Designation

- **P**: Steel
- **M**: Stainless
- **K**: Cast iron
- **N**: Non-ferrous
- **S**: Superalloy
- **H**: Hard material

#### Ceramic Dimension (mm)

- **C**: Continuous cutting
- **L**: Light interrupted cutting
- **H**: Heavy interrupted cutting

#### Application

- **Square, 90° without hole**
- **Triangular, 60° with hole**

#### Materials

- **Steel**: SNGD120712, SNGD120716
- **Stainless**: SNGN090308, SNGN120408, SNGN120412, SNGN120416, SNGN120420, SNGN120424, SNGN120708, SNGN120712, SNGN120716
- **Cast iron**: TNGA160404, TNGA160408, TNGA160412, TNGA160416
- **Non-ferrous**: TNGA160404

#### Dimensions

- **RE**: Line up
- **IC**: New
### Insert NEGATIVE TYPE

#### TN

<table>
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<th>Designation</th>
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<td>TNGN160408</td>
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#### VN

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#### HN

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<td>HNGD050716</td>
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</table>

- **P**: Steel
- **M**: Stainless
- **K**: Cast iron
- **N**: Non-ferrous
- **S**: Superalloy
- **H**: Hard material

**Application**

- **C**: Continuous cutting
- **L**: Light interrupted cutting
- **H**: Heavy interrupted cutting

**Chipbreaker Designation**

- **RE**: Line up
- **IC**: New

**Finishing to medium cutting**

- ***:** with dimple

- **Dimension (mm)**

<table>
<thead>
<tr>
<th>RE</th>
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<th>S</th>
<th>D1</th>
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<td>0.4</td>
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<tr>
<td>1.2</td>
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<td>1.6</td>
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<tr>
<td>2</td>
<td></td>
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</tbody>
</table>

**Dimensions (mm)**

- **Rhombic, 35° without hole**
- **Hexagonal, 120° without hole**
- **Triangular, 60° without hole**

**Ceramic**

**Steel**

**Stainless**

**Cast iron**

**Non-ferrous**

**Superalloy**

**Hard material**

**Ceramic Dimension (mm)**

- **Hexagonal, 120° without hole**

- **Rhombic, 35° without hole**

- **Triangular, 60° without hole**
**ACCELERATED MACHINING**

**PRACTICAL EXAMPLES**

<table>
<thead>
<tr>
<th>Workpiece type</th>
<th>Cylinder liner</th>
<th>Roll</th>
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<td>Special boring tool</td>
<td>ACLNL2525M12-A</td>
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<tr>
<td>Grade</td>
<td>TZ120</td>
<td>LX21</td>
</tr>
</tbody>
</table>

**Workpiece material**

| Cutters         | Centrifugal cast iron | Chilled cast iron (40HRC) |

<table>
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<tr>
<th>Cutters</th>
<th>200</th>
<th>80</th>
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</thead>
<tbody>
<tr>
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<td>0.2</td>
<td>0.2</td>
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<tr>
<td>Depth of cut : ap (mm)</td>
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<td>1.0</td>
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<tr>
<td>Machining</td>
<td>Boring</td>
<td>External</td>
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<tr>
<td>Coolant</td>
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<td>No</td>
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**Results**

TZ120 is superior in wear resistance for centrifugal cast iron (such as cylinder liner) and extended tool life by 1.3x. FX105 decreases the occurrence of sudden breakage providing stable machining.

<table>
<thead>
<tr>
<th>Workpiece type</th>
<th>Disc brake rotor</th>
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<td>Toolholder</td>
<td>Special toolholder</td>
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<tr>
<td>Insert</td>
<td>SNMX120716</td>
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<tr>
<td>Grade</td>
<td>FX105</td>
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</table>

**Workpiece material**

| Cutting speed : Vc (m/min) | 450 |
| Feed : f (mm/rev)          | 0.5 |
| Depth of cut : ap (mm)     | 1.5 |
| Machining                  | Face turning |
| Coolant                     | Wet |

<table>
<thead>
<tr>
<th>Cutting speed : Vc (m/min)</th>
<th>Tool life (pcs / edge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TZ120</td>
<td>Fracture 130% Competitor</td>
</tr>
<tr>
<td>LX21</td>
<td>Wear 125% Tool life Competitor</td>
</tr>
</tbody>
</table>

FX105 is superior in wear resistance for hardened cast iron rolls turning providing improved tool life by 1.25x over conventional ceramic grade.