

# SAFETY OF CUTTING TOOL PRODUCTS

## 1. Use of Cutting Tool Products

Packages of Mitsubishi products carry a safety warning label. However, tools are not labelled with detailed warning indications. Please read the "Safety of Cutting Tool Products" in this catalogue before handling cutting tool products and cemented carbide materials. Moreover, as a part of your workers' safety education, please notify the contents of the "Safety of Cutting Tool Products" to all workers.

## 2. Basic Characteristics of Hard Tool Materials

### In Terms of "Safety of Cutting Tool Products"

Hard Tool Materials : General term for tool materials such as cemented carbide alloy, cermet, ceramics, sintered CBN, sintered diamond, high speed steel and alloy steel, etc.

### Physical Characteristics

Appearance : Varies depending on the type of material. Eg. grey, black, gold, etc.

Smell : None

Hardness, Specific Gravity :

Hard Tool Materials	Hardness (HV)	Specific Gravity	Hard Tool Materials	Hardness (HV)	Specific Gravity
High Speed Steel (HSS)	200—1200kg/mm <sup>2</sup>	7—9	Sintered CBN	2000—5000kg/mm <sup>2</sup>	3—5
Cemented Carbide	500—3000kg/mm <sup>2</sup>	9—16	Sintered Diamond	8000—12000kg/mm <sup>2</sup>	3—5
Cermet	500—3000kg/mm <sup>2</sup>	5—9	Alloy Steel	200—1200kg/mm <sup>2</sup>	7—9
Ceramics	1000—4000kg/mm <sup>2</sup>	2—7	Diamond Electroforming Product	8000—12000kg/mm <sup>2</sup>	3—5

### Constituents

Carbide, nitride, carbon nitride, oxide, W, Ti, Al, Si, Ta, B, V and metals such as Fe, Co, Ni, Cr, Mo.

## 3. Safety of Cutting Tool Products

- Hard tool materials have a large specific gravity. Thus, they require special attention as heavy materials when the size or quantity is large.
- Cutting tool products generate dust and mist during grinding operations or heating. This dust and mist can be harmful to the human body when coming in contact with the eyes or skin, or if substantial quantities are swallowed. When grinding and machining, it is recommended to use local exhaust ventilation and respirators, a dust protective mask, glasses, gloves and so on. If dust makes contact with the hands, thoroughly wash the affected area with soap and water. Don't eat in the exposed area, and wash hands thoroughly before eating. Remove dust from the clothing by a cleaner or washing, but don't shake off.
- Cobalt dust can affect the skin, respiratory organs and heart through repeated or prolonged contact.
- For further information, please refer to **MSDS** (Material Safety Data Sheet).

**Home page: <http://www.mitsubishicarbide.com/msds/>**

## 4. Handling Cutting Tool Products

- Surface conditions affect toughness of cutting tools. Therefore, use a diamond grinding wheel for finishing.
- Hard tool materials are extremely hard and brittle at the same time. Thus, they may be broken by shocks and tightening with excess force.
- Hard tool materials and ferrous materials have different thermal expansion ratios. Shrinkage or swell fit products may suffer from cracks when applied temperature is higher or lower than the appropriate temperature for the tool.
- Pay special attention on storing hard tool materials. Toughness of hard tool materials is lowered when they corrode due to coolant and other liquid.
- When brazing hard tool materials, if the temperature is too high or too low from the melting point of the brazing material, loosening and breakage may occur.
- After regrinding cutting tools, make sure that there are no cracks.
- Machining hard tool materials on EDM may cause cracks on the surface due to remaining electrons resulting in lowering the toughness. Eliminate cracks by grinding, etc.

# SUGGESTIONS ON HOW TO USE CUTTING TOOLS

Products	Hazard	Countermeasure
All Cutting Tools	◎ Cutting tools have sharp cutting edges. Handling them with bare hands may cause injuries.	* Take precautions such as wearing gloves especially when handling tools and during installation.
	◎ Improper use of tools and application of inappropriate cutting conditions may cause the tool to break and be expelled from the machine providing risk of injury.	* Ensure safety guards and goggles are used. * Refer to handling explanatory notes and catalogues. Use tools under recommended cutting conditions.
	◎ Impact load and rapid increase of cutting resistance due to excessive wear may cause the tool to break and be expelled from the machine providing risk of injury.	* Ensure safety guards and goggles are used. * Exchange tools before excessive wear occurs.
	◎ Cutting tools and workpieces become extremely hot during cutting. Touching them with bare hands may cause burns.	* Take precautions such as wearing gloves.
	◎ Expelled hot chips produced during cutting produces risk of injuries and burns.	* Ensure safety guards and goggles are used. * During swarf removal and machine cleaning ensure the machine is stopped and wear gloves. Please use tools, such as cutting nippers and cutting clippers.
	◎ In cutting, sparks, hot chips and heat generation caused by tool breakage provides a risk of igniting a fire.	* Avoid using cutting tools in places where there is a possibility of igniting a fire. * In case of using non-water soluble oil, make sure to have a fire prevention countermeasure.
	◎ Using machines, chucks, and tools with poor balance at high revolutions may cause tools to break providing risk of injuries.	* Ensure safety guards and goggles are used. * Check the machine for vibration, chattering, and abnormal noise.
	◎ Handling machined parts with burrs using bare hands may cause injuries.	* Wear gloves.
Indexable Inserts Type Tools	◎ If inserts and spare parts are not held securely, they may become loose and be expelled producing risk of injuries.	* Clean insert locating seat and spare parts before setting inserts. * Use the tool provided for setting inserts, and ensure the inserts and spare parts are clamped securely. Do not use the tool provided for things other than the prescribed inserts and spare parts.
	◎ Clamping inserts and spare parts too tightly by using tools such as extension pipes may cause them to break and be expelled.	* Do not use extra tools for more leverage. Only use the tool provided.
	◎ When applying high cutting speed, spare parts and inserts may be expelled due to centrifugal force. Pay special attention to each safety guideline.	* Refer to the handling explanatory notes and catalogues. Use tools under recommended cutting conditions.
Cutters and Other Rotating Tools	◎ Milling cutters have sharp edges. Handling them with bare hands may cause injuries.	* Take precautions such as wearing gloves.
	◎ Poor balance or off centre revolving of tools may cause vibration and chattering which could cause the tool to break and be expelled.	* Apply cutting speed within the range of recommended cutting conditions. * Adjust accuracy and balance of spindles and bearings periodically to prevent off center revolving and chattering caused by wear on these parts.
Drilling Tools	◎ Through cutting in cases when the workpiece revolves may produce a disk shaped peice with sharp edges when the cutting tool breaks through.	* Ensure safety guards and goggles are used. Also install a cover on the chuck.
	◎ Drills with an extremely small diameter have a very sharp point which may puncture the skin if not handled carefully. If the drill breaks during cutting, the broken pieces may be expelled.	* Handle with care. Take precautions such as wearing gloves and goggles.
Brazed Tools	◎ Weakening of the braze and breakage of inserts may cause injury.	* Before using them, ensure they are brazed securely. * Do not use them under conditions which produce very high temperature.
Others	◎ Machine and tools may be damaged if they are used for purposes other than the prescribed application.	* Use them strictly for the prescribed application.

## INFORMATION

This catalog completes the basic precautions for safety use of our company's products. For further information, please refer to the guideline, catalogs or contact us. We are not responsible for any accidents causing by modifying tools without our permission.