CB-CERATIZIT GROUP

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CB-CERATIZIT GROUP

HARD MATERIAL SOLUTIONS BY CERATIZIT

Newsletter

of EDM and High Speed Stamping

New Corrosion Free Grade --NF series

Harmful Cleansing Agent – Acetone

Carbide Mchining Technology and Application

New CB Series CBS30, CBU22 for Electronics Industry

Market Trend of High Speed Stamping in EV Industry

With Schaeffler Group Complement – –

Global Best Supplier Award for CERATIZIT GROUP

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CB-CERATIZIT has demonstrated its professionalism by delivering exceptional solutions to the high-precision stamping industry. Through significant investments in research and development, we have successfully created high-quality tungsten carbide grades that meet market demands for tool life.

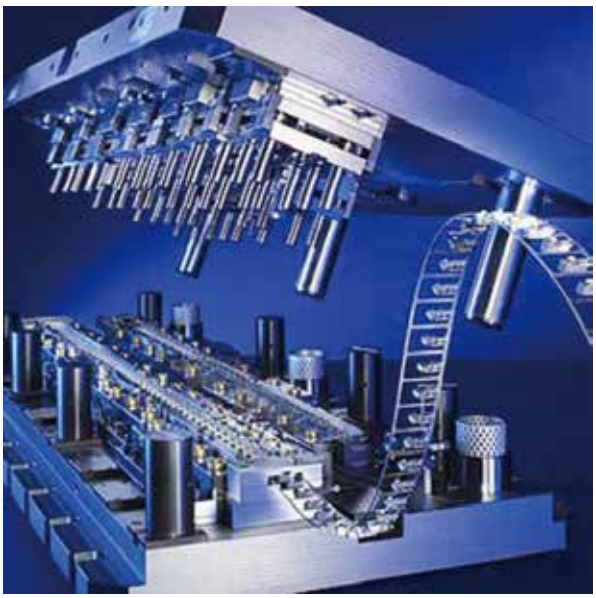
Since the merger with CBCT in 2000, there has been extensive technical collaboration between CBCT and CERATIZIT Europe, leading to significant advancements in product development, manufacturing, and R&D. A notable outcome of this collaboration is the introduction of the locally manufactured Corrosion Free NF series, designed for the blanking and lamination sectors. This series is based on the Ceratizit Corrosion Free Grades CF-H40S and CF-H25S, modified from our locally produced WF30 and KG4 grades using advanced corrosion-free technology. We will delve deeper into the benefits of the NF series later in this chapter.

Additionally, since the merger, CB-CERATIZIT has expanded its capabilities by acquiring numbers of Sintering Oven and Hot Isostatic Press (HIP) from Europe, enhancing production stability and sintering quality. We recognize the critical role that carbide materials play in high-speed precision stamping. Therefore, in terms of product stability, consistency, quality assurance, and after-sales support, CBCT is committed to excellence, aiming to provide our customers with a high cost-performance ratio and satisfaction.

In this chapter, we aim to showcase the efforts and results of our R&D initiatives. We also welcome your feedback on technical inquiries and quality expectations. Please feel free to reach out to one of our sales representatives to discuss any issues that could lead to mutually beneficial outcomes.

Development trend of Precision Stamping Mould

With the rapid advancement of the automotive and electronics industries, the demand for products requiring high precision, high volume, and fast manufacturing speeds has become more critical than ever. The rise of electric vehicles and the growing variety of electronic peripheral components have further diversified product offerings. To meet the needs of this booming market, precision mould manufacturers face the challenges of sophisticated design and high-quality mould.



High-speed stamping refers to machines operating at speeds of >400 SPM with stamping pressure of >70 tons. Under these extreme conditions, both the machines and moulds must exhibit exceptional precision and stability. Additionally, the quality of the spare parts, particularly the cutting components within the stamping moulds, must be consistently high. If the tool life of the carbide cutting parts fails to meet the required capacity, resulting in the need for additional sets of moulds or cutting parts, the associated costs and time can exceed 10 times the initial investment in high-quality carbide that ensures the expected tool life from the outset. This illustrates the importance of cost-performance efficiency.

Components such as USB connectors, switches, rotors, and lead frames are all produced through high-speed stamping. Consequently, as market challenges intensify, the quality of stamping moulds must also be enhanced. One fundamental approach to improving mould stamping quality is to utilize high-quality carbide materials for critical cutting parts.

As low-efficiency and low-value-added factories gradually phase out in markets like China, the key to remaining competitive lies in embracing high automation and volume production. Therefore, the development of high-precision moulds will become increasingly vital, leading to a heightened focus on cost-performance efficiency and a growing demand for high-quality carbide materials.

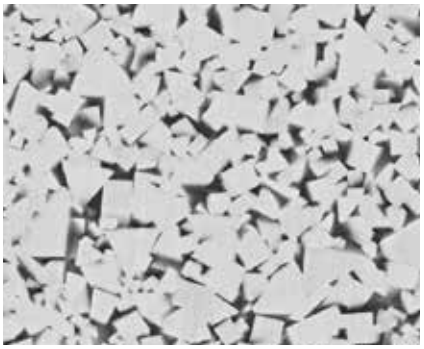
CB CERATIZIT Corrosion Free Series application table

Grade	Co (±0.5%)	Grain Size (μm)	Density (g/cm^3)	Hardness (HRA)	TRS (Kgf/mm^2)	Stampins applicction	Production site
CF-H40S+	12.0	1.0~2.0	14.15±0.1	90.3±0.5	340	Silicon Steel , >0.4mm Stainless Steel, General Hardware Stamping.	Europe
CF-H25S+	8.5	0.6~1.0	14.55±0.1	92.1±0.5	320	Copper Alloy, <0.4mm Stainless Steel Stamping	Europe
NFS16	8.2	0.6~1.0	14.56±0.1	92.0±0.5	350	Below 0.60mm Stainless Steel, All types of Cu alloy	China
NFS26	13.0	0.8	14.08±0.1	90.5±0.5	350	Copper alloy, Semi-con	China
NFM24*	12.5	1.0~2.0	14.18±0.1	89.8±0.5	350	General Hardware, Silicon Steel, >0.4mm Stainless Steel Stamping	China
NFM25*	12.5	3.0	14.18±0.1	88.8±0.5	350	General Hardware, Silicon Steel, >0.4mm Stainless Steel Stamping.	China
NFM23	11.5	1.3~2.5	14.18±0.1	90.7±0.5	340	General Hardware, Silicon Steel, >0.4mm Stainless Steel Stamping.	China

*NFM24 = TNF25B NFM25 = TNF25A

Tungsten carbide is readily available in various qualities in the market. Initially, many customers made their selections based solely on price, often opting for lower-cost carbide to save money. However, this approach frequently leads to higher overall costs for the moulds. It's important to consider that the machining cost of carbide is typically 10 to 20 times greater than the cost of the carbide material itself. In many instances, the ability of a mould to deliver a high cost-performance ratio is closely tied to the quality of the carbide used.

Unlike normal steel, Tungsten carbide is a powder metallurgical material, and its sintering process is conducted by the manufacturer. As a result, each carbide manufacturer has its own unique recipe (grade) and expertise in production. Consequently, the quality of carbide is heavily influenced by the manufacturer's know-how and technology. Additionally, once carbide is sintered, it cannot undergo any further processes to alter its properties or quality, such as heat treatment or re-hardening. This means that the quality of the carbide you receive is largely dependent on the manufacturer you choose, which ultimately affects the tool life during the stamping process.



CB CERATIZIT Corrosion Free Grade NFS26

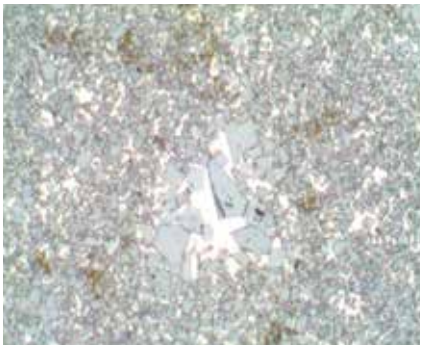
Many end-users are not equipped to differentiate between high and low-quality Tungsten carbide. Below, CB-CERATIZIT highlights some key characteristics of high-quality carbide:

1.Consistency of Carbide Grain:
An uneven distribution of carbide grains leads to inconsistent hardness throughout the material, which can compromise its stability and introduce residual stress. This may result in cracking during wire-cutting.

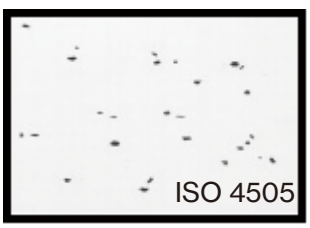
2.Absence of Porosity:
High-quality carbide materials should be free of porosity, as this directly impacts surface quality.

3.Corrosion Resistance:
Quality carbide materials should be resistant to corrosion when exposed to harsh environments, ensuring durability and longevity.

In addition to these points, the experience and research and development capabilities of the manufacturer play a crucial role in ensuring the long-term consistency and quality of carbide material supply.

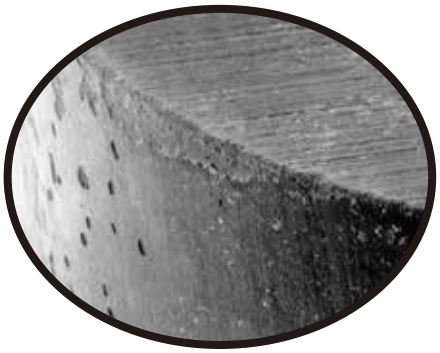


Inconsistent grain distribution in carbide



With Porosity Problem

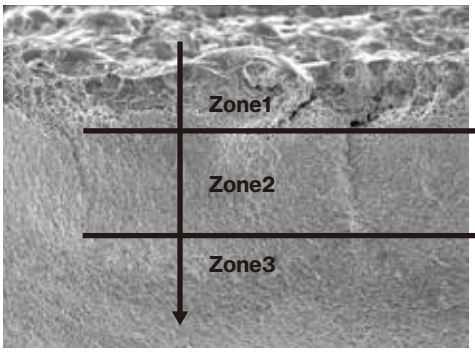
With Porosity Problem



Corrosion Problem

Carbide machining Technique

Optimization:
Carbide's high hardness makes it suitable formachining only through processes such as WEDM (Wire Electrical Discharge Machining), EDM (Electrical Discharge Machining), and grinding. Additionally, carbide is not heat-resistant; temperatures exceeding 700 degrees Celsius can alter its properties, leading to issues like thermal cracking, which can be readily identified. Consequently, precise power control during the WEDM process is essential. The image on the left illustrates the surface of carbide after WEDM. In addition to signs of copper adhesion, the surface exhibits significant micro-cracking at varying depths.



Rough cut (high cutting speed, high current etc.)

1. Eroded Layer (residue material, sticking material)
2. Thermal Crack layer
3. O.K layer

This can lead to several issues:

1. Surface chipping during the grinding process.
2. Chipping of punches or dies during stamping operations.
3. Detection of cracks on the die part.
4. Problems with wear resistance.

These factors ultimately reduce the overall quality and tool life of punches and dies.

To address these concerns, CBCT Group recommends a WEDM strategy of 2 rough cuts followed by 5 fine cuts to minimize the risk of thermal cracks remaining on the surfaces of fine parts. With advancements in WEDM technology, we are now implementing a strategy of 1 rough cut followed by 3 fine cuts, while maintaining the standards for each cut. The following chart outlines the required standards for each cut and the final cut that must be achieved:

No. of Cut (AGIE)	Ra (μm)	WEDM Erode Deepness (μm)	Thermal Crack (μm)	Corrosion layer (μm)
1st Cut (Rough)	1.46 μm	up to 10μm	<20μm	up to 20μm
2nd Cut (Rough)	0.91 μm	up to 6μm	<10μm	up to 10μm
3rd Cut (Fine)	0.86 μm	up to 6μm	<10μm	up to 8μm
4th Cut (Fine)	0.80 μm	up to 6μm	<10μm	up to 8μm
5th Cut (Fine)	0.75 μm	up to 5μm	-	up to 8μm
6th Cut (Fine)	0.51 μm	up to 4μm	-	up to 6μm
7th Cut (Fine)	**0.17 μm**	up to 1μm	-	up to 3μm

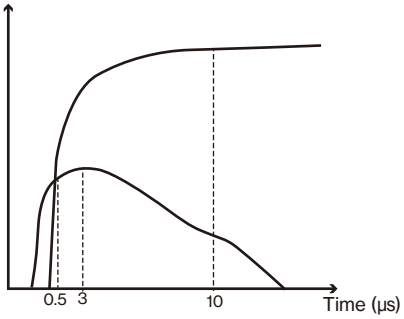
★ Attention: Surface finishing should achieve **Ra 0.17μm** to ensure Qualified Surface

The Principle of WEDM and Precaution

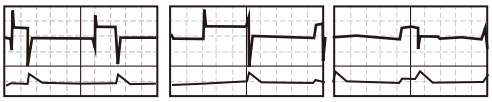
WEDM, or Wire Electrical Discharge Machining, utilizes copper wire as a charged electrode, bringing it close to an oppositely charged workpiece in a fluid medium to induce spark erosion. In essence, the WEDM process employs DC current along with capacitors to create a cycle of charging and discharging within a liquid insulation medium. When the electrode wire approaches the workpiece at a distance of 0-5 micro-meters, the insulating properties of the medium (such as water) diminish, resulting in the generation of sparks. At this moment, the voltage drops to zero and then recharges. Through this repeated process, the surface of the workpiece is eroded into the desired shape and precision.

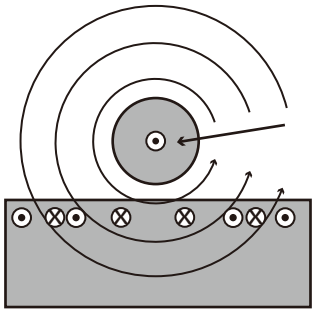
Since the machining process relies on spark erosion between two oppositely charged substances, fine adjustments to the current flow can help achieve precise requirements for the workpiece.
Many users may not be fully familiar with the working principles of the WEDM process, leading to instances where the surface quality of the workpiece is compromised, ultimately undermining the benefits of carbide tool life.

As previously mentioned, the charging and discharging principles of EDM incorporate a crucial concept: the electric pulse cycle of the spark erosion process. The sparks involved are not large surface eruptions but rather millions of tiny sparks occurring on the surface. If there are issues with current adjustment or the insulating medium (liquid) that cause short circuits between these tiny points, the sparks will not be released, preventing successful cutting during the WEDM process. Thus, the quality of the WEDM process heavily relies on the stability of the electric pulse, which in turn affects both the precision and tool life of the punches and dies post-machining.

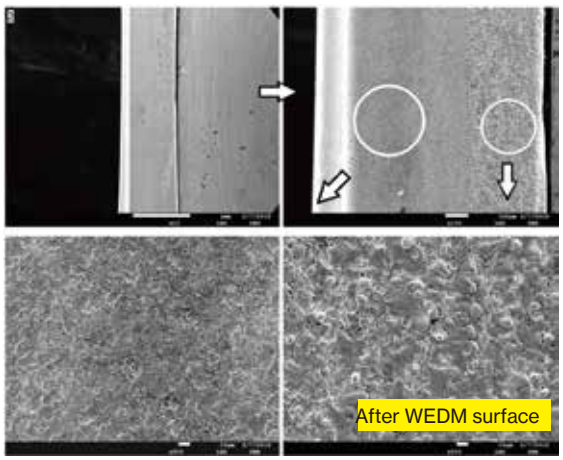


Picture 1: Simultaneous charging cycle


Picture 2: Simultaneous Electric pulse cycle


Picture 3: WEDM process surface

Case Study:



SEM magnification

The sample received was reported to have experienced chipping. Upon SEM inspection, it was determined that the chipping was caused by an improper WEDM process rather than material defects. The root cause was that the eroded surface was not adequately removed during the first rough cut and the second cut of the WEDM process. As a result, the second WEDM cut allowed the eroded marks to persist into the fine cuts, leading to even deeper damage.

This case study illustrates an example of an unstable WEDM process that resulted in surface damage. The instability in machining may be attributed to factors such as wear and tear of machine parts, maintenance issues, or control problems, all of which can adversely affect the performance of the WEDM process.

Grinding Process Technique and Precautions

To enhance grinding quality and achieve a high-quality surface finish (Ra) without causing micro-cracks, consider the following recommendations:

1. Grinding Wheel
While there are various types of grinding wheels suitable for machining carbide, diamond grinding wheels are the preferred option. Additionally, grinding wheels with resin binders are the optimal choice for this application.

2. Rough Grinding
It is crucial to utilize a wet grinding process to effectively cool the surface and prevent thermal cracks. Wet flushing also aids in efficiently removing chips during this stage.

3. Fine Grinding
A wet grinding process should be employed for fine grinding. In the case of profile grinding (PG), if dry grinding is necessary, it should be conducted at a reduced feed rate and grinding speed to minimize the risk of thermal cracks. For standard fine grinding, limit the grinding depth to less than 0.010 mm per pass and use a grinding wheel with a grit size of 600 or higher to further reduce the potential for thermal cracks on the surface.

By selecting the appropriate grinding wheel and method, you can achieve excellent surface quality (Ra) on the workpiece while significantly enhancing tool life performance, ultimately resulting in a high cost-performance (CP ratio) for the tool.

X10 Thermal Crack after improper grinding

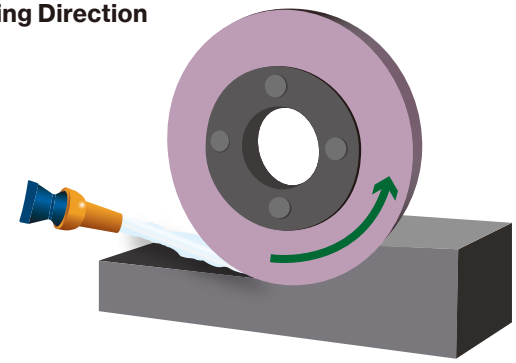
Carbide Slitting/Rough Cut and Precautions

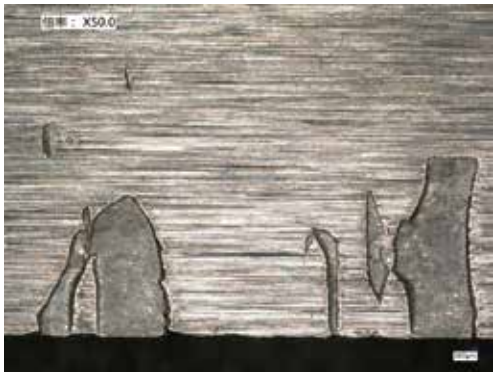
Carbide is known for its high hardness and exceptional wear resistance, but it is also more brittle compared to standard steel. As a result, traditional slitting and cutting methods are not suitable for tungsten carbide. When it comes to the slitting process for carbide, consider the following precautions:

Carbide Rods:
For rods with a diameter less than 2 mm, manual slitting using diamond slitting wheels is feasible due to their small cross-sectional area. However, it is essential to grind the silted surface afterward to ensure that any thermal cracks and damaged areas are properly removed before further machining.
For rods with a diameter greater than 2 mm, the slitting process should be performed exclusively using the Wire Electrical Discharge Machining (WEDM) method.

Carbide Blocks:
The slitting process for carbide blocks must be carried out using WEDM; diamond slitting wheels are not applicable. Additionally, the silted surface should be ground before use or any fine machining to ensure optimal quality.

Grinding Direction

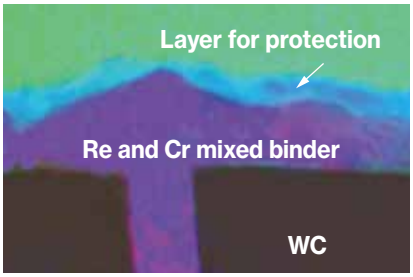




X50 Thermal Crack

CBCT Corrosion Free Grade working principle

Pitting surface



Carbide is composed of tungsten carbide and cobalt, with cobalt serving as a binder that enhances fracture toughness. From an electrochemical perspective, cobalt is classified as a non-noble metal. During the machining of carbide, contact with the dielectric (such as water and other impurities) can lead to electrochemical corrosion, manifesting as pitting. In this context, corrosion refers to the oxidation and dissolution of cobalt, which compromises its effectiveness as a binder in tungsten carbide.

To address this corrosion issue, the industry has explored various solutions. Some have suggested replacing cobalt with noble alloys or nickel as binders; however, this approach often results in a material that does not perform as well as cobalt due to altered physical properties. Tungsten carbide using these alternative binders tends to exhibit inferior mechanical properties and performance in WEDM machining.

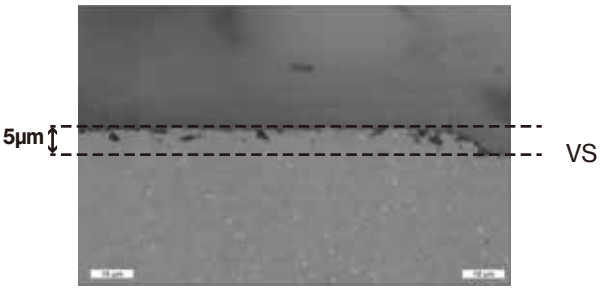
To mitigate the corrosion problem associated with cemented carbide, experts from CERATIZIT and CB CERATIZIT have collaborated with leading WEDM machine manufacturers to develop new corrosion-resistant carbide grades known as the NF series. These grades enhance the stability and corrosion resistance of tungsten carbide, significantly improving the tool life of stamping dies.

The NF series grades can reduce the cobalt depletion rate by a factor of 80 and enhance the stability of cemented carbide during WEDM and other machining processes. This advancement greatly extends the tool life of punches and dies commonly used in the blanking and lamination industries. The corrosion resistance is achieved during grade preparation by incorporating corrosion inhibitor elements into the powder. When NF grade carbide comes into contact with dielectric substances (e.g. Oxygen, Water, Lubricants), a protective thin oxide layer will forms on the carbide surface, isolating the carbide from the external environment and preventing the surface from corrosion. Since the corrosion inhibitors are mixed inside the powder, this protection is sustainable and continuous throughout the machining process.

The CF/NF grades offer the following advantages:

1. Enhanced ability to withstand extreme dielectric conditions during the WEDM process, reducing filtration costs.
2. Elimination of the need for additional corrosion prevention measures, minimizing negative effects on the machined surface.
3. Maintenance of good surface quality after machining, preventing sticking during stamping and thereby increasing tool life.
4. A significant reduction in corrosion rate by a factor of 80.

Case Study:



Further 3 hours inside the tank after the WEDM process of **Non** CF/NF Grade, it shows a further 5um thickness of corrosion layer.

Further 3 hours inside the tank after the WEDM process of CF/NF Grade, it shows no trace of corrosion layer.

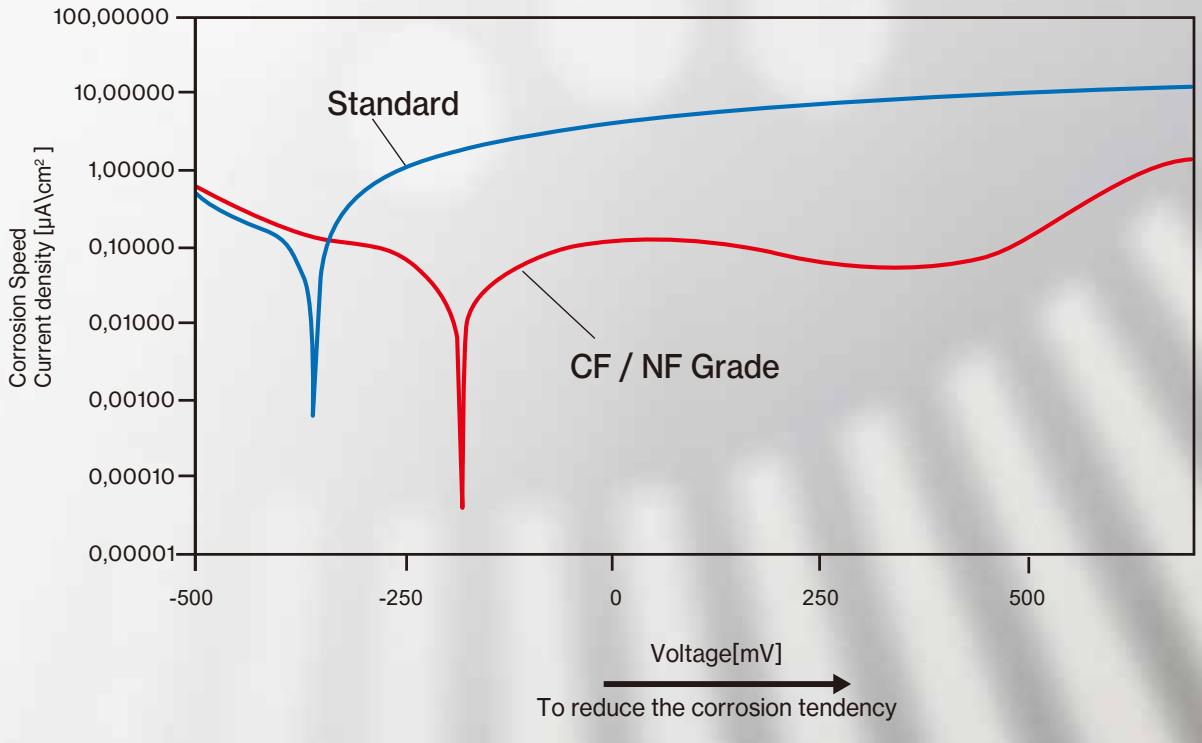
The concept of NF and CF series

Before the announcement of the new corrosion-free grade by CERATIZIT and CB CERATIZIT, the industry had long awaited a solution to the corrosion issues associated with carbide materials. Tungsten carbide, known as the hardest metal in the world, can only be machined using wire erosion technology. The WEDM process is time-consuming and primarily uses water as a dielectric medium, making corrosion a prevalent challenge. Furthermore, as the WEDM progresses, the quality of the dielectric medium deteriorates, leading to an increase in corrosion rates. This not only affects machining quality but also raises the costs associated with filtering the dielectric medium.

To address the negative effects of corrosion, the CERATIZIT Group conducted electrochemical corrosion tests in WEDM settings in Europe a decade ago. These tests were performed in an aggressive corrosion medium, specifically using water with a pH of less than 5. Unlike traditional corrosion tests that measure weight loss according to DIN 50905, this new testing method for carbide provided insights into the mechanisms behind carbide corrosion. In these tests, carbide samples were immersed in the aggressive dielectric medium while an electrical potential was applied. The electrical potential was gradually increased, and the resulting current was measured.

The measured current serves as an effective indicator of the amount of cobalt that has corroded and the rate at which corrosion is progressing. The electrical potential curve reflects the material's susceptibility to corrosion. The diagram below illustrates the relationship between corrosion velocity (measured in µA/cm²) and corrosion probability (potential in mV). With the introduction of the NF grades, which form a protective oxide layer on the carbide surface before further cobalt corrosion occur, the corrosion velocity can be reduced by a factor of 80. This protective layer, composed of chromium oxide, is visible in transmission electron microscope images.

Additionally, the cobalt binder is combined with elements from groups 7 and 8 of the periodic table, such as rhenium, germanium, palladium, and copper, to further minimize corrosion tendencies. Since the costs associated with corrosion prevention and tool maintenance often exceeds the initial investment in high-quality materials, selecting corrosion-free carbide is essential for enhancing tool life and reducing overall tool costs.



The current density against voltage graph metrics

CERATIZIT

Corrosion free grade analysis

To help fabricators and end users better understand how corrosion impacts the precision and surface quality of carbide workpieces, CB CERATIZIT conducted tests in collaboration with the renowned WEDM machine manufacturer, AGIE CHARMILLE. The results are presented below.

Case 1 :

Machine: AGIE CHARMILLE
Ra-value: 0.2µm
Conductivity: 15-20 µS
Machining hours: 23 hours

After machinning 23 hours,
the part stays inside the tank for 63 hours

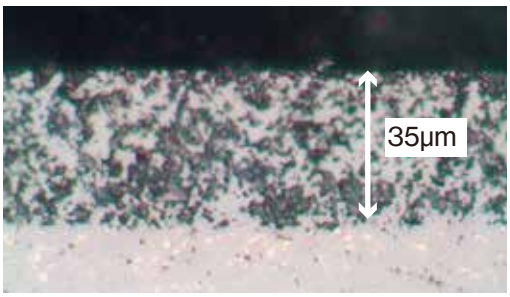


Figure 1: the picture was taken without corrosion resistance grade.

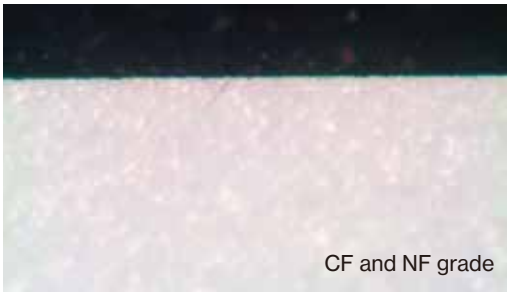


Figure 2: the picture was taken with corrosion resistance grade.

The case presented above compares carbide grades with and without corrosion resistance. Under conditions of Ra 0.2 µm and 5-20 µS electrical conductivity during the WEDM process, the workpiece was machined for 23 hours and then left in the tank for an additional 63 hours. The findings indicate that carbide lacking corrosion resistance experienced cobalt depletion of up to 35 µm, which is several times the re-grinding allowance for punches or dies. The results also demonstrate that when tungsten carbide workpieces come into prolonged contact with aggressive media, they can corrode significantly. Furthermore, during the WEDM process, higher levels of impurities in the dielectric medium lead to increased corrosion severity.

To mitigate the impact of corrosion on workpieces, it is essential to not only take good care of machined parts but also to use corrosion-resistant carbide grades (CF and NF series) that eliminate corrosion factors altogether.

Advantages of using CF and NF series carbide include:

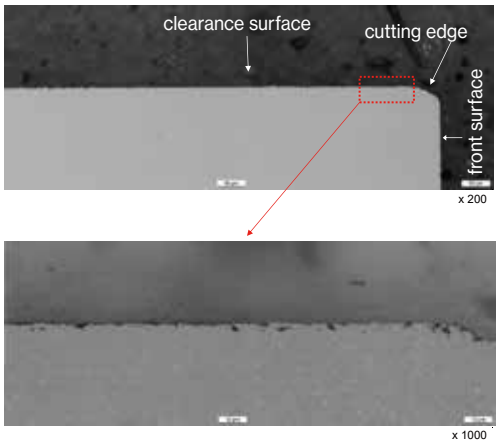
1. Reduced filtration costs for the dielectric medium during the WEDM process.
2. Lower handling costs for preventive measures against carbide corrosion, resulting in overall cost savings.
3. Consistent maintenance of surface quality.
4. Prevention of material sticking (e.g., copper dust) on punch and die surfaces due to enhanced surface quality.
5. Extended tool life for punches and dies.

Corrosion free grade analysis

Case 2 :

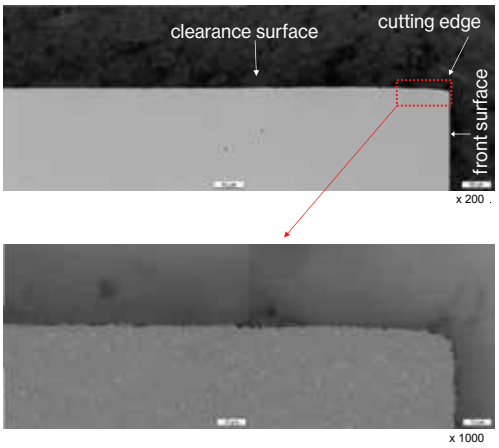
Machine: MITSUBISHI
Ra-value: 0.6µm
Conductivity: 20 µS
Machining hours: 8 hours

Punch 1: Grade WF30, customer complains about cutting edge, quick wears.



Corrosion depth up to 6µm

Punch 2: Grade NFS26, tool life increase more than 30%, normal wears only.



Corrosion layer was not detected

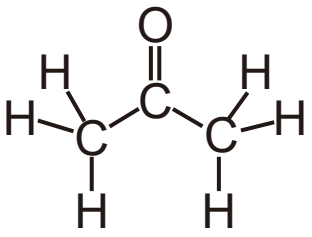
In Case 2, we analysed the tool life of two punches made from carbide with and without corrosion resistance. For Punch 1, we observed poor surface quality under the microscope, with the cutting edge exhibiting significant wear and a lack of sharpness. We suspected that the punch faced severe corrosion issues, resulting in material sticking to the surface. Consequently, the punch was no longer cutting effectively but was instead tearing, which led to rapid burring of the stamping material and a shortened tool life.

In contrast, Punch 2 was produced using corrosion-resistant NF-grade carbide. The analysis revealed only normal wear, and the tool life of this punch increased by 30%.

These results demonstrate that utilizing high-performance NF and CF corrosion-resistant grades can significantly enhance tool life. While some customers may invest millions in high-quality machines to ensure product consistency, they can also achieve substantial improvements in tool life by selecting high-performance carbide materials for their stamping tools, which represents only 2-3% of that investment. Through these case studies, we aim to highlight the critical importance of addressing corrosion issues in tools and exploring ways to optimize cost-performance efficiency.

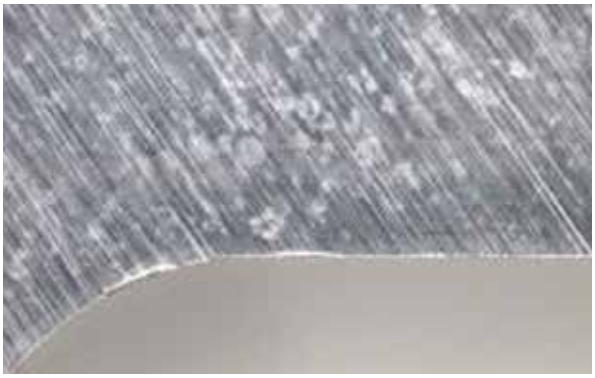
Harmful Cleansing Agent to Tungsten Carbide – Acetone

Corrosion remains one of the most significant challenges in precision machining. It can occur to varying degrees and may introduce additional dimensional tolerances of 5 µm to 7 µm in precision machined components, greatly affecting machining accuracy. Furthermore, the temperature of the workpiece rises during the machining process, which accelerates corrosion and can reduce tool life by 10% to 20%.
As a result, many fabricators and end users are exploring ways to optimize their machining processes to minimize the impact of corrosion on their tools.
To prevent corrosion issues, in addition to using the previously mentioned CF and NF series carbide grades, it is crucial to avoid strong acidic and alkaline cleaning agents when cleaning machined parts. Among various cleaning agents, acetone is a notable example of a harmful chemical that can cause significant corrosion to carbide components.
Despite its effective degreasing ability and relatively low cost, many fabricators often choose to use acetone for cleaning tungsten carbide parts. However, this might cause severe corrosion and induce micro cracks on the workpiece surface, which will lead to chip off problem during usage of the tools.severe corrosion and pitting problem, this may even cause the carbide stamping parts to crack during stamping due to poor surface finishing.

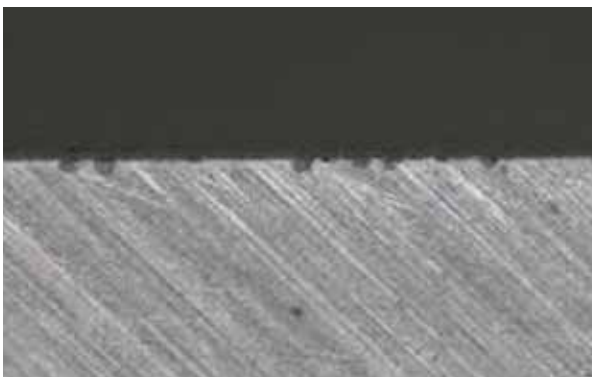


Case Study 3:Tungsten Carbide parts chip off after usage of Acetone for cleaning

Abnormal surface color



Cobalt depletion was found after magnification



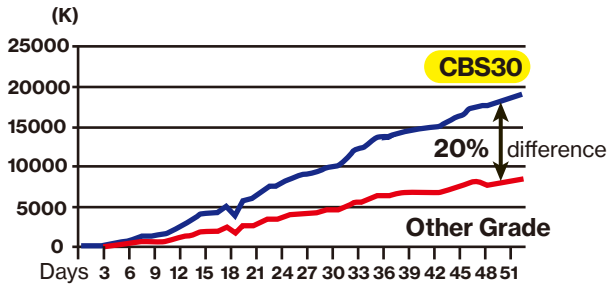
Further magnification shows cutting edge chip off

After Magnification of 1000x , obviously the chip off is caused by corrosion and further sticking of material was found on the surface

This case involved a customer who experienced chipping on the cutting edge of a die component. Upon further investigation, it was determined that the issue stemmed from severe corrosion caused by the improper use of a cleaning agent to remove oil from the parts. This corrosion compromised the surface quality of the die and led to material sticking issues. It is important to note that standard carbide grades offer no corrosion resistance.

New CB Series Grade CBS30, CBU22

With the recent R&D breakthrough at CB CERATIZIT, we have launched a new CB series that demonstrates a higher CP ratio for electronics applications. Compared to traditional grades like UF30 and TF25+, the new CB series can increase the TRS value by up to 28%. This new grade has optimized the stamping performance of Tiny Punches, which are widely used in the semiconductor and lead frame industries.

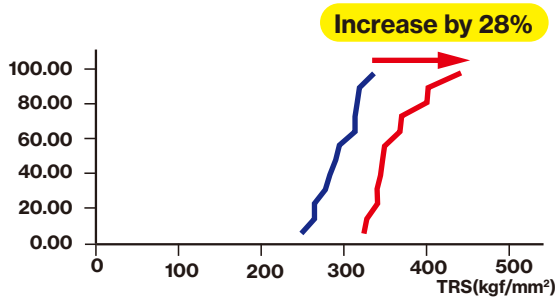


▲ Cumulative tool life Comparison in Copper alloy (Cu-p) Stamping

CBS30 (Solution for Electronics Stamping)

By utilizing a breakthrough in the sintering process, CBS30 exhibits impressive properties, including high toughness (K1C 11.8) and TRS (420 MPa), while maintaining a high hardness value (HRA 91). This means that under the same hardness conditions, the CB series demonstrates superior TRS and toughness compared to traditional grades.

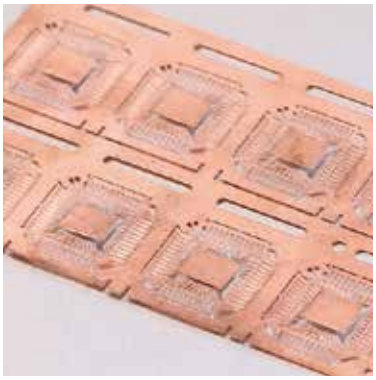
With its submicron grade, CBS30 not only enhances surface finishing after machining but also offers a new solution for stamping Copper and Stainless Steel. The new CBS30 features high wear resistance, which significantly improves tool performance. Additionally, the enhanced toughness and TRS reduce the likelihood of tool deformation and chipping.



▲ CB Series increase the TRS performance

CBS30 is ideal for stamping stainless steel strips of less than 0.6 mm and Copper Alloy strips of less than 1 mm, making it particularly suitable for applications in the automotive industry, such as connectors and electronic components. The combination of toughness and wear resistance in this grade greatly enhances the stability and precision of stamping tools while ensuring extended tool life.

CBU22 (Solution for Leadframe/Tiny Punches Application)

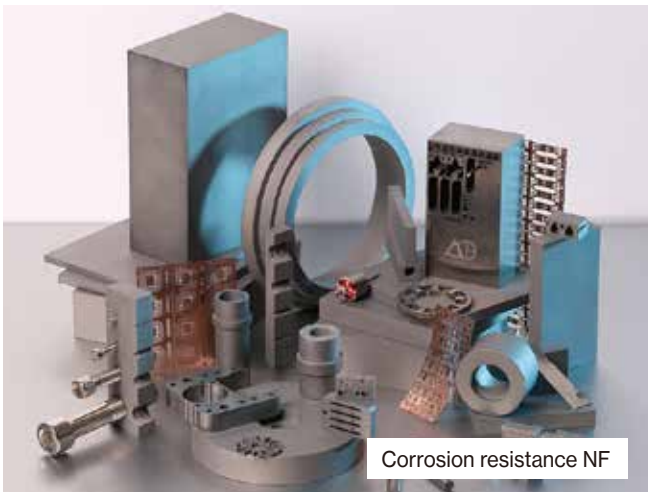


In Lead frame Stamping applications, the design of the mold, stamping stability, and machining precision are critical for achieving high performance. For stamping lead frame with 128 pins, 256 pins, or 512 pins, the cutting clearance between the punches and dies is less than 0.10 mm, making tool wear resistance essential for ensuring tool longevity.

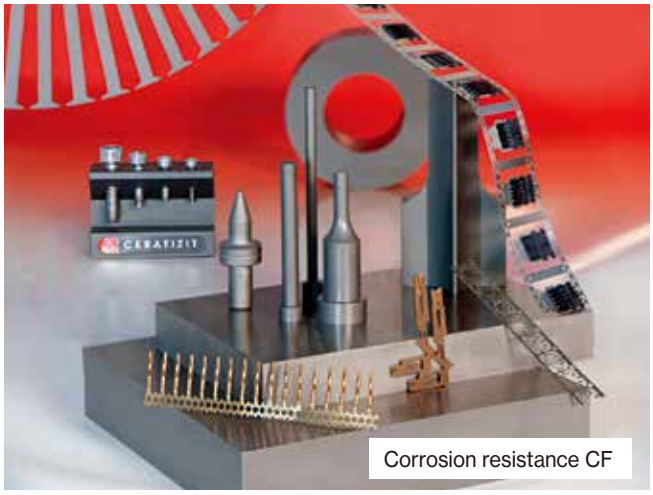
As the cutting edges of the punches become smaller, the importance of wear resistance increases significantly. Given the high speed of lead frame stamping, even minor issues or breakage of a punch can lead to substantial problems and material waste. Consequently, quality is far more critical than cost in this application.

To address these challenges, CB CERATIZIT has launched the high-performance grade CBU22 specifically designed for this application. CBU22 features an ultra-fine grain size and a hardness of HRA 92.3, effectively balancing wear resistance and toughness. This grade has also gained widespread acceptance in the market as a new solution for customers.

Grade	Grain Size	Co	Density	Hardness		T.R.S.		Toughness	Application
	μm	(±0.5%)	(g/cm³)	HRA	HV30	kgf/mm²	MPa	MPa*m$^{1/2}$	
CBU22	0.3	11	14.15	92.3	1660	380	3750	9	• For Stamping <0.3mm copper alloy • High T.R.S. Value
CBS30	0.7	15	13.8	91.0	1470	420	4116	11.8	• Stamping all kinds of Copper Alloy and Stainless Steel • High T.R.S Value



Corrosion resistance NF



Corrosion resistance CF

Application Table of Corrosion Free grade - the NF Series

Grade	Grain Size	Application	Characteristics
NEW!! Corrosion resistance NFS16	Submircon	• All Cu alloys stamping • Thin stainless steel stamping • High Speed Stamping • Connectors stamping • Semi-con stamping	• Ideal combination of hardness and toughness. Improved wear resistance for high tensile strength material cutting • Corrosion resistance • Ideal brand • Short leadtime • High stability • Good quality • High speed stamping • High CP value
NEW!! Corrosion resistance NFS26	Submicron	• High speed stamping • Connector Stamping • Semi-con stamping	• Combination of hardness and toughness, highly optimized for general use • Good for stamping high sticking metal plate • Corrosion resistance material
NEW!! Corrosion resistance NFM24 (TNF25B)	Medium	• Motor Core Stamping • Silicon steel stamping • Hardware stamping	• Corrosion resistance material • Fast delivery • Good Quality Assurance • Recognized Grade and Brand • High stability • High Cost- Performance efficiency • Suitable for high to medium speed stamping
NEW!! Corrosion resistance NFM25 (TNF25A)	Medium	• Motor Core Stamping • Silicon steel stamping • Hardware stamping	• Corrosion resistance material • Fast delivery • Good Quality Assurance • Recognized Grade and Brand • High stability • High Cost- Performance efficiency • Suitable for high to medium speed stamping
NEW!! CBU22	Ultra Fine	• Leadframe (For Tiny Punch) • Semi-Con Stamping	• Ultra Fine grain size, super high • Quality Ensurance • wear resistance, High Surface finishing • Fast Leadtime • For High Speed Stamping High CP ratio • High Stability • Anti-deformation
NEW!! CBS30	Submicron	• High Speed Stamping • Conector Stamping • Semi-Con Stamping • Electronics Stamping	• Combination of wear resistance and Toughness, • General Application • Good solution for Copper Alloy • Good for corrosion resistance material

Application Table of Corrosion Free grade - the CF Series

Grade	Grain Size	Application	Characteristics
Corrosion resistance CF-H25S+	Medium	• Suitable for stamping <0.6mm stainless steel • Suitable for connector stamping • High Speed Stamping	• Corrosion Resistance material • High stability • High toughness • Good cutting and trimming ability • Stock availability
Corrosion resistance CF-H40S+	Medium	• Silicon steel,Motor core stamping and Iron Steel stamping • Suitable for folding, cutting and deep drawing • High Speed stamping	

Grade selection Method

When discussing carbide grade selection, we often focus primarily on one parameter: hardness (HRA/HV30). However, toughness (KIC) is equally important. Many end users recognize that wear resistance is crucial for durability, as well as toughness to prevent chipping. Nevertheless, some may be uncertain about which parameters to prioritize when making their selection. In this context, KIC is the key value to consider.

The following is a reference chart for carbide grade selection:

Min → Surface finishing requirement → Max

Material thickness (mm)	Tensile Strength(N/mm²) <500	500-900	900-1400	1400-2000	>2000
<0.2	CTS12D CF-H25S+ CTS18D NFS16 CBU22 CBS30	CTS12D CF-H25S+ CTS18D NFS16 CBU22 CBS30	CTS18D CF-H25S+ NFS16 CBS30	CTS18D CF-H40S+ NFS26 NFS16 CBS30	CF-F35Z NFM25 VA95
0.2-0.5	CTS12D CF-H25S+ CTS18D NFS16 CBU22 CBS30	CTS12D CF-H25S+ CTS18D NFS16 CBU22 CBS30	CTS18D CF-H25S+ NFS16 CBS30	CF-H40S+ CF-F35Z NFS16 NFS26 CBS30	CF-F35Z NFM25 VA95
0.5-0.8	CTS18D CF-H25S+ NFS16 CBS30	CTS18D CF-H40S+ NFS26 NFS16 CBS30	CTS18D CF-H40S+ NFS26 NFS16 CBS30	CF-F35Z NFM25 VA95	○
0.8-1.2	CTS18D CF-H40S+ NFS26 NFS16 CBS30	CF-H40S+ NFM23 NFM24	CF-H40S+ NFM23 NFM24	CF-F35Z NFM25 VA95	○
1.2-1.5	CF-H40S+ NFM23 NFM24	CF-H40S+ CF-F35Z NFM24 NFM25	CF-H40S+ CF-F35Z NFM24 NFM25	CF-F35Z NFM25 VA95	○
1.5-2	CF-H40S+ NFM23 NFM24	CF-H40S+ CF-F35Z NFM24 NFM25	CF-F35Z NFM25 VA95	○	○
2-3	CF-H40S+ NFM23 NFM24	CF-H40S+ CF-F35Z NFM24 NFM25	CF-F35Z NFM25 VA95	○	○
3-6	CF-H40S+ CF-F35Z NFM24 NFM25	CF-F35Z NFM25 VA95	○	○	○
6-10	CF-F35Z NFM25 VA95	○	○	○	○
>10	○	○	○	○	○

Min → Surface finishing requirement → Max

*In case of queries, pls. contact our sales office (Blue for CT grade, Black for CBCT grade)

5G vs Mould Intelligent

Regarding Mould Intelligent, significant advancements in software and hardware have been made in the areas of mould fabrication and high-speed stamping. These developments help ensure and optimize working precision, ultimately enhancing production efficiency. With the implementation of 5G transmission, larger data sets can be collected, share and utilize within and between subsidiaries, allowing for greater control over precision and facilitating the production of complex parts. Additionally, network-based maintenance of progressive stamping systems reduces the likelihood of human error, leading to improved efficiency. Finally, this approach minimizes disturbances to tool life for each quality component in the stamping process, including punches and dies.

CBCT as one of the market leader in Tungsten Carbide Material, we play a very important role to ensure high quality carbide is produced to our customer to guarantee optimized performance output.

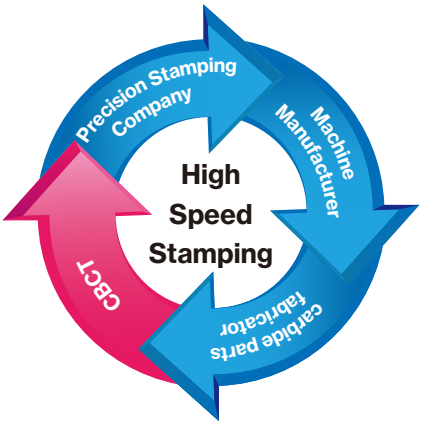
As intelligent automation continues to advance, raw materials quality, particularly carbide parts, will play a significant role in determining success and the cost-performance (CP ratio) in production. It's important to recognize that investing in process automation with ensuring stable raw material quality can lead to outcomes that reflect the saying, “Stitch In Time Saves Nine.” In this newsletter, you'll find extensive information about our new CF and NF corrosion-free series grades. These patented grades are designed to eliminate the negative effects of environmental factors such as water, oxygen, and acidic or alkaline liquids, which can destabilize carbide. By enhancing carbide quality, we can significantly improve tool life and machining yield. Therefore, CF/NF grades represent an ideal solution for optimizing cost-performance efficiency in the mould and die industry.

Development of EV (Electric Vehicle)

“Innovative, Step ahead in Technology” has been the motto of CB CERATIZIT. In the advent of this decade, there is a big innovation over the concept of Automobile. Electric car will be the next focus over this century and also has brought infinite opportunity to our industry. In the aspect of EV, the “Driving Motor” and“ Batteries” known as the heart of the vehicle that provide mobility and energy. The quality of the Motor and Battery itself play an important role over the safety issue of the drivers also. Motor is made up of Rotor and Stator which are stamped silicon steel. The material and tolerance of silicon steel highly affect the powder of the motor as well as the safety.

Electric Vehicle

Each vehicle has Thousands of small Lithium batteries also. Battery casing are stamped parts which contribute electric conductivity and weight balance to the vehicle. Together with stamped connectors inside the car, this become very important to tool and die industry. CB CERATIZIT has been supplying big Carbide Block and Rings for motor production and different Punch and Dies for the battery and connectors industry. The carbide (CF/NF) quality helps to optimize the stable production in tool and die which indirectly contribute to the good performance of the components.



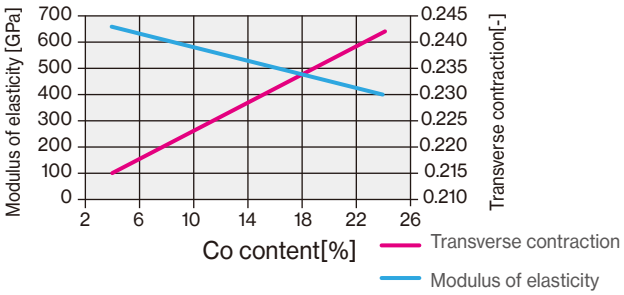
The service chain formed between CBCT, machine manufacturer and mould fabricator.

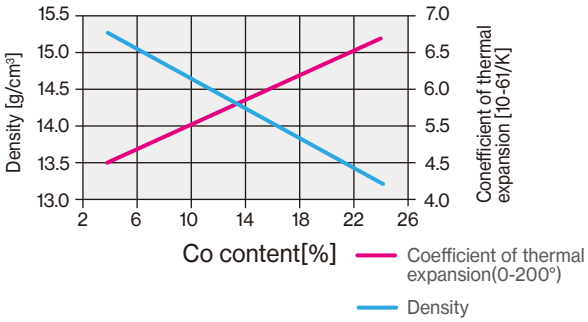
Fundamental guidelines for selecting the right carbide grade:

Grain size	Impact strength	Stress caused by notch tensions	Tension and bending stress (With good surface quality!)	Resistance to adhesion (against metal)
Coarse / medium	++	+	o	o
Fine	+	o	o	+
Submicron	o	-	+	++
Ultrafine	-	--	++	++

Within the grain size categories the following applies: with decreasing Co content (= increasing hardness) wear resistance and compressive strength rise, while toughness decreases considerably.

Modulus of elasticity, transverse contraction, density and coefficient of thermal expansion





Hardness Conversion

HV10	HV30	HRa	HV10	HV30	HRa	HV10	HV30	HRa	HV10	HV30	HRa
790	780	83.3	1140	1130	87.7	1490	1470	91.0	1840	1810	93.1
800	790	83.4	1150	1140	87.8	1500	1480	91.1	1850	1820	93.1
810	800	83.6	1160	1150	87.9	1510	1490	91.2	1860	1830	93.2
820	810	83.7	1170	1160	88.0	1520	1500	91.2	1870	1840	93.2
830	820	83.9	1180	1170	88.1	1530	1510	91.3	1880	1850	93.3
840	830	84.0	1190	1180	88.2	1540	1520	91.4	1890	1860	93.3
850	840	84.2	1200	1190	88.2	1550	1530	91.5	1900	1870	93.4
860	850	84.3	1210	1200	88.3	1560	1540	91.5	1910	1880	93.4
870	860	84.4	1220	1210	88.5	1570	1550	91.6	1920	1885	93.4
880	870	84.5	1230	1220	88.6	1580	1560	91.6	1930	1890	93.5
890	880	84.6	1240	1230	88.7	1590	1570	91.7	1940	1900	93.5
900	890	84.7	1250	1240	88.8	1600	1580	91.8	1950	1910	93.6
910	900	84.8	1260	1250	89.0	1610	1590	91.9	1960	1920	93.6
920	910	85.0	1270	1260	89.1	1620	1600	91.9	1970	1930	93.7
930	920	85.1	1280	1270	89.2	1630	1610	92.0	1980	1940	93.7
940	930	85.2	1290	1280	89.3	1640	1620	92.1	1990	1950	93.8
950	940	85.3	1300	1290	89.4	1650	1630	92.1	2000	1960	93.8
960	950	85.5	1310	1300	89.5	1660	1640	92.2	2010	1970	93.8
970	960	85.6	1320	1310	89.6	1670	1650	92.2	2020	1980	93.9
980	970	85.8	1330	1320	89.7	1680	1660	92.3	2030	1990	93.9
990	980	85.9	1340	1330	89.8	1690	1670	92.3	2040	2000	94.0
1000	990	86.0	1350	1340	89.9	1700	1680	92.4	2050	2010	94.0
1010	1000	86.1	1360	1350	90.0	1710	1685	92.4	2060	2020	94.0
1020	1010	86.3	1370	1355	90.0	1720	1690	92.5	2070	2030	94.1
1030	1020	86.4	1380	1360	90.1	1730	1700	92.5	2080	2040	94.1
1040	1030	86.5	1390	1370	90.2	1740	1710	92.6	2090	2050	94.2
1050	1040	86.6	1400	1380	90.3	1750	1720	92.6	2100	2060	94.2
1060	1050	86.7	1410	1390	90.3	1760	1730	92.7	2110	2070	94.2
1070	1060	86.8	1420	1400	90.4	1770	1740	92.7	2120	2080	94.3
1080	1070	87.0	1430	1410	90.5	1780	1750	92.8	2130	2090	94.3
1090	1080	87.2	1440	1420	90.6	1790	1760	92.8	2140	2100	94.3
1100	1090	87.3	1450	1430	90.7	1800	1770	92.9	2150	2110	94.4
1110	1100	87.3	1460	1440	90.8	1810	1780	92.9	2200	2130	94.8
1120	1110	87.5	1470	1450	90.8	1820	1790	93.0	2300	2200	95.2
1130	1120	87.6	1480	1460	90.9	1830	1800	93.0	2350	2250	95.4