CB-CERATIZIT GROUP

HARD MATERIAL SOLUTIONS BY CERATIZIT

Newsletter

of EDM and High Speed Stamping

New Material Technology and Application

Market Trend of High Speed Stamping

New Corrosion Free Grade --NF series

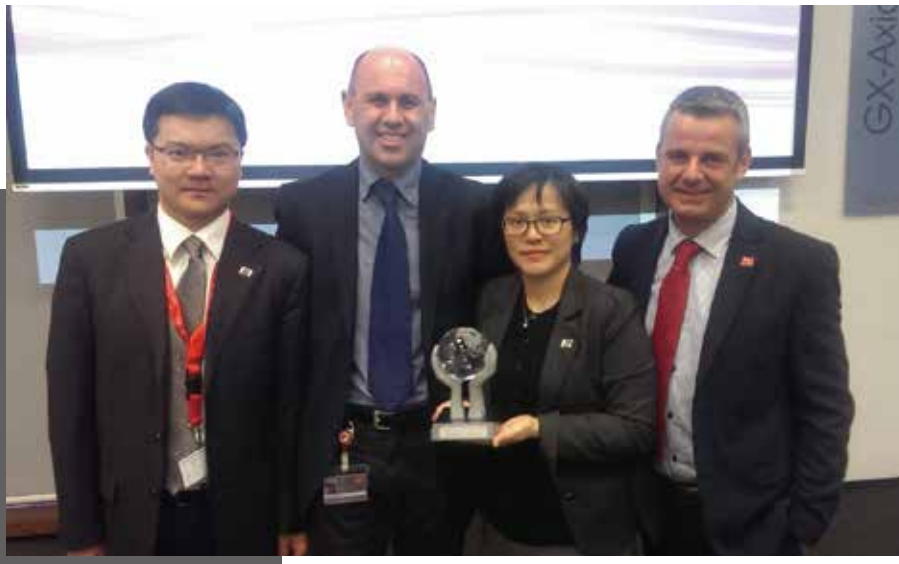
Harmful Cleansing Agent – Acetone

Application of Corrosion Free grade

Carbide Machining Technique

TOOLING THE FUTURE

2nd edition



With Schaeffler Group Complement——

Global Best Supplier Award for CERATIZIT GROUP

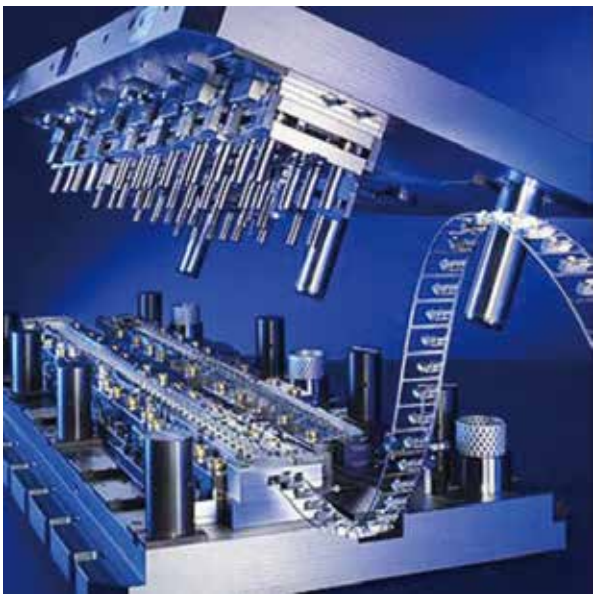
Contents

CB-CERATIZIT has been showing its professionalism by providing perfect solution to high precision stamping industry. CB-CERATIZIT through huge investment in R&D project, we have successfully developed high quality Tungsten Carbide grade correspond to the tool life request of the market. Beyond the merger of CBCT in 2010, there have been a lot of technical exchanges and cooperation between CBCT and Europe CERATZIT that brought huge breakthrough in product development, manufacturing and R&D side. The most obvious result is the introduction of locally manufactured Corrosion Free grade NF series for the blanking and lamination industry. The grade is from the basis of Ceratizit Corrosion Free Grade CF-H40S and CF-H25S, which was then modified from locally produced WF30 and KG4 grade with the implementation of corrosion free technology. There will be more in-depth discussion about the advantages of NF series later in this chapter.

At the same time, beyond the merger in 2010, CB-Ceratizit has increased more than 20 sets of sintering and HIP (Hot Isostatic Press) branded machines from Europe which further improve the production stability and sintering quality. We understand how important the role of carbide material plays on high speed precision stamping. Therefore, no matter on product stability, consistency, Quality Assurance and after sales support, CBCT has done its serious job and hope that our product can help to bring high cost performance ratio and satisfaction to our customer. In this chapter, we hope we can show you the effort and result of our R&D work. We also feel welcome to feedbacks from your side regarding on technical question and quality expectation. Please reach one of our sales points and share issues with us that might bring beneficial result to both of us .

Development trend of Precision Stamping Mould

With the strong and fast development of car and electronic industry, products which need high precision, high volume and high manufacturing speed have become more important than before. The launch of electric car and the increase in electronics peripheral parts have also increased the product variety. In order to fulfill the booming industry, sophisticated design and high quality mould have become the challenges of most precision mould manufacturers. What we meant by high speed stamping is that the machine works under a condition of stamping speed of 1000 hits/minute and with stamping pressure of minimum 100 ton. Under this extraordinary working condition, machine and mould are both required to have high precision and high stability. In addition, the quality of the spare parts (cutting parts) inside the stamping mould also needs to be high and very stable. Providing that the tool life of the carbide cutting parts cannot meet the expected capacity and one or more extra sets of mould or cutting parts need to be produce, the value and time cost spent might be over 100 times compare to the cost of choosing good quality carbide at the beginning that can help to achieve the expected tool life in one time, this is what we meant by cost performance efficiency. Parts such as USB connectors, switches, rotors, leadframe etc. are all produced by high speed stamping, therefore with the increasing market challenges, the quality of the stamping mould must also be increased. To increase the stamping quality of the mould, as mentioned before, the most basic way is to use high quality carbide material on the critical parts (cutting parts).



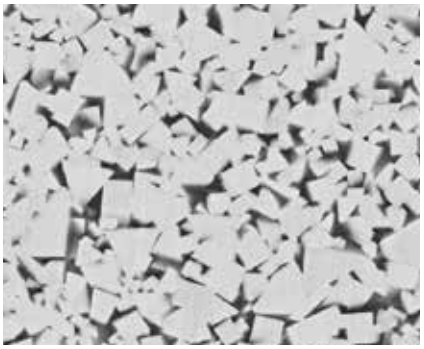
With the slowly elimination of low efficiency and low value-added factories in market like China, the only solution to remain competitive is to focus on high automation and volume production, therefore, the development of high precision mould will become increasingly important. High cost-performance efficiency will reach more attention and demand for high quality carbide material will also increase.

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	Motor Core, <0.6 stainless steel, Hardware stamping	Europe
CF-H25S	8.5	1.0~2.0	14.55±0.1	92.1±0.5	320	Copper alloy, <0.6 staineless steel	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	Hardware stamping, Motor core, silicon steel	China
NFM25*	12.5	3.0	14.18±0.1	88.8±0.5	350	Metal parts, motor core and silicon steel stamping	China
NFM23	11.5	1.3~2.5	14.18±0.1	90.7±0.5	340	0.5-1.5 Silicon steel, metal parts and iron plate	China

*NFM24 = TNF25B NFM25 = TNF25A

Tungsten carbide can be easily found with different qualities in the market. In the early time, customers only choose by price basis, some prefer using low cost carbide to save money, but this action usually results in paying even higher cost for the mould. To evaluate, first of all, we need to know that the machining cost of carbide is usually 10 to 100 times compare to the carbide material cost itself and in most cases, whether the mould can provide high cost-performance level is highly dependent on the carbide material quality itself. The difference between Tungsten Carbide and normal Steel is that Tungsten Carbide is powder metallurgical steel, the sintering process is done by the manufacturer itself, therefore each carbide manufacturer has their own unique carbide recipe (grade) and know-how in manufacturing. In this case, the carbide quality is very dependent on manufacturer's know-how and technology. On top of this, once carbide is sintered, it cannot go through any further process to modify its property and quality (e.g. Heat treatment and re-hardening process), so this mean the quality of the carbide you get depends very much on the quality of the manufacturer you buy from, which will also determine the tool-life in the stamping process.



CB CERATIZIT Corrosion Free Grade NFS26

Many End-users do not understand how to distinguish between high and low quality Tungsten Carbide. In the following, CB-Ceratizit will shares some point on showing the characteristics of high quality Carbide:

1. The consistency of carbide grain

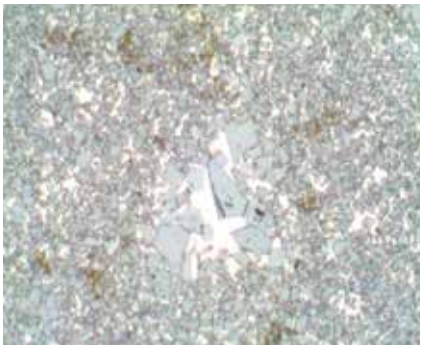
Uneven distribution of carbide grain will result in uneven hardness spread over the material, this will affect the stability of material as well as inducing residual stress inside, the results may be cracking of the carbide during wire-cutting.

2. Non existence of porosity in the carbide material

This will affect the surface quality

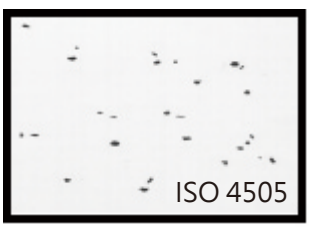
3. Corrosion free carbide material

This will prevent carbide material from corrosion when exposed to corrosive material



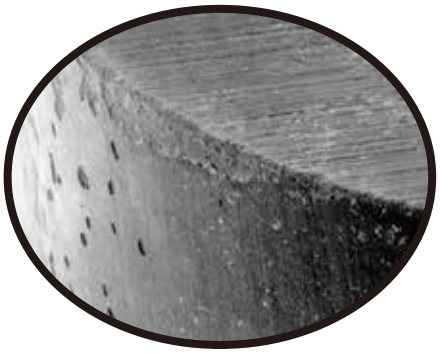
Inconsistent grain distribution in carbide

Apart from the above stated points, the experience and R&D capability of the manufacturer will also directly affect the consistency and quality of carbide material supply in the long run.



With Porosity Problem

With Porosity Problem



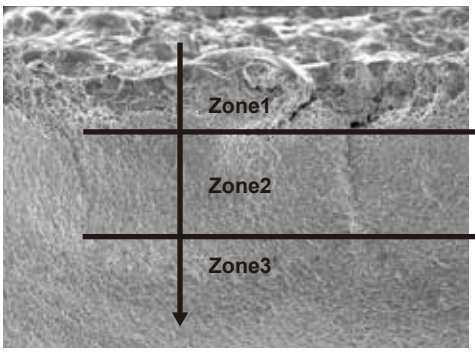
Corrosion Problem

Carbide machining Technique

Optimization

Due to the fact that Carbide has high hardness, WED-M/EDM and Grinding is the only process to machine it. Carbide is also a non-heat resistance material, normally above 700 Degree Celsius, material properties will start to change, thermal crack is an example which can be easily detected. Therefore, during the WEDM process, power control of the sparkling process is very crucial.
Left side is a picture of carbide surface after WEDM. On the surface, beside the detection of copper sticking, there's also serious micro-crack to certain deepness.

This will cause:
1.Surface chip off during Grinding process
2.The chip off of punch or die during stamping process.
3.Detection of cracks on the die part.
4.Wear resistance problem.
The overall quality of the punch and tool life will decrease.



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

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

Due to the above reasons, CBCT Group provided some suggestion to our customer in WEDM process. We suggested 2 Rough Cut + 5 Fine Cut Principle to avoid thermal crack remain on the surface of fine parts. To the advance of WEDM machine, nowadays, we are doing more on the 1 Rough Cut + 3 Fine Cut principles. However, the standard of each cut remain to be unchanged. The following chart shows the standard of each cut and final-cut that needs to be achieve:

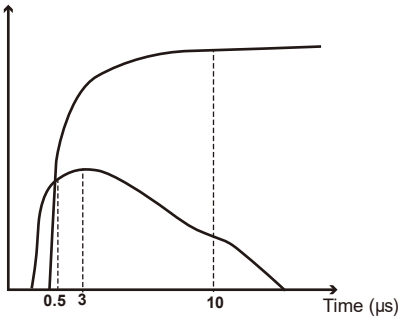
No. of Cut (AGIE)	Ra (μm)	WEDM Erode Deepness (μm)	Thermal Crack (μm)	Corrosion layer (μm)
1st Cut (Rough)	1.46 μm	up to 10μm	<20μm	up to 20μm
2nd Cut (Rough)	0.91 μm	up to 6μm	<10μm	up to 10μm
3rd Cut (Fine)	0.86 μm	up to 6μm	<10μm	up to 8μm
4th Cut (Fine)	0.80 μm	up to 6μm	<10μm	up to 8μm
5th Cut (Fine)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

The Principle of WEDM and Alert

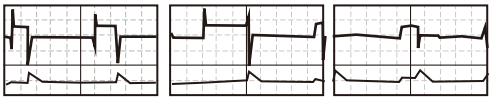
What we known as WEDM is a process that makes use of copper wire as charged electrode and by bringing it towards the opposite charged work piece in a fluid medium to create spark erosion. Generally speaking, the WEDM process is make use of DC current plus capacitors to create a charging and discharging process cycle inside a liquid medium as an insulation. When the Electrode wire moves in proximity to the work piece with a distance of 10-15um, the medium of insulation (e.g. water) property will disappear and sparks are created. At this moment, the voltage will drop to zero instantly and charge up again. By this repeated process, the surface of the work piece will be eroded to the desire shape and precision. Due to the facts that the machining process applied the concept of spark erosion from 2 oppositely charges (+, - charges) substance, therefore by fine adjustment of the current flow can help to control the precise requirement of the work piece.

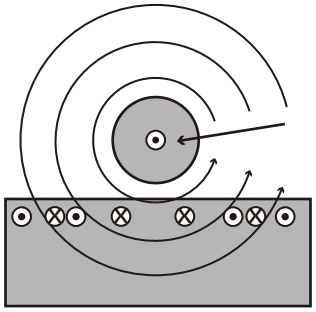
Some users are not too familiar with the working principle of WEDM process, this lead to a lot of cases that surface quality of work piece was damage by WEDM process that the benefit of carbide tool life was never been recognized.

The above we mentioned about the charging and discharging principle of EDM, this includes a very important concept of electric pulse cycle of the sparking erosion process. These sparks that we mentioned are not a big surface of 1 spark creation but millions of tiny sparks that happen on 1 surface. This mean in case the current adjustment or medium (liquid) has problem that cause a short circuit in between each tiny points, tiny sparks will never be release and the cutting process by WEDM will never be achieve. Therefore, the quality of WEDM process depends very much on the stability of electric pulse, it will also affect the precision and tool life of the punch and die after machining.

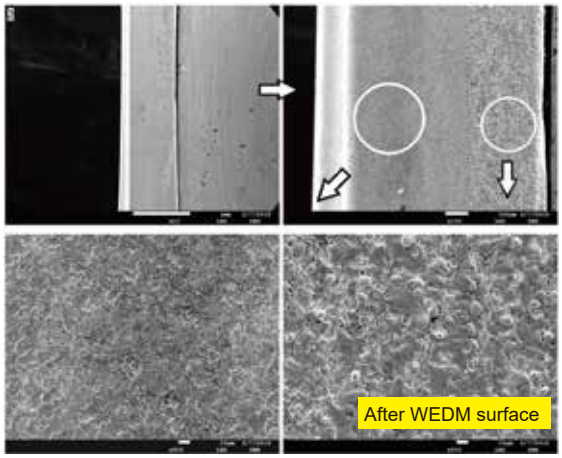


Picture 1: Simultaneous charging cycle


Picture 2: Simultaneous Electric pulse cycle


Picture 3: WEDM process surface

Case Study:



SEM magnification

The sample received reported to have chipped off. Under SEM inspection, the surface was treated by improper WEDM process, the marks on the surface is not related to material defects. The cause is due to material chips was not remove properly in the 1st rough cut process that the surface with chips continue to undergoes 2nd spark erosion. The 2nd spark erosion leads to the marks to appear. The above case study shows an example of unstable WEDM process that lead to surface damage.

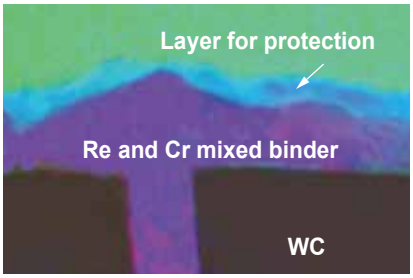
The reason of such machining instability may due to the machine itself or improper chips flashing that cause WEDM does not perform well.

In recent years, with the strong growth of China economy together with the continuous breakthrough of high technology products, high precision mould design and stamping have also face a rapid development. However, facing big market competition, prices of mould has dropped significantly compare to 5 years ago. Leading to a lower margin and profit, the only way to solve the situation is to consider and emphasize on high cost-performance stamping mould. A lot of stamping mould manufactures are ambitious in ways to produce better quality mould and thus to increase the tool life. However, better quality needs better design, better manufacturing process and better material; this mean the production cost might increase instead of decreasing which contradict to the low cost philosophy. Therefore in order to evaluate the cost issue, we should try to emphasize more on the cost-performance ratio of the stamping mould instead of just calculating the cost input. Considering the overall cost of a stamping mould, choosing good carbide material can be regarded as the most basic and efficient way to improve the cost-performance ratio of a mould as carbide itself is the most critical parts in the stamping process, improving carbide quality means will lead to an increase of tool life and better cost performance efficiency.

CB-Ceratizit Group has its own specific carbide grades for specific stamping applications, we have developed special corrosion free grade which beyond our customer expectation. Tungsten Carbide is powder metallurgy alloy made of Tungsten Carbide powder and Cobalt as binder. Cobalt is used to increase the facture toughness of carbide. However, when carbide is pro-long exposed to liquids (e.g. Water, air, etc) during grinding and WEDM process, the cobalt binder will undergoes corrosion, and thus affecting the surface quality of the finished parts. Due to this reason, CB-CERATIZIZT has introduced Tungsten Carbide with corrosion resistance capability, the NF series and CF series. Both CF-H40S, CF-H25S, NFM24 and NFS26 have corrosion resistance properties and the only difference is hardness with respect to different stamping application. CF-H40S and NFM24 are with hardness of HRA88.5-90.7 and use for stamping silicon steel, NFS26 and CF-H25S are with hardness of HRA90.5-92.1 and use for stamping thin stainless steel and copper alloy . In fact, these grades are all corrosion resistance and therefore they have the ability to help maintain a good surface quality of the parts after machining and therefore help to avoid metal sticking during the stamping process, reducing wearing rate and helps to improve the tool-life.

CBCT Corrosion Free Grade working principle

Pitting surface



Carbide consists of Tungsten Carbide and Cobalt. Cobalt is used as binder and provides fracture toughness. From the electrochemical view, cobalt belongs to non-noble metals. During the machining of carbide, due to the contact with the dielectric (H2O and other impurities) we get an electrochemical corrosion in the form of pitting. Corrosion in this case means the binder cobalt is oxidized and dissolved, losing its role as a binder in Tungsten Carbide. The solution to this problem which had been widely researched by the industry, some suggest using binders with noble alloys or nickel to replace cobalt can help to eliminate the corrosion problem of Cobalt. However, this method can never perform well with compare to Cobalt as binder as the physical properties of the material has been changed. Tungsten carbide with this kind of binder can't get good physical performance in term of mechanical properties and WEDM machining.

In order to solve the corrosion problem of cemented carbide and avoid the above problem, CERATIZIT and CB CERATIZIT experts collaborated with branded WEDM machine manufacturers to create the new corrosion resistant carbide grades –NF series, in order to increase the stability and corrosion resistance feature of Tungsten Carbide, thus highly improve the tool life of stamping die.

The new NF series corrosion free grades not only can slow down the cobalt depletion rate by a factor of 80, it can also help to increase the stability of cemented carbide during the WEDM and other machining process. Thus it can greatly improve the tool life of the punch and die which is most widely used in blanking and lamination industry. Corrosion resistance concept works in the beginning of grade preparation by mixing the powder with corrosion inhibitor elements. Once the NF grade carbide contacts with dielectric substance (e.g. water, lubricant etc.), a thin layer of oxide will form on the surface of the carbide for protection (see figure). It will isolate the carbide with the outside environment and thus preventing it from further corrosion. Because the corrosion inhibitor elements are mixed with the powder, so the protection is sustainable, and continuous throughout the whole machinning processing.

The CF/NF Grade has the below advantages:

1.) **More able to sustain extreme dielectric medium condition in WEDM process which help to cost down filtration cost.**
2.) **Can avoid extra corrosion prevention measure which reduce the poor affect on the machined surface.**
3.) **Maintain good surface quality after machining that avoid sticking during stamping, thus increase tool life.**

CF/NF Grade able to decrease the corrosion speed by a factor of 80.

Case Study:

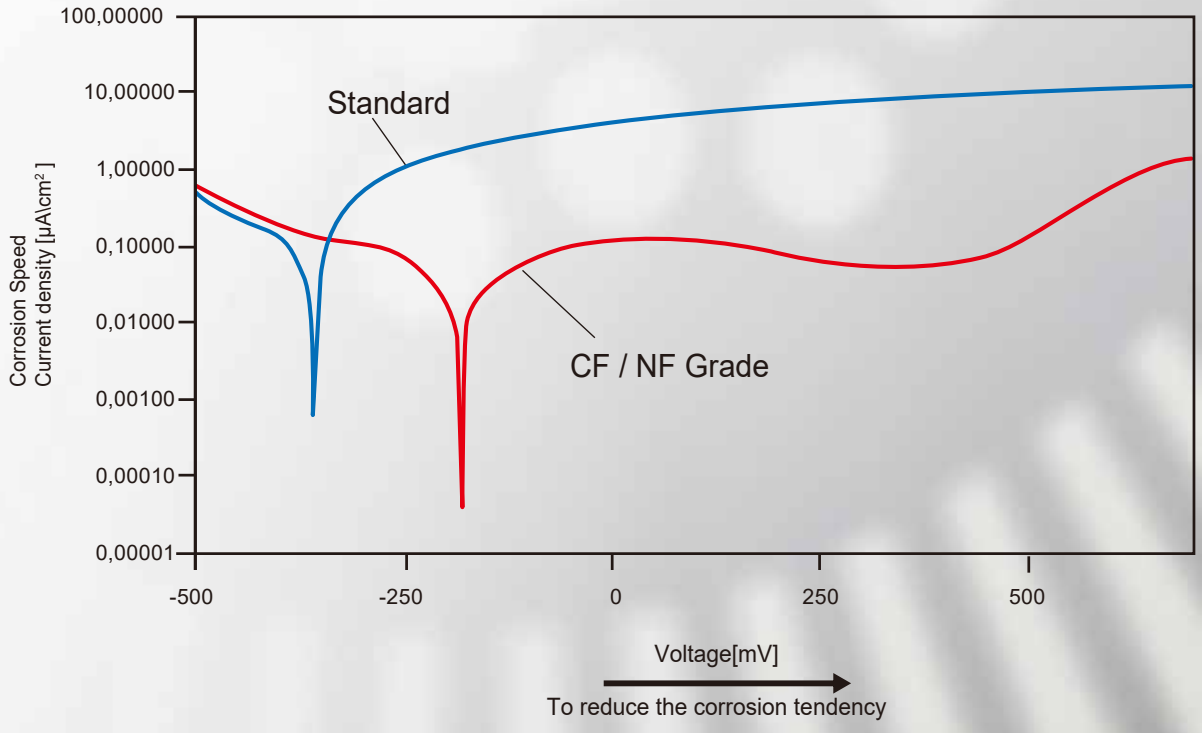
Further 3 hours inside the tank after the WEDM process of **Non** CF/NF Grade, it shows a further 5um thickness of corrosion layer.

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

Regarding the corrosion free issue, before CERATIZIT AND CB CERATIZIT announced the new corrosion free grade, the industry had been waiting long for the corrosion free solution on carbide material. The reason is Tungsten Carbide is the hardest metal in the world and therefore it can only be machined by wire erosion technology. WEDM process takes time and mostly use water as dielectric medium, thus corrosion is a common problem. In addition, as the WEDM process goes on, the dielectric medium quality will decrease, as a result corrosion speed will also increase. This will decrease the machining quality and will increase dielectric medium filtration cost. To solve these side effect brought by corrosion, CERATIZIT Group did the electrochemical corrosion test in WEDM ten years ago in Europe. The test was done under an aggressive corrosion medium (here we are using water, dielectric with PH<5) were recorded. In comparison to the known corrosion tests (loss of weight using a corrosion medium according to DIN50905) this new test method for carbide indicates why carbide corrodes. In this test, the carbide test piece is immersed in an aggressive dielectric medium and electric potential is applied. The electrical potential is continuously increased and the current is measured.

The measured current is a good indicator of the amount of cobalt corroded and how quick the corrosion is advancing or the corrosion speed. The electrical potential curve relates to the corrosion susceptibility and probability of the material to corrode.(see below diagram1)in this diagram , the corrosion velocity (measured in uA/cm2) as a function of the corrosion probability (potential in mV) is plotted. Due to the formation of the oxide protection layer on carbide surface before the cobalt was further corroded in the dielectric medium (with the NF grades), the corrosion velocity can be decreased by a factor of 80. The protecting layer consists of chromium oxide and cobalt can be seen in a transmitting electron microscope picture. In addition, the cobalt binder was in combined with the 7th and 8th groups elements and transition element in the periodic table, such as Rhenium, Germanium, Palladium, or copper in order to reduce the tendency to corrode. Due to the fact that corrosion prevention and tool maintenance cost is always higher than choosing good material to start with that help to eliminate all the uncertainty, therefore choosing high quality carbide (corrosion free) is always the basic condition to improve tool life and to cut down the tool cost accordingly



The current density against voltage graph metrics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Corrosion free grade analysis

In order to let fabricators and end users have a better understanding of how corrosion affect the precision and surface quality of a Carbide work piece, CB CERATZIZT did some test with famous WEDM machine maker AGIE CHARMILLE. The result is showed as follow.

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

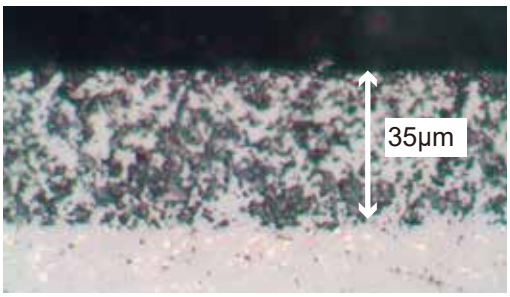


Figure 1: the picture was taken without corrosion resistance grade.

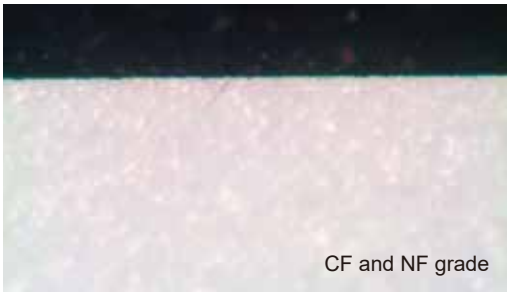


Figure 2: the picture was taken with corrosion resistance grade.

Above case 1 is a comparison between carbide grades with and without corrosion resistance ability. Under the condition of Ra 0.2μm and 15-20 μS electric conductivity WEDM process, the work piece was machined for 23 hours and then left in the tank for another 63 hours respectively. The finding shows that carbide without corrosion resistance ability has cobalt depletion up to a deepness of 35μm. This deepness is equal to few times of re-grinding allowance of the punch or die.The result also shows that in the machining of Tungsten Carbide, once the work piece get contact with aggressive medium for long time, it will corrode seriously. In addition, during the WEDM process, the higher the level of impurity inside the dielectric medium, the more severe the corrosion is. In order to avoid corrosion affecting the work piece, except have good care of the machined parts, the best way is to use Corrosion Resistance grade carbide (CF and NF series) that eliminate all the corrosion factors.

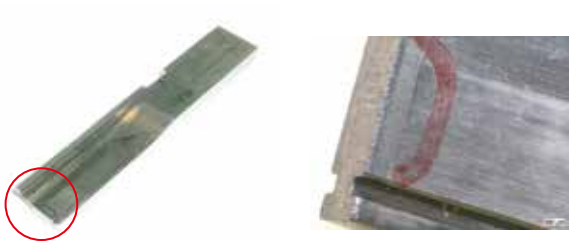
Advantages of using CF& NF series:

1. Save filtration cost of the dielectric medium during WEDM process.
2. Save handling cost for preventive measure to avoid carbide corrosion and therefore help to save cost.
3. Maintain good surface quality.
4. Avoid sticking of stamping material (e.g. copper dust) on the punch and die surface due to poor surface quality.
5. Improve the tool-life of the punch and die.

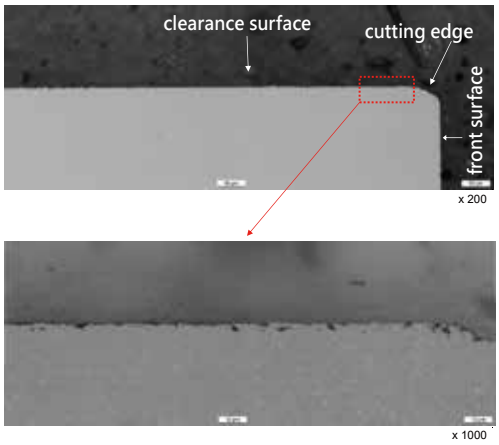
Corrosion free grade analysis

Case 2

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

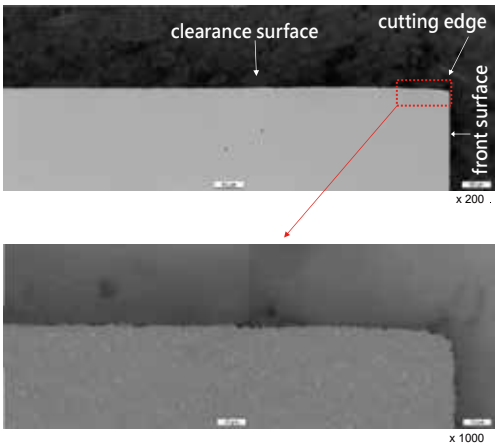


Punch 1: Grade WF30, customer complains about cutting edge, quick wears.



Corrosion depth up to 6μm

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



Corrosion layer was not detected

Above case 2, we analyses the tool life of 2 punches which is made from with and without using corrosion resistance grade carbide.For Punch 1, we found a poor surface quality under microscope, the cutting edge has wear off with poor sharpness. We suspected the punch undergo serious corrosion problem that cause sticking on the surface. The punch is no longer cutting but only tearing which lead to rapid burring on the stamping material and cause short tool life of the punch. For Punch 2, customer re-produces the parts by using corrosion resistance carbide NF-grade, the picture shows only normal wear has detected and the tool life of the punch has increased by 30%.

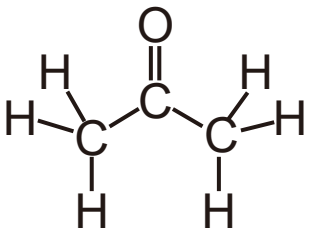
The results concluded that by using high performance NF and CF corrosion resistance grade can help to bring big changes in tool life improvement.To improve in tool life and guarantee product consistency, some customer may spend million of investment for good machine to ensure perfect quality; however, one can also improve its tool-life by choosing high performance carbide material for their stamping tools that spending only 2-3% of the above investment. From the above case studies, we hope every one of us can have a better understanding of the importance of corrosion issue on the tools and ways to optimize the cost-performance efficiency.

Harmful Cleansing agent to Tungsten Carbide – Acetone

Corrosion problem is always the biggest challenge in precision machining. Corrosion problem can happen in any extent and it can bring additional 5 um-7 um dimensional tolerances to the precision machined parts that greatly alter the machining precision. Meanwhile, during the machining process, temperature of the work piece rises, this cause corrosion to speed up and the tool life to reduce by a factor of 10% - 20%. Therefore, a lot of fabricators and end users started to consider how to optimize their machining process in order to minimize the corrosion afeect on their tools.

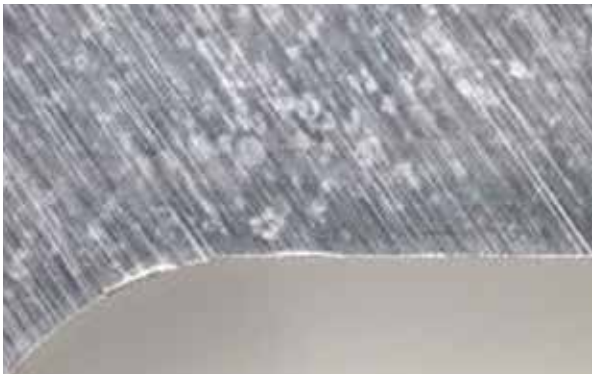
To avoid corrosion problem, beside using the CF and NF series carbide grade that we have introduced before; when cleaning the machined parts, we should also avoid using strong acidic and strong alkaline liquid as cleansing agent. Among various cleansing agent, Acetone is a typical example of harmful chemical that can bring destructive corrosion to carbide parts..

Many fabricators would like to use Acetone as cleansing agent. The reason is Acetone has an effective degreasing ability and the price is relatively low. Therefore most of the fabricators will not hesitate to use it to clean Tungsten Carbide Parts too. However, continuous usage will lead to severe corrosion and pitting problem, this may even cause the carbide stamping parts to crack during stamping due to poor surface finishing.

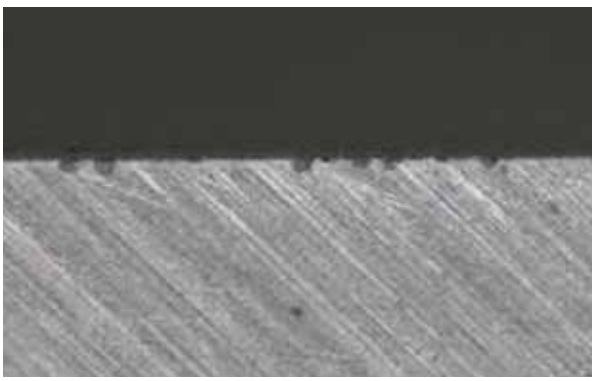


Case Study 3:Tungsten Carbide parts chip off after usage of Acetone for cleaning

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

The case was from a customer who found chip off problem on the cutting edge of the die part. Further examination concluded that it was caused by severe corrosion problem due to wrong use of cleansing agent to clean the oil on the parts. The corrosion problem damages the surface quality of the die and cause sticking problem. Normal Carbide grades are non-corrosion resistance at all..

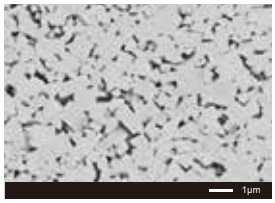
The Launch of NEW NF grade NFS16

With the breakthrough of CBCT R&D, more and more grade are being recognized by different stamping application. One of our new page is the introduction of our New NF Grade NFS16.

This NFS16 grade (hardness of HRA 92) has brought a new solution to our customer with those looking for harder grade in corrosion free above HRA90.5 and is locally produced. This submicron grade brings a new solution to Cu alloy and thin Stainless Steel stamping.

Due to the increase of NFS16 hardness, the wear resistance is much more remarkable which mean a better tool life performance. In term of toughness, the new grade stays on the high level (K1C 9.5). This mean with an increase of hardness (wear resistance) and the toughness doesn't decrease, this help to decrease chip off rate of the punch and die during the stamping process.

Submicron



NFS16 : New corrosion free grade. Mainly in stamping 0.6mm below Stainless Steel and all types of Cu alloy. The grade is widely used in electronics industry, car industry and lead-frame industry. The hardness is HRA 92, high hardness with a compromise toughness. Submicron grade and with corrosion free properties, can help to enhance punch stability and precision. Can help to improve the wear resistance and surface quality of the punch and die.

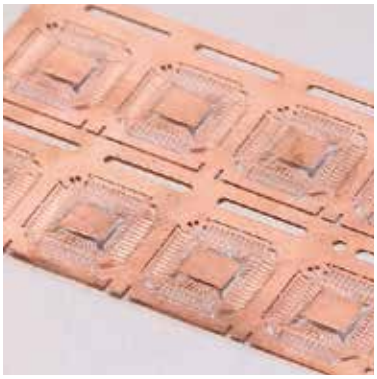
* New NFS16 has enhanced the completeness of the CBCT corrosion free grade series.
The new NFS16 is available in all size and preform. Please feel free to any enquiries.

TF25+ Solution to Leadframe Punch

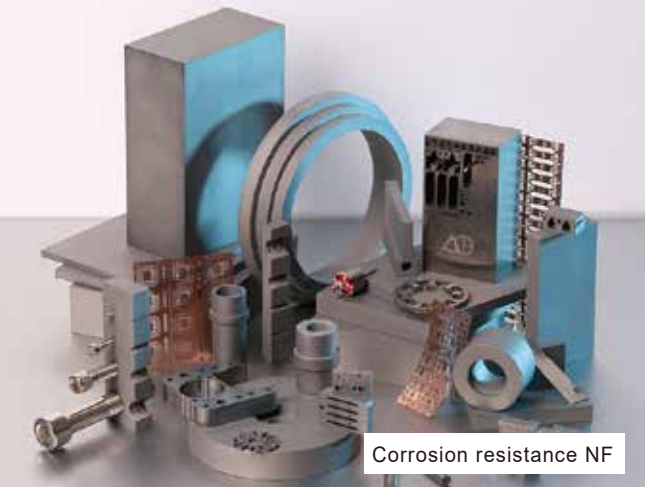
To the lead-frame stamping industry, mould design, stamping and machining unstability is extremely important. To special leadframe strips with 128 legs, 256 legs and 256 legs , the clearance between each legs are almost less than 0.01mm. Therefore, wear resistance of the punch is extremely crucial.

The more tiny the punch, the more wear resistance material it requires. Due to the progressive stamping process and high stamping rate per minute, any unstable circumstances happen on the punch will lead to a very serious result. In these precision industries, material price is no longer a topic but the quality of the carbide material will take into more account.

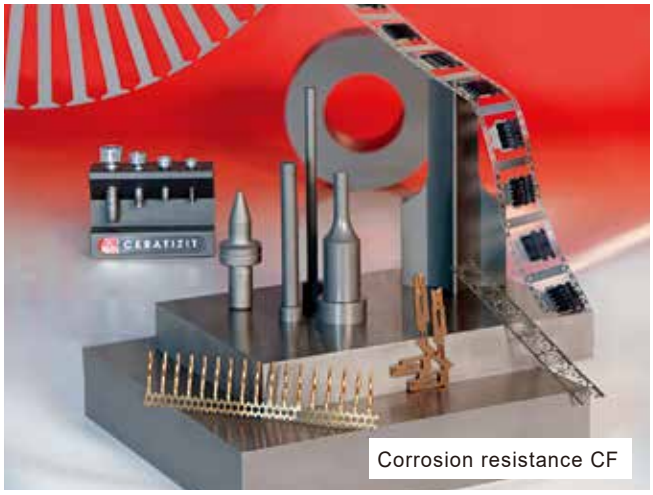
CBCT launch a special grade TF25+ mainly for leadframe punch application. TF25+ is Ultrafine grade with HRA92.3, this is a balance between hardness and toughness and has been widely used in high precision leadframe stamping. This also bring a new carbide solution to the local market in lead frame application.



Grade	ISO code	Co	Density	Hardness		TRS		Toughness
		(±0.5%)	(g/cm^3)	HRA	HV30	kgf/mm^2	MPa	$MPa*m^{1/2}$
TF25+	K10~K20	11	14.15	92.3	1660	380	3750	9



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 • High Cost- Performance efficiency • High stability • Suitable for high to medium speed stamping • Recognized Grade and Brand
NEW!! Corrosion resistance NFM25 (TNF25A)		• Motor Core Stamping • Silicon steel stamping • Hardware stamping	• Corrosion resistance material • Fast delivery • Good Quality Assurance • High Cost- Performance efficiency • High stability • Suitable for high to medium speed stamping • Recognized Grade and Brand
NEW!! TF25+	Ultrafine	• For leadframe stamping • For tiny punch	• Ultrafine grain size, high wear resistance and surface finishing • Ideal Brand , High speed stamping • Good quality , Short leadtime, High stability

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	
Corrosion resistance CF-S18Z	Submircon	• Copper alloy stamping • High Speed Stamping • Can reach a high surface finishing	

Grade selection Method

When we are talking about carbide grade selection method, usually we just try to emphasize on one parameter only, that is Hardness (HRA/HV30). In fact, beside hardness, toughness (K1C) are equally important parameters. A lot of end user do understand that wear resistance is an important factor for wear resistance as well as toughness to prevent chip off. However, some may not have the idea to choose which parameter to take into account, K1C is therefore the right value to pay attention to.

The following is a reference chart for carbide grade selection:

Min ← Surface finishing requirement → Max

Min ↓ Surface finishing requirement ↓ Max

Material thickness (mm)	Tensile Strength (N/mm²)				
	<500	500-900	900-1400	1400-2000	>2000
<0.2	CF-S12Z NFS16 CF-H25S+ TF25+ CF-S18Z	CF-S12Z NFS16 CF-H25S+ TF25+ CF-S18Z	CF-S18Z NFS16 CF-H25S+	CF-S18Z NFS26 CF-H40S+ NFS16	CF-F35Z NFM25 CF-20HP VA95
0.2-0.5	CF-S12Z NFS16 CF-H25S+ TF25+ CF-S18Z	CF-S12Z NFS16 CF-H25S+ TF25+ CF-S18Z	CF-S18Z NFS16 CF-H25S+	CF-H40S+ NFS16 CF-F35Z NFS26	CF-F35Z NFM25 CF-20HP VA95
0.5-0.8	CF-S18Z NFS16 CF-H25S+	CF-S18Z NFS26 CF-H40S+ NFS16	CF-S18Z NFS26 CF-H40S+ NFS16	CF-F35Z NFM25 CF-20HP VA95	○
0.8-1.2	CF-S18Z NFS26 CF-H40S+ NFS16	CF-H40S+ NFM23 NFM24	CF-H40S+ NFM23 NFM24	CF-F35Z NFM25 CF-20HP VA95	○
1.2-1.5	CF-H40S+ NFM23 NFM24	CF-H40S+ NFM24 CF-F35Z NFM25 CF-20HP	CF-H40S+ NFM24 CF-F35Z NFM25	CF-F35Z NFM25 CF-20HP VA95	○
1.5-2	CF-H40S+ NFM23 NFM24	CF-H40S+ NFM24 CF-F35Z NFM25 CF-20HP	CF-F35Z NFM25 CF-20HP VA95	○	○
2-3	CF-H40S+ NFM23 NFM24	CF-H40S+ NFM24 CF-F35Z NFM25 CF-20HP	CF-F35Z NFM25 CF-20HP VA95	○	○
3-6	CF-H40S+ NFM24 CF-F35Z NFM25 CF-20HP	CF-F35Z NFM25 CF-20HP VA95	○	○	○
6-10	CF-F35Z NFM25 CF-20HP VA95	○	○	○	○
>10	○	○	○	○	○

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

5G vs Mould Intelligent

About Mould Intelligent, in the aspect of mould fabrication and high speed stamping, there are quite a lot of software and hardware developed already that help to gurantee as well as to optimize the working precision to achieve production efficiency. With the usage of 5G transmission, bigger data bank can be collected and share both inside and outside the company to reach a more higher control over precision and achieve the production of difficult parts. Maintenance of progressive stamping over the network is also possible which mean less human handling error can be avoided to each a higher efficiency level. Last but not the least, each quality parts in stamping process (punch and dies) thus have less disturbance towards tool life optimization.

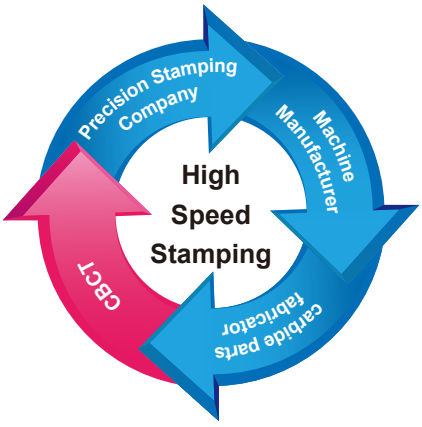
CBCT as one of the market leader in Tungsten Carbide Material, we play a very important role to ensure high quality carbide is produced to our customer to guarantee optimized performance output.

As long as more inteligent automization is developed over the trend, raw material (carbide parts) itself will has a high contribution over the success and CP ratio in production. Just consider that with good investment in process automation but without a stable material quality itself, the outcome might be just what we known as “Twice the effort , Half the Performance “ in Chinese word. In this Newsletter , you find a lot of introduction about new CF and NF corrosion free series grade. These grade are the only patented grade that can eliminate the influence of environment (e.g. water, oxygen, acid and alkaline liquid etc.) attack that cause carbide to become unstable. With the improvement of carbide quality, the tool-life and yield of the machining can be much reduced. Therefore, CF/NF should be the perfect solution to optimize the Cost Performance Efficiency in the mould and die industry.

Development of EV (Electric Vehicle)

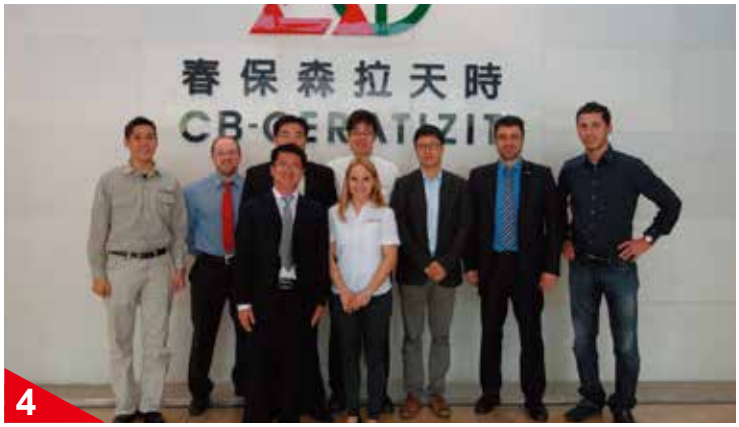
“Innovative, Step ahead in Technology” has been the motto of CB CERATIZIT. In the advent of this decade, there is a big innovation over the concept of Automobile. Electric car will be the next focus over this century and also has brought infinite opportunity to our industry. In the aspect of EV, the “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. 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.

Electric Vehicle



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

Activities and events



1. Precision Cutting Tools Seminar held in Beijing by CBCT
2. The High-Speed Stamping seminar held by CBCT in Taiwan
3. Precision Cutting Tools workshop and seminar held in Changzhou by CBCT
4. The visit of our honorable customer Schaeffler China to our CBCT Xiamen Factory
5. The High-Speed Stamping and Mould Machinning Seminar in Shenzhen held by CBCT
6. The Guest speaker from BRUDERER in seminar held by CBCT

CB-CERATIZIT
GROUP

CB-CERATIZIT (Xiamen) China Head Office
ADD: 69 Xingxi Rd.,Xinglin, Jimei, Xiamen, China
TEL:+86-592-666-1000
FAX:86-592-621-9599
E-mail: sales@cbceratizit.com

CB-CERATIZIT (Kaohsiung) Office
ADD: No.161-24, Ganghou, Alian Dist., Kaohsiung , Taiwan
TEL:+886-7-631-8833
FAX:+886-7-631-5533

CB-CERATIZIT (Taichung) Office
ADD: No.331, Huide St., Nantun Dist.,
Taichung City 408, Taiwan
TEL:+886-4-2382-5222
FAX:+886-4-2382-6622

CB-CERATIZIT (Guangdong) Office
ADD: No.316, Chang'an Commerce Plaza(District 4),
No.303, Changqing South Road,
Chang'an Town, Dongguan
TEL:+86-769-8509-3461
FAX:+86-769-8509-3509

CB-CERATIZIT (Shanghai) Office
ADD: 51 Dongshe Rd., Dongjing Industrial Area,
Dongjing Town, Songjian District, Shanghai, China
TEL:+86-21-6767-9401
FAX:+86-21-3767-9003

CERATIZIT (Taiwan) Group Head Office
ADD: 3F.,NO.217,Sec.2, New Taipei Blvd.,Hsin
Chuang Dist.,New Taipei City ,Taiwan
TEL: +886-2-8521-6688
FAX: +886-2-8521-1011
E-mail: sales@cbceratizit.com

CB-CERATIZIT (Changzhou) Office
ADD: No.8, Building 3, Jingxi Huating, Xixiashu Town,
Xinbei District, Changzhou, Jiangsu
TEL:+86-519-8508-3688
FAX:+86-519-8508-3699

CB-CERATIZIT (Tianjin) Office
ADD: No.10, Haitai Development Path 5,
Haitai Industrial Park ,Xiqing District , Tianjin
TEL:+86-22-5810-7000
FAX:+86-22-5810-7077

CB-CERATIZIT (Chengdu) Office
ADD: No.203, Unit 1, Building 1,Crown international
community ,No.1018, Beiquan Road, Longquan
Subdistrict, Longquanyi District, Chengdu
TEL:+86-28-8487-2055
FAX:+86-28-8487-2055

CB-CERATIZIT (Ningbo) Office
ADD: Room 301, No.5, Haishang Plaza, Sanwu Road,
Luotuo Town, Zhenhai District, Zhejiang, China.
TEL:+86-574-8813-9549
FAX:+86-574-8813-9546