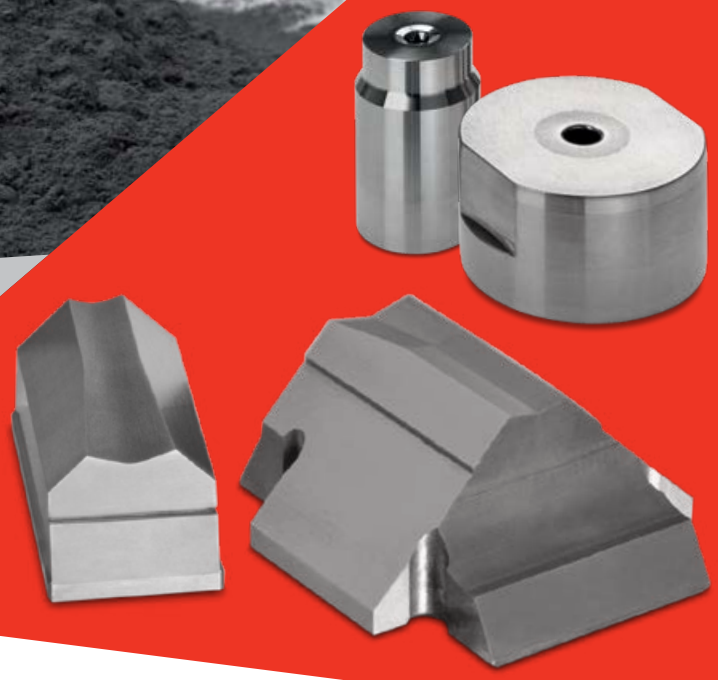
Hard Material Solutions

2022 **EN**

CFG: innovative carbide grades for metal forming tools



CERATIZIT GROUP

CERATIZIT is a high-technology engineering group specialised in cutting tools and hard material solutions.

Tooling the Future

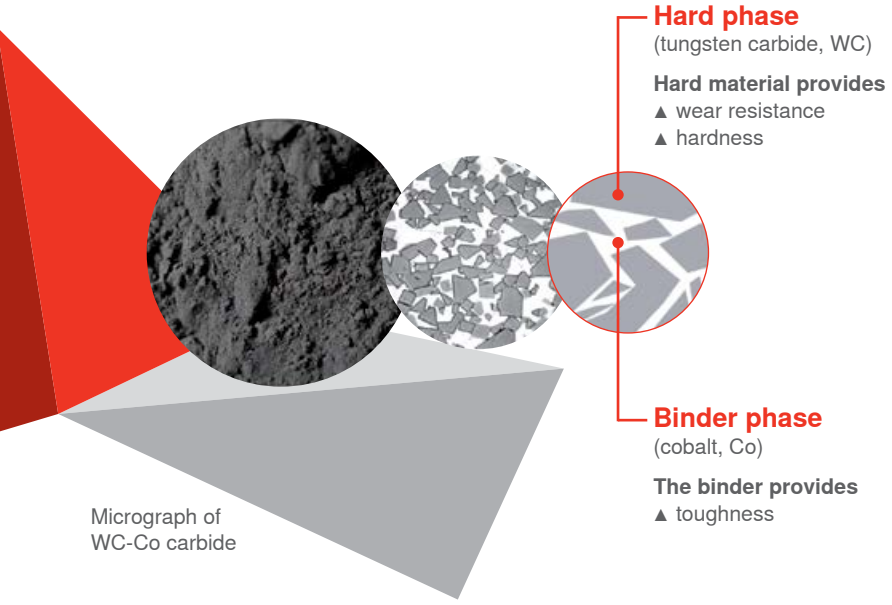
ceratizit.com

Cemented carbide: a success story since 1921

When referring to cemented carbide, the general meaning is a material group characterised by **high hardness** and metallic properties. The first cemented carbides were developed in 1921 and were mainly used for turning operations.

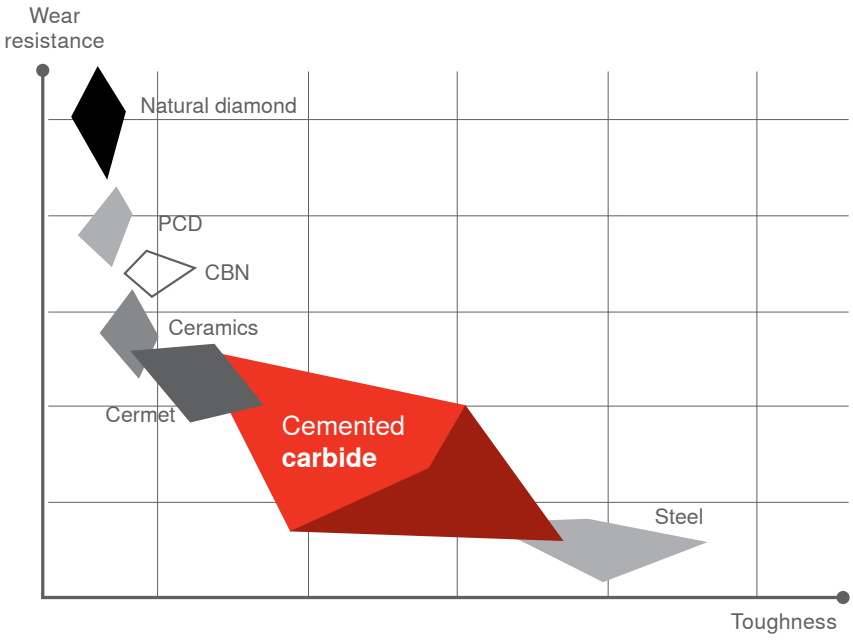
Before the introduction of carbides, non-metal hard materials were used as abrasive materials. The decisive advantage of cemented carbides is their good **electrical and thermal conductivity.** These characteristics in combination with the high hardness and wear resistance represented a significant advance. Based on its leading expertise CERATIZIT offers a broad variety of customised solutions: **technical knowledge from the raw material to the ready-to-use product** results in metal forming tools which meet the customer's requirements by offering premium quality, productivity and process reliability.

Cemented carbide: a smart composition



When starting production, the powder is prepared with a **composition that varies depending on the application.** Each powder mix consists of two phases: a hard material and a binder phase. The hard material provides hardness, i.e. wear resistance, while the metal binder ensures toughness.

Both the grain size and the binder content may be varied to meet specific needs, resulting in **numerous application possibilities.** In metal forming tool construction, cemented carbide consisting of tungsten carbide (WC) and cobalt (Co) is primarily used. The graphic on the left shows this in the form of a microscope image.



Cemented carbide covers the widest application range.

Cemented carbide: your advantages at a glance

- ▲ Hardness = wear resistance
- ▲ Toughness
- ▲ Compressive strength, impact strength and transverse rupture strength
- ▲ Tribological, magnetic and thermal properties
- ▲ Specific weight
- ▲ Rigidity/modulus of elasticity
- ▲ Corrosion resistance, oxidation resistance

CFG: revolutionary grades for cold and hot forming dies

Innovative strength and optimal adaptation to the specific application is a permanent focus at CERATIZIT. You benefit from **precisely adjusted grades.** CFG stands for 'G grades' with **outstanding corrosion, oxidation and adhesion resistance.** These materials have been specifically designed for cold or hot metal forming processes.

Ultimate metal forming with CFG grades

The three CFG grades cover a wide range of mechanical properties. Their optimised characteristics result from an innovative carburisation process. In addition to hardness and toughness, also **resistance to both corrosion and oxidation as well as adhesion** is vital when it comes to the tool's performance.
An innovative binder composition which – combined with excellent resistance to thermal shock – makes them usable for **some hot forming applications.**

Records by the dozen with CFG

Tool life is a key criterion for defining the quality of a forming tool. Many CFG solutions have already proven to have a **significantly longer service life** compared to tools made from conventional tungsten carbide materials. CERATIZIT experts will be happy to discuss the right grade for your application at any time.

Grade table

CERATIZIT grade code	ISO code	Binder [m %]	Density [g/cm³]	Hardness [HV30]	Transverse rupture strength [MPa]	Fracture toughness KIC [MPa*m½]
CFG-CTM30	G30	15	14.05	1150	2950	17.5
CFG-CTM40	G40	20	13.55	1010	3150	21.0
CFG-CTM50	G50	25	13.10	850	3100	23.5

Grade recommendation

Grade	Cold forming applications	Hot forming applications
CFG-CTM30	Wear resistance. Extrusion and drawing applications. Low impact applications.	Highest oxidation and adhesion resistance. Extrusion and light impact applications.
CFG-CTM40	Toughness. Upsetting, reduction and shearing applications.	Toughness and thermal shock resistance. Preferred option for most applications.
CFG-CTM50	High toughness. Upsetting and high impact applications.	Highest impact and thermal shock resistance.

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