2019 **EN**

# Solutions for the plastics industry

CERATIZIT is a high-tech engineering groupspecialized in tooling and hard material technologies.

## Tooling the Future

www.ceratizit.com

HARD MATERIAL SOLUTIONS BY CERATIZIT

Stephane Claude
Wear Protection Line Manager

# Specially developed for you: as your expert partner we create made-to-measure carbide solutions.

# Carbide solutions for the plastics industry

As a producer of plastic components or tool manufacturer for such components, you represent a growing market. **Ever more companies need more and more plastic materials in an increasing number of industrial sectors.** In Europe, 60,000 enterprises with more than 1.5 million employees generate almost 350 billions of Euros – and the trend is on the rise.

Along with this growing demand, requirements relating to the material and its properties are rising as well. Hard Material Solutions by CERATIZIT delivers **customised carbide solutions of premium requisites** for many sectors of the plastics industry. You can order nozzles and mould cores for Metal Injection Moulding (MIM) as well as dies and knife blades or rotor knives for pelletizing. Everything from a single source!

In the nature of things, cemented carbide has great dimensional stability and is extremely wear-resistant. But it offers even more advantages. For the plastics industry, thermal conductivity and corrosion resistance are crucial additional parameters. There is no need to tell you that your products are only as good as the tool used to produce them. With products from CERATIZIT you can count on reliability – the reliability you would expect from an internationally leading carbide expert. You can benefit from our many years of experience in the **development of specific solutions** which set standards in the plastics industry. CERATIZIT's achievements have made an impression on many prestigious customers, seeing that we command the entire process chain of carbide production from the raw material to the finished product. Thanks to this unique expertise we can provide you with **your own individual solution** ensuring the maximum service life of your assembly groups.

# Advantages and benefits

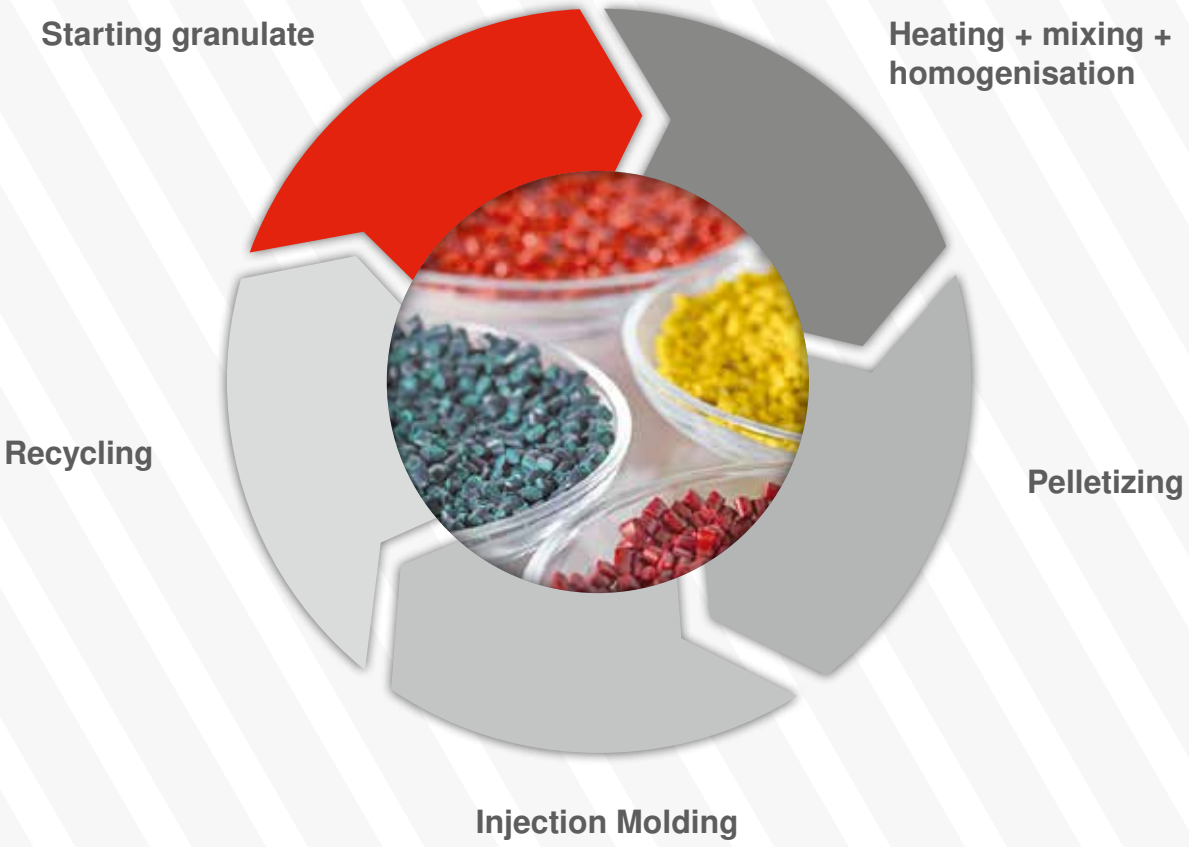
| Advantages | Benefits |
|---|---|
| Optimised carbide grades for working temperatures even over 400 °C: rigid, dimensionally stable, wear-resistant, corrosion-resistant and heat-resistant, very good heat-conducting properties | Maximum tool life, higher productivity, more process reliability |
| Highly precise versatile production procedures: minimum tolerances, optimal surfaces, maximum precision | High production speed, optimal product quality |
| Individual solutions based on the specific needs of the customer – e.g. also ceramic and titanium-zirconium-molybdenum solutions can be provided, as we are part of the CERATIZIT and Plansee Group | Design specially geared to the given application |
| Technical advice on site: sales representatives and product managers with technical know-how of the sector | A contact person for every challenge and innovation, rapid response when needed |
| More than 60 company sites worldwide | There is always a contact person nearby |

# Premium products for all applications

We offer carbide solutions for various applications and process steps in the plastics industry, e.g. for:

- ▲ **Hot runner systems,**
- ▲ **Mould-making for injection moulding**
- ▲ **Injection moulding machines**
- ▲ **Pelletizing technology**

## The cycle of of plastics products



# Cemented carbide for hot runner systems

For the production of hot runner systems Hard Material Solutions by CERATIZIT delivers **both nozzle tips for hot runner nozzles as well as shut-off needles.**

## Process efficiency with all materials

Whether you process thermoplastics, elastomer or thermosetting plastics, metals or ceramics (MIM, CIM) or whatever – solutions from CERATIZIT always ensure a **homogeneous and stable injection moulding process**. This is particularly important for sophisticated components which have to be produced in high quantities. In this case hot runner systems are almost always used.

## Ideal nozzles

Such a system connects the entrance of the plastification unit with the mould of the injection moulding tool (the cavity) and is thermally separated from the remaining components. The **hot runner nozzles are of decisive importance in this process** as the critical interface between the cavity and the machine, since they represent the plastification unit. Carbide nozzles ensure good transport, master the transmission superbly while also ensuring excellent thermal stability.

## For all systems

Valve gate nozzles allow carbide to show its strengths: excellent heat conductivity, maximum wear protection with abrasive plastics and abrasion of the shut-off needle. We supply components for all hot runner systems, whether open or valve gate systems. In the first case there are **different types of nozzle tips,** with one or more openings.

| Advantages | Benefits |
|---|---|
| **Optimised carbide grades**<br>Very high thermal conductivity, high wear resistance and corrosion resistance with working temperatures even over 400 °C | Very good heat transmission, optimal flow properties in the hot runner nozzles, homogeneous final products, maximum tool life, highest process reliability |
| **Versatile production**<br>Almost every execution can be made to customer's request, highly precise manufacture for minimum tolerances | Individual geometries can be provided at any time, innovation can always be looked into |
| **Manufacturer's expertise**<br>Advice for every application from our sales representatives and product manager staff, detailed technical expertise in dealing with materials, processes and products | Innovative partner on your level, on site presence in next to no time |

# Product overview

## Nozzle tips

### Standard types

- Ready-to-use products: finish-ground nozzle tips with a surface quality up to Ra 0.02 µm, polished, for open systems (hole as sintered) and shut-off needle systems (ground exit hole)
- Semi-finished products: as sintered components with preground areas, exactly tailored to your needs and the possibilities of your production department
- Blanks: sintered parts with a surface roughness of Ra 0.8 µm and a dimensional accuracy of +-1 %

### Individual solutions

- Design according to customer drawing
- For any type of assembly situation (e.g. specific threads and forms of the outer profile)
- Complicated hole geometries for special nozzles
- Nozzle tips are available as hybrid and composite parts. CERATIZIT is the only carbide manufacturer worldwide who offers components made of steel, TZM or ceramic produced within the Group.

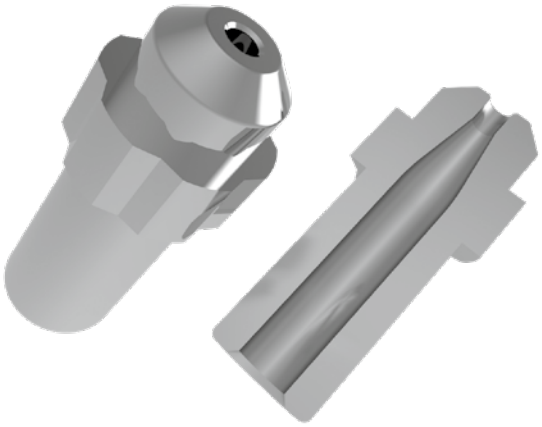
## Shut-off needles

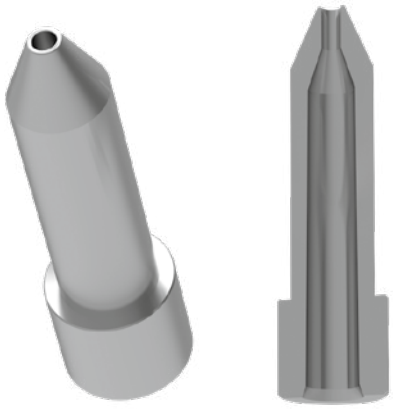
CERATIZIT provides extrusion-pressed blanks, preground rods and ready-to-use ground shut-off needles

- Surface quality up to Ra 0.1 µm
- Dimensional and geometrical tolerances in the µm range
- Valve needles with axial slots and complicated geometries possible

## Valve gate nozzles

- Sintered pressed/formed inner profiles
- Complex outer profiles of the blank: hexagonal, wrench flat, threads
- Ground guide holes
- Virtually all grinding operations possible





## Nozzles for open systems

- Sintered formed inner profiles
- Wide design latitude in relation to the exit holes
- Fastening thread / fine thread on the outer profile
- Entirely ground outer profile
- Virtually all grinding operations possible

# Ready-to-use assembly groups

**Numerous high-performance materials from a single source**

Benefit from a virtually unlimited selection of high-performance materials:

**Directly from the CERATIZIT/Plansee Group:**
- Cemented carbide (tungsten carbide – cobalt – nickel)
- TZM (titanium – zirconium – molybdenum)
- Ceramic (silicon nitride)

**Outsourced materials:**
- High-performance steels
- Stainless steels
- Copper composite materials
- Many others available upon request

**Finishing possibilities**
- Technical coating
- Tumbling/blasting

**Joining procedures**
- Screw connections
- Brazing
- Shrinking
- Pressing
- Gluing (special materials)

# Optimised carbide grades for hot runner technology

**Our recommendation: CTC25A**
- High thermal conductivity up to 150 W/(m*K)
- Optimal wear resistance (12% cobalt-content)
- Good thermal resistance
- Good corrosion resistance

# Mould cores in cemented carbide

If you produce injection moulding parts with cavities, the quality of the mould core is crucial. Any injection moulding expert is aware that **the final product is only as good as the tool used to produce them.** This is because the injection mould part is the exact negative of the mould.

## The material of choice

As a material for the mould core, cemented carbide has proved its worth on grounds of its numerous excellent properties. Neither abrasive wear, which results when the parts are removed, nor thermal impact with working temperatures of 200-400 °C, present any problem for Hard Material Solutions by CERATIZIT. **The tool remains extremely robust, tough and heat-resistant** over the entire service life, even when additional corrosion stress occurs. The high thermal conductivity of our cemented carbide means you can count on shorter process times due to faster cooling down, especially when producing small parts where because of the size no coolant hole can be used in the mould.

## Injection mould parts with cavities

Mould cores are used for a variety of products, e.g. for pipette tips, test tubes, measuring cups for medical use or cartridge tips, buckets and drinking bottles. **The variety of final products is matched by the versatility of CERATIZIT** mould cores. These are suitable for production processes with various materials, from thermo-plastics to elastomer or thermosetting plastics, metal (MIM) or ceramic (CIM), guaranteeing maximum precision in component production.

| Advantages | | Benefits |
|---|---|---|
| **Optimised carbide grades**<br>High thermal conductivity, rigidity, wear resistance and corrosion resistance with working temperatures even over 400 °C | → | Excellent heat transmission for quick cooling of the injection mould parts, low thermal expansion and high rigidity resulting in maximum precision |
| **Highly precise production**<br>Minimum tolerances, optimal surfaces | → | High precision in the manufacture and low adhesion of the final products on the tool |
| **Manufacturer's expertise**<br>Advice for every application from our sales representatives and product manager staff, detailed technical expertise in dealing with materials, processes and products | → | Innovative partner on your level, on site presence in next to no time |

# Product overview

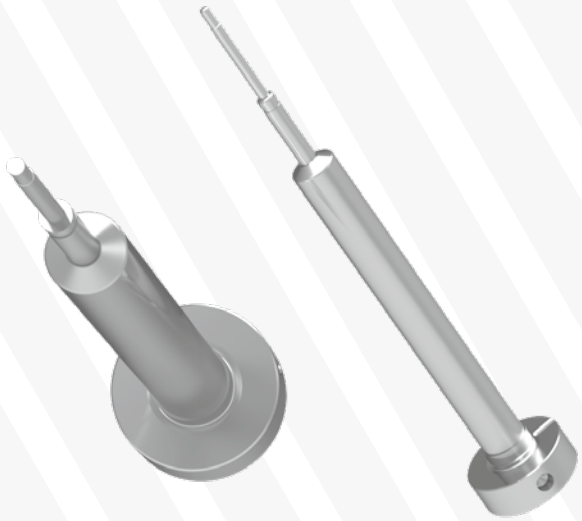
CERATIZIT offers blanks, semi-finished products and ready-to-use ground mould cores where the outer profile is characterised by optimal surface quality and minimum tolerances over the entire length.

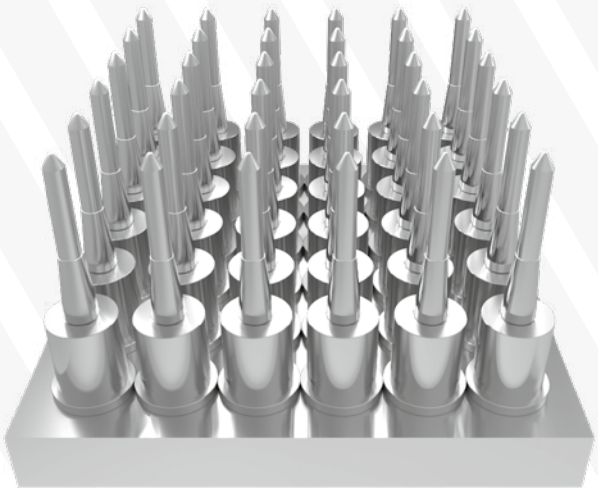
**Base variants**
- On the mould core as a solid carbide step
- As a steel mounting base (for brazing, gluing, shrinking or screw connection)

**Coolant**
To ensure speed of production, the mould cores generally come with coolant holes inside.

**Finish**
- Rotationally symmetrical, straight or
- Helical (several holes)

Hard Material Solutions by CERATIZIT supplies coolant holes as a standard in sintered condition with a surface quality of approx. Ra 0.8 µm RZ16. **All other surfaces are polished to a quality of Ra 0.02 µm upon request.**





# Carbide for pelletizing technology

The pelletizing process calls for dies, knife blades or rotor knives; for maximum efficiency of pelletizing, you can count on Hard Material Solutions by CERATIZIT **as carbide cutting tools offer the reliability you require.** Our carbide solutions with nickel or cobalt binder provide strength, toughness, corrosion resistance and thermal resistance – important properties for important processes, whether you use classic extrusion pelletizing or underwater pelletizing.

## Standing up to reinforced plastics

**Maximum wear resistance of all components** is crucial, as fibre-reinforced plastics are frequently used in the pelletizing process. This increases wear for all components.

## Wear-resistant on principle

Whatever the process you use, carbide solutions from CERATIZIT make wear resistance a top priority: this means not only **maximum tool life**, but also resistance to process water and extraordinary heat resistance giving carbide products a **leading position in the quality scale**.

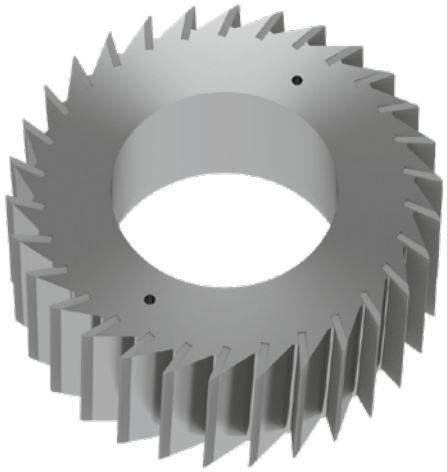
| Advantages | Benefits |
|---|---|
| **Optimised carbide grades/innovative steel-carbide combinations:** High wear resistance, corrosion resistance and thermal resistance | Long tool life, very good economic efficiency thanks to low acquisition costs of the composite solutions |
| **Highly precise manufacture & mounting:** Minimum tolerances, optimal surfaces; Various joining processes for the production of composite parts | Granulate without burrs, high speed thanks to application-specific design |
| **Manufacturer's expertise** Advice for every application from our sales representatives and product manager staff, detailed technical expertise in dealing with materials, processes and products | Innovative partner on your level, on site presence in next to no time |

# Product overview

Hard Material Solutions by CERATIZIT offers you
- ▲ Cutting rotor blades for extrusion pelletizing facilities
- ▲ Pelletizing dies for underwater pelletizing

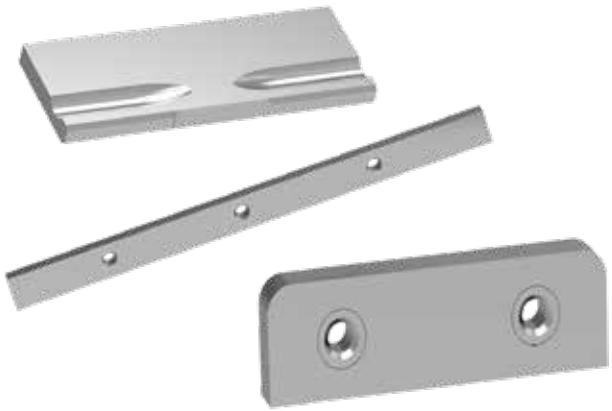
## Decisively better: rotor blades

The blades of cutting rotor blades face enormous wear which is why they are produced in carbide. They are brazed, mounted with screws or clamped. Blades from CERATIZIT can be ground **quickly and easily to the desired cutting angle** (from -3 up to +15°).



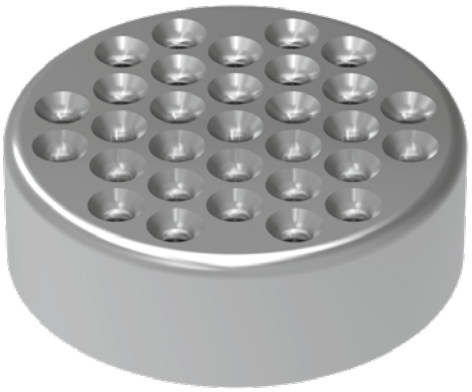
## Best performance: cutting strips

In order to separate the granulate effectively, cutting strips are required. CERATIZIT offers you all types and lengths of strips, which can be made either **in solid carbide or in a combination of steel and carbide**. The thickness or the blade can be ground in keeping with your requirements, so as to achieve optimum parallelism and maximum sharpness.



## Massive meets filigree: pelletizing dies

For underwater pelletizing CERATIZIT supplies **pelletizing dies in solid carbide or for steel-carbide composite parts**: the latter ones consist of a perforated steel plate which is brazed onto the carbide segments. Both variants need to be provided with micro-holes to a diameter of 0.1 mm.



# Cemented carbide for injection moulding systems

Plastic manufacturers are interested in **maximum strength of the material**, which is why glass and carbon fibres may be integrated into the material to reinforce the granulate. In order to improve fire resistance, highly corrosive flame inhibitors are also used in addition. It follows that for all components which come into contact with plastic injection moulding systems **maximum wear and corrosion resistance is a must!** Only then can maintenance be kept to a minimum throughout the tool life.

### High selection for high demands

At CERATIZIT you can find components for non-return valves like cochlea tips, shut-off and pressure rings, components for the plastification unit such as cylinders, cochleas and bushes as well as machine nozzles and shut-off needles for your specific application. The products are **either made of carbide or provided with a carbide plating**. Corrosion-protected grades with various hardness and strength levels give you a wide range of individual choice. With our many years of expertise, we can recommend the ideal material combination, whatever the component requirements. **CERATIZIT delivers maximum service life!**

### Always guaranteed individuality

Your machine is geared to your needs – so it follows that components must also be specifically made to measure. **You can count on always getting the best individual solution**, which is designed on the basis of your technical drawing.

| Advantages | | Benefits |
|---|---|---|
| **Optimised carbide grades**<br>Very high wear resistance, corrosion resistance and thermal conductivity with working temperatures even over 400 °C | → | Notably longer service life of the components and systems, less maintenance work and downtimes, higher process reliability, better product quality |
| **Versatile production**<br>Almost every execution can be made to customer's request, highly precise manufacture for minimum tolerances | → | Any geometry is possible, innovations can be put into practice at any time |
| **Manufacturer's expertise**<br>Advice for every application from our sales representatives and product manager staff, detailed technical expertise in dealing with materials, processes and products | → | Innovative partner on your level, on site presence in next to no time |

# Product overview

The portfolio of Hard Material Solutions by CERATIZIT includes the following products:

- Components for non-return valves: cochlea tips, shut-off and pressure rings
- Components for the plastification unit: bushes, cylinders and cochleas
- Machine nozzles and shut-off needles

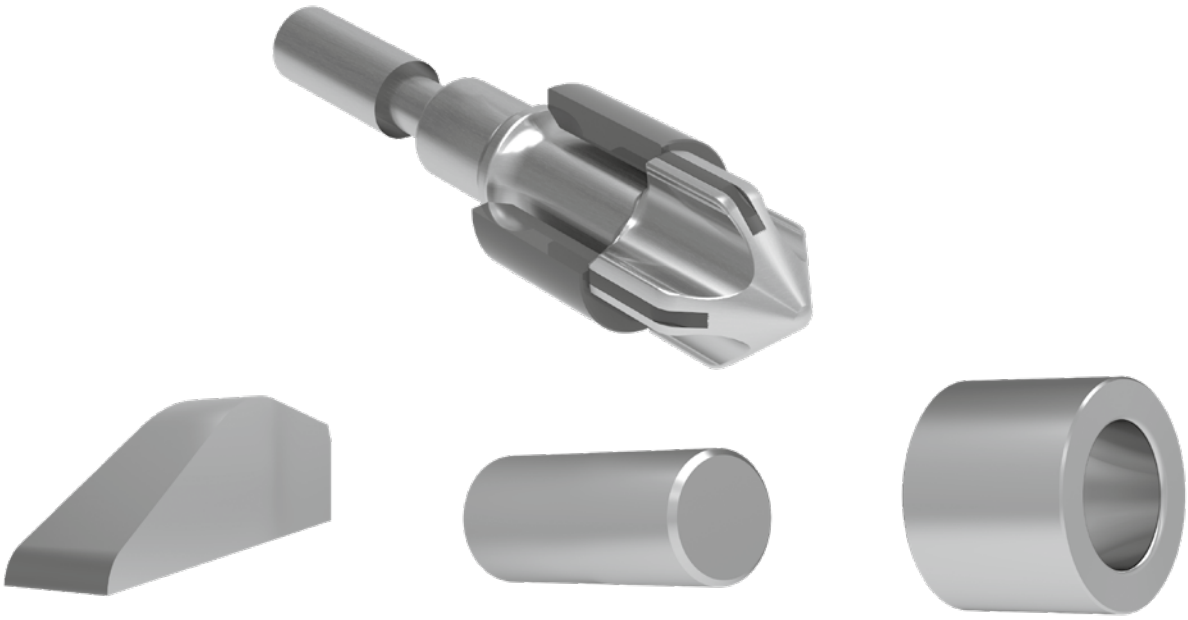
For all these and other products you can benefit from **customised wear parts** for injection moulding systems manufactured based on your drawing in proven carbide grades by CERATIZIT.

## Cochlea tips with plating

For the non-return valves of your injection moulding machine you can order **cochlea tips which are provided with a carbide plating**. Grooves, pockets or holes are milled into the steel cochleas and carbide plates, and cylinders or pins are brazed onto them. This **carbide-steel composite part** is ground on an external cylindrical grinding machine before it is ground to the desired surface quality (up to Ra 0.1 µm).

## Innovations for cylinders and cochleas

Cylinder linings and solid carbide cochlea blanks also form part of our portfolio. Bushes from Hard Material Solutions by CERATIZIT are the ideal choice when cylinder manufacturers need to give their products the best possible lining so as to **minimise wear**.
Ready-to-use steel cylinders with carbide plating will also be available in the future – please contact us with your individual enquiry at any time!



## Shut-off and pressure rings as reliable seals

Solid carbide shut-off and pressure rings reliably seal the non-return valve thanks to high wear resistance over a long service life. When designing these parts your specifications are the top priority: with its long-standing expertise, CERATIZIT is able to develop the best individual solution for you – **from the blank to the ready-to-use part**.

## Optimal transmission with carbide machine nozzles

Machine nozzles, always a large-size component, complete the CERATIZIT premium range. We will make your individual nozzle using our own production facilities. And should you need shut-off needles, you can of course find them in our wide product assortment.

# The right grade for every application

In the table below you can find all the carbide grades we recommend for applications in the plastics industry.

**If you are looking for a customer-specific product, simply get in touch with us: we are happy to develop exactly your solution!**

## One value creation – one supplier – one promise

You can trust our unique expertise: CERATIZIT **is one of the few suppliers worldwide who masters the entire process chain of carbide production** from the raw material all the way to the final product, from metallurgy to composition and development. **Top-quality carbide grades** adapted to your individual specifications – that is what we promise and what you can count on. Premium solutions withstanding maximum stress and convincing in every aspect, with **stability, toughness, thermal conductivity as well as thermal and corrosion resistance** – together with durability that sets new standards for the service life of your applications.

| CERATIZIT grade code | Binder [m%] | Density [g/cm³] | Hard-ness [HV10] | Transverse rupture strength [MPa] | Heat resist. [Wm-1K$^{-1}$] | Thermal expansion coefficient [10-6K$^{-1}$] |
|---|---|---|---|---|---|---|
| CTC25A | 12.0 | 14.25 | 1080 | 3100 | 135 | 5.4 |
| CTF12D | 6.0 | 14.90 | 1750 | 2500 | 100 | 4.8 |
| CF-H20P | 10.0 | 14.31 | 1300 | 2800 | 95 | 5.2 |
| CTS20L | 10.0 | 14.40 | 1650 | 4000 | 85 | 5.5 |
| CTF30D | 15.0 | 13.75 | 1130 | 3300 | 80 | 5.7 |

| CERATIZIT grade code | Binder [m%] | Density [g/cm³] | Hard-ness [HV10] | Transverse rupture strength [MPa] | K1C value [MPa*m$^{1/2}$] | Heat resist. [Wm-1K$^{-1}$] | Thermal expansion coefficient [10-6K$^{-1}$] |
|---|---|---|---|---|---|---|---|
| CF-S12Z | 6.0 | 14.83 | 1860 | 3600 | 9.0 | 90 | 5.1 |
| CF-S18Z | 9.0 | 14.48 | 1630 | 3500 | 11.0 | 95 | 5.2 |
| CF-H40S+ | 12.0 | 14.15 | 1400 | 3200 | 12.5 | 90 | 5.4 |
| CF-F35Z | 17.5 | 13.58 | 1200 | 3300 | 15.6 | 85 | 6.0 |
| CTU12R | 6.0 | 14.82 | 1750 | 2600 | 7.0 | 100 | 5.1 |
| CTS17R | 8.5 | 14.51 | 1600 | 2800 | 8.7 | 100 | 5.1 |
| CTF16R | 8,0 | 14,58 | 1480 | 2900 | 11,4 | 85 | 5,1 |
| CTF21R | 10,5 | 14,35 | 1300 | 3100 | 10,0 | 80 | 5,5 |

# The right partner for many industries

Carbide solutions from CERATIZIT optimise the processes of plastic production, whether your **parts are produced by injection moulding, extrusion pressing or deep drawing**.

The final products are used in the following economy sectors:

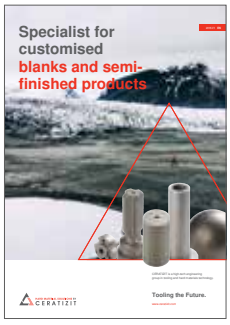
- Mechanical engineering
- Automotive industry
- Aerospace industry
- Sanitary industry
- Medical and laboratory technology
- Packaging industry

# Hard Material Solutions by CERATIZIT

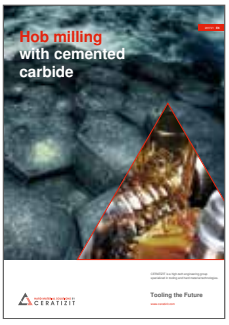
## Wear protection for all applications and industries

- **Individual carbide solutions** for your application
- **Tools** for metal forming
- **High-performance components** for tool construction

# Extract from our product portfolio

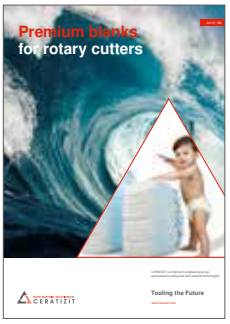




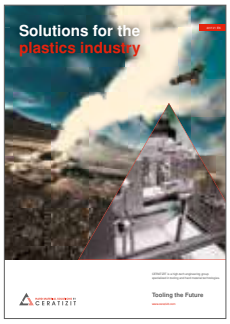



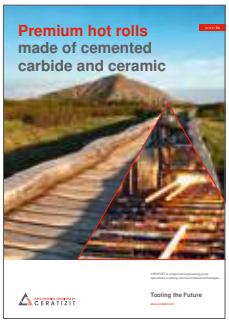




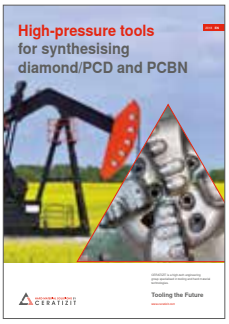








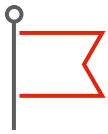

# The CERATIZIT Group

For over **95 years**, CERATIZIT has been a **pioneer** developing exceptional hard material products for cutting tools and wear protection.

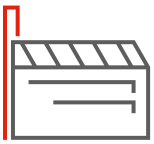
The privately owned company, based in Mamer, Luxembourg, develops and manufactures highly specialised carbide cutting tools, inserts and rods made of hard materials as well as wear parts.

The CERATIZIT Group is the **global market leader** in several wear part application areas, and successfully develops new types of cemented carbide, cermet and ceramic grades which are used for instance in the wood, metal and stone working industries.

# Facts and figures



**1 headquarters**
Mamer, Luxembourg



**34**
production sites

**> 70**
sales subsidiaries

**> 9,000**
employees

**> 100,000**
different products

**> 1,000**
patents and
utility models

**> 200**
employees in R&D

**> 10**
innovation awards

**30 %**
of products developed
in the last 5 years

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