ZCC Cutting Tools
Europe GmbH

Rail technology

Tooling solutions from ZCC Cutting Tools

– EN –

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Unique challenges in rail applications

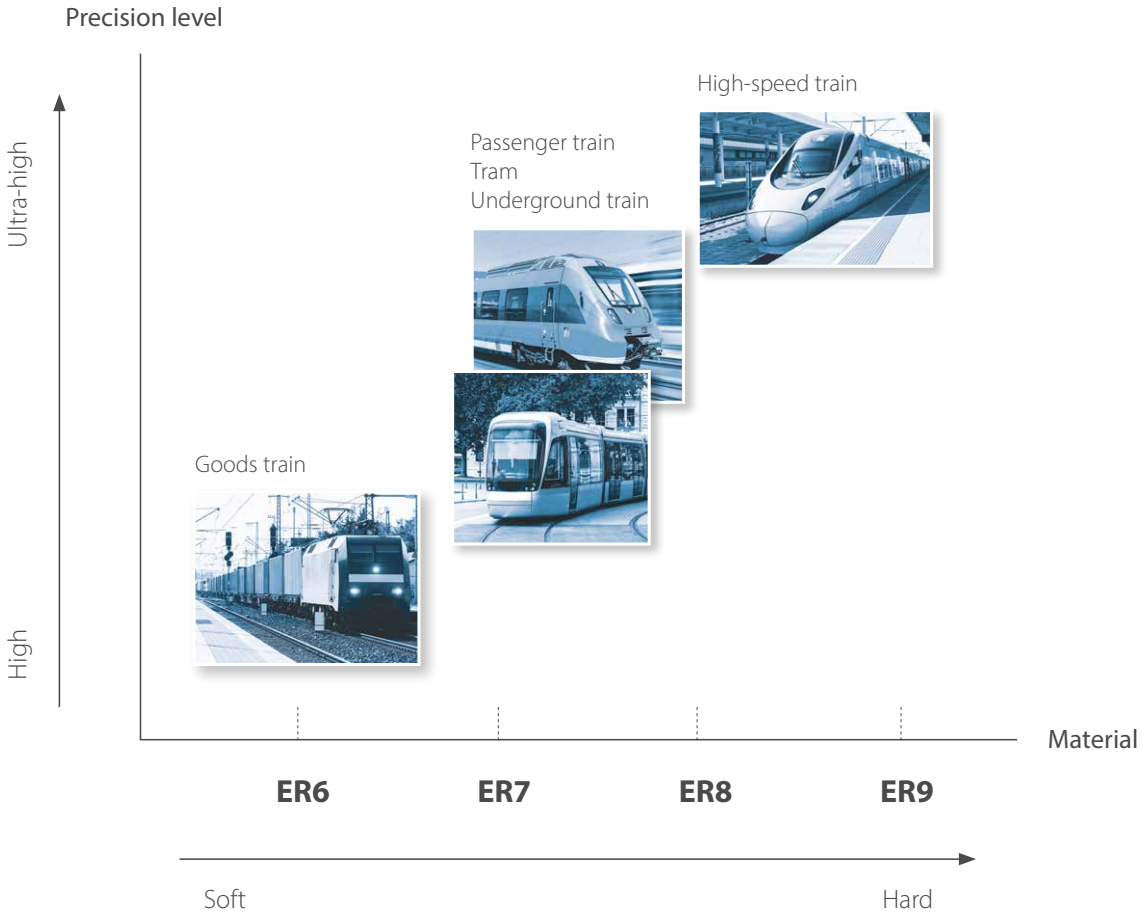
There are a number of requirements that today's rail vehicles have to meet. They must be able to withstand **high stresses and loads** while also delivering passengers and goods to their final destination **on time**, **at low cost** and **in comfort**.

To meet the stringent requirements in terms of durability and precision, **materials that are both long-lasting and resistant to deformation** are needed. To give an example, unalloyed and low-alloyed steels are the basic materials used to the manufacture of wheelsets. The names and standards applicable to the materials vary from market to market. In the case of wheels for rail vehicles, the majority (95 per cent) are made from rolled steel and a much smaller number from cast steel.

Special material properties needed to produce high-quality components

The material names, for example **ER1** to **ER9**, indicate the hardness grades, the most popular ones being **ER6** to **ER9**.

ZCC-CT offers high-quality cutting tools for the precision machining of rail vehicle components. Our product line includes high-performance turning inserts from the LNUX series for bottom and top machining of used wheels, the RCMX series of turning inserts for the manufacture of new wheels, a wide array of milling and drilling systems as well as the ALP and ALG series used in the machining of aluminium chassis components.



Tool solutions for manufacturing new railway wheels

Consistent quality and uniform process reliability are the top priorities when it comes to machining wheels. This places extremely high demands on the tools used to machine them. ZCC Cutting Tools offers a wide array of solutions, grades and chip breakers that deliver on both counts.

Typical components:

Solid wheels
Steel tyres
Wheel bodies

Typical materials:

Special steels (alloyed, unalloyed)
ER6, ER7, ER8, ER9
Other newly developed materials

Challenges:

Process reliability
High chip removal rates
Surface quality
Dimensional stability
Chip control

Tool solutions for manufacturing new railway wheels

External turning
Machining running surfaces and flanges

Turning (web)
Machining between hub and flange

Hub turning
Machining central bore holes

Drilling (web)
Machining forcing bores and mounting holes

Tool solutions for manufacturing new railway wheels

External turning
Machining running surfaces and flanges

RCMX3209MO-A YBC252A The ideal solution for long machining times

MO-A: Special chip breaker design for roughing operations with optimal chip breaking
YBC252A: The perfect balance between wear resistance and toughness for long machining times and high feed rates

Typical application

Machining type	Roughing
Material	ER8
Insert	RCMX3209MO-A YBC252A
Cutting speed	100–120 m/min
Feed rate	0.8–1.2 mm/rev.
Depth of cut	1–6 mm

RCMT2006MO-A YBC152A The wear-resistant solution for high surface qualities

MO-A: Special chip breaker design for high dimensional stability and surface qualities in finishing operations
YBC152A: Excellent wear resistance at high cutting speeds

Typical application

Machining type	Finishing
Material	ER8
Insert	RCMT2006MO-A YBC152A
Cutting speed	160–180 m/min
Feed rate	0.6–1.0 mm/rev.
Depth of cut	1–2 mm

P

Tool solutions for manufacturing new railway wheels

Turning (web)
Machining between hub and flange

RCMX3209MO-A YBC252A The highly stable tool for high feed rates

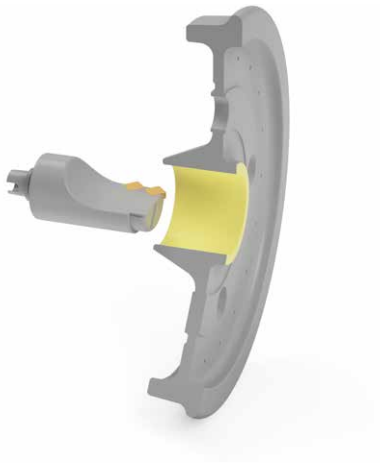
MO-A: Special chip breaker design for roughing operations with optimal chip breaking
YBC252A: The perfect balance between wear resistance and toughness for long machining times and high feed rates

Typical application

Machining type	Roughing
Material	ER7
Insert	RCMX3209MO-A YBC252A
Cutting speed	80–160 m/min
Feed rate	1.0–1.4 mm/rev.
Depth of cut	2–12 mm

Tool solutions for manufacturing new railway wheels

Hub turning
Machining central bore holes



SNMM250724-HDR YBC252 Insert with a highly efficient roughing geometry

HDR: Features a highly efficient roughing geometry for hub machining
YBC252: The perfect balance between wear resistance and toughness for long machining times and high feed rates

Typical application

Machining type	Drilling
Material	ER8
Insert	SNMM250724-HDR YBC252
Cutting speed	120–160 m/min
Feed rate	0.8–1.1 mm/rev.
Depth of cut	3–10 mm

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Tool solutions for manufacturing new railway wheels

Drilling (web)
Machining forcing bores and mounting holes

ZCC Cutting Tools offers a number of tools for use in drilling applications:

ZSD series New	SU series		GD series New	SL series	Threading tools	
Indexable insert drills with the SPMX insert	Solid carbide step drills (custom-made drills also available)	Solid carbide universal drills	Solid carbide twist drills	Solid carbide deep hole drills	Thread formers	Thread mills

Please refer to the **General Catalogue 2019** and **Product Innovations 09/20** for more information on these tools:

General Catalogue 2019

Product Innovations 09/20

Tool solutions for remachining railway wheels

Rail vehicle wheels are subjected to constant, heavy loads and must be regularly inspected and remachined to guarantee safety and ride comfort. While inspections are carried out every couple of years in the case of goods trains, passenger trains are inspected once a year or more. The inspection interval for high-speed trains is even shorter, with checks carried out every few weeks.

Typical components:

Worn and damaged wheel sets

Typical materials:

Special steels (alloyed, unalloyed)
ER6, ER7, ER8, ER9, etc.
Other newly developed materials

Challenges:

Machining damaged areas
Dense, hard material surfaces
Process reliability
Surface quality
Dimensional stability
Chip control

Tool solutions for remachining railway wheels

There are two methods used to remachine railway wheels. Both generally involve dry machining.

In the case of **bottom machining**, the entire train, rail car or carriage is positioned above the underfloor lathe integrated into the floor. The individual wheels are then machined while still on the vehicle.

When it comes to **top machining**, the entire axle is removed and remachined on a lathe from above.

External turning
Reconditioning running surfaces
Machining a running surface with flat or damaged spots
Reconditioning flange flanks

Machining running surfaces and flanges
Machining running surfaces
Machining internal flanges

Tool solutions for remachining railway wheels

External turning
Reconditioning running surfaces

LNUX191940-RF YBC152 The perfect tool for remachining wheels

Compatible with all commercially available clamping systems thanks to our innovative bore hole design
RF: Optimised chip breaking for high process reliability
YBC152: Excellent wear resistance at high cutting speeds

Typical application

Machining type	Medium machining and finishing
Material	ER8
Insert	LNUX191940-RF YBC152
Tool holder	RW-PLANR-19
Cutting speed	90 m/min
Feed rate	0.2 mm/rev.
Depth of cut	1.5–2.5 mm

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Tool solutions for remachining railway wheels

External turning
Machining a running surface with flat or damaged spots

LNUX191940-RF YBC152 The perfect tool for remachining wheels

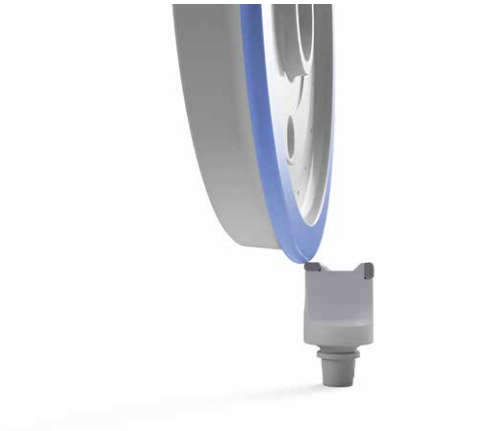
Compatible with all commercially available clamping systems thanks to our innovative bore hole design
RF: Optimised chip breaking for high process reliability
YBC152: Excellent wear resistance at high cutting speeds

Typical application

Machining type	Medium turning
Material	ER8
Insert	LNUX191940-RF YBC152
Tool holder	RW-PLANR-19
Cutting speed	70 m/min
Feed rate	0.14–0.16 mm/rev.
Depth of cut	3.5 mm

Tool solutions for remachining railway wheels

External turning
Reconditioning flange flanks



LNUX191940-RF YBC152 The perfect tool for remachining wheels

Compatible with all commercially available clamping systems thanks to our innovative bore hole design
RF: Optimised chip breaking for high process reliability
YBC152: Excellent wear resistance at high cutting speeds

Typical application

Machining type	Medium machining and finishing
Material	ER8
Insert	LNUX191940-RF YBC152
Tool holder	RW-PLFNR-19
Cutting speed	80 m/min
Feed rate	0.2–0.4 mm/rev.
Depth of cut	1.0–2.5 mm

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Tool solutions for remachining railway wheels

LNUX insert
Reliable machining operations

All-in-one solution:
Compatible with all commercially available clamping systems thanks to our innovative bore hole design

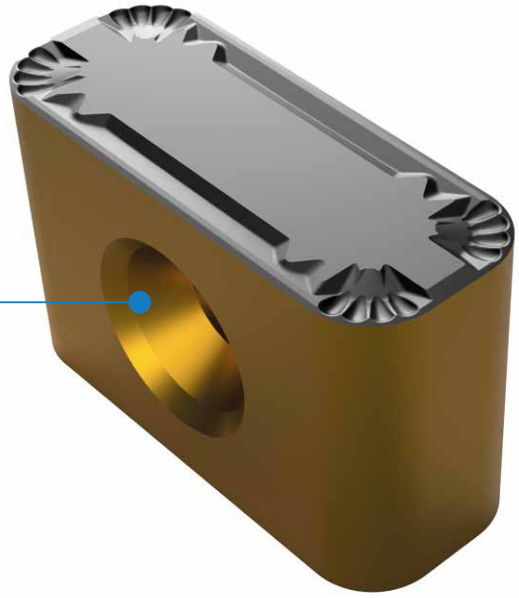
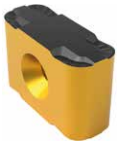


Fig.: LNUX301940-RF

YOUR BENEFITS

– Easy to use thanks to plug-and-play
– Highly flexible
– Minimal inventory costs
– No need to switch to a new tool system with the high costs this entails

The following versions are available:	
LNUX301940-RF LNUX191940-RF	LNUX301940-RH LNUX191940-RH
	

Compatible cassettes	
RW-PLANR/L-19 RW-PLANR/L-30	RW-PLFNR/L-19

Go to our website for more information on the **LNUX insert**.

Tool solutions for remachining railway wheels

Machining running surfaces and flanges
Machining running surfaces
Machining internal flanges

CNMM191140-RF YBC152 The perfect tool for remachining wheels

RF: Optimised chip breaking for high process reliability
YBC152: Excellent wear resistance at high cutting speeds

Typical application

Machining type	Medium machining and finishing
Material	ER7
Insert	CNMM191140-RF YBC152
Tool holder	RW-PCLNL-19
Cutting speed	80–100 m/min
Feed rate	0.5–2.0 mm/rev.
Depth of cut	1.0–3.0 mm

Tool solutions for remachining railway wheels

Notes

Tool solutions for axle manufacturing

Axles, which connect the wheels on a rail vehicle, are subjected to significant bending and torsional forces when in use. This is why high quality and safety standards are critical criteria in their manufacture.

Typical components:

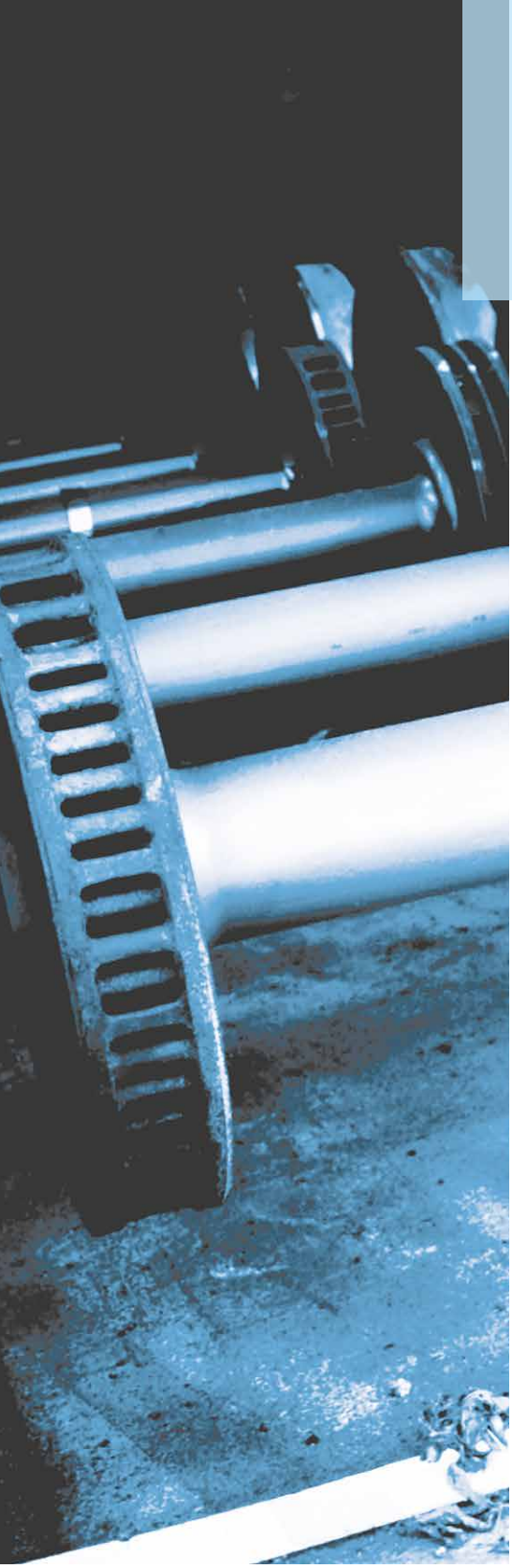
Axles and bearing shafts

Typical materials:

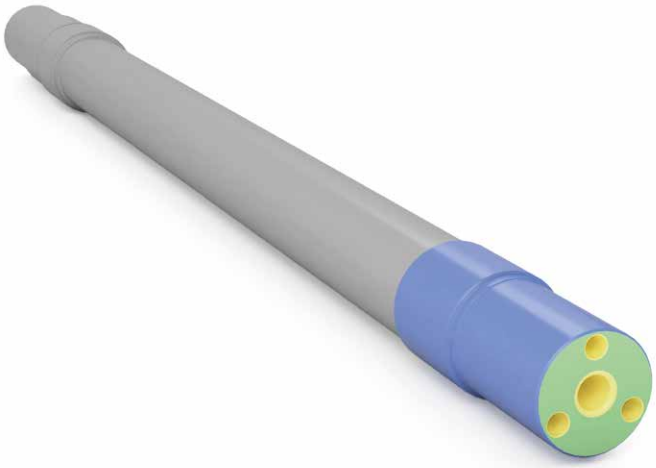
Special hardened steels
For example, A1–A5
(C35/C45/22MnCrV5/25CrMo5/42CrMo4)

Challenges:

Process reliability
High chip removal rates
Surface quality
Dimensional stability
Chip control



Tool solutions for axle manufacturing



External turning
Roughing operations on axles/bearing shafts
Finishing bearing seats

Drilling

Face milling
Trimming axle ends

Tool solutions for axle manufacturing

External turning
Roughing operations on axles/bearing shafts
Finishing bearing seats

SNMM250924-HDR YBC252 For highly efficient roughing operations

HDR: Highly efficient roughing geometry for axle machining
YBC252: Excellent balance between wear resistance and toughness for long machining times and high feed rates

Typical application

Machining type	Roughing
Material	25CrMo4
Insert	SNMM250924-HDR YBC252
Cutting speed	180 m/min
Feed rate	0.4–0.8 mm/rev.
Depth of cut	2–7 mm

SNMG150612-DM YBC152 For finishing operations with high dimensional stability

DM: Special chip breaker design for high dimensional stability and surface qualities in medium machining and finishing operations
YBC152: Excellent wear resistance at high cutting speeds

Typical application

Machining type	Medium machining and finishing
Material	25CrMo4
Insert	SNMG150612-DM YBC152
Cutting speed	250 m/min
Feed rate	0.2–0.4 mm/rev.
Depth of cut	1–4 mm

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Tool solutions for axle manufacturing

Drilling

ZCC Cutting Tools offers a number of tools for use in drilling applications:

ZSD series New	SU series		GD series New	SL series	Threading tools	
Indexable insert drills with the SPMX insert	Solid carbide step drills (custom-made drills also available)	Solid carbide universal drills	Solid carbide twist drills	Solid carbide deep hole drills	Thread formers	Thread mills

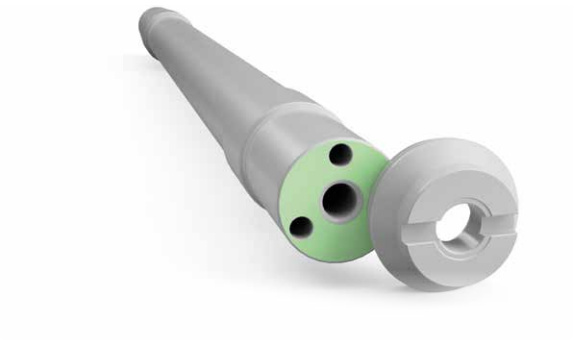
Please refer to the **General Catalogue 2019** and **Product Innovations 09/20** for more information on these tools:

General Catalogue 2019

Product Innovations 09/20

Tool solutions for axle manufacturing

Face milling
Trimming axle ends



In the first machining step, the axle blanks are face-milled at both ends. This is done to ensure the component is securely clamped in place during the subsequent turning operation. ZCC Cutting Tools has a variety of milling systems to choose from based on the size of the component or the relevant machining conditions.

All associated tools are available in a wide range of diameters as well as the accompanying inserts with a variety of chip breakers and grade combinations. Customised bell tools are typically used for chamfering the ends of the axles.

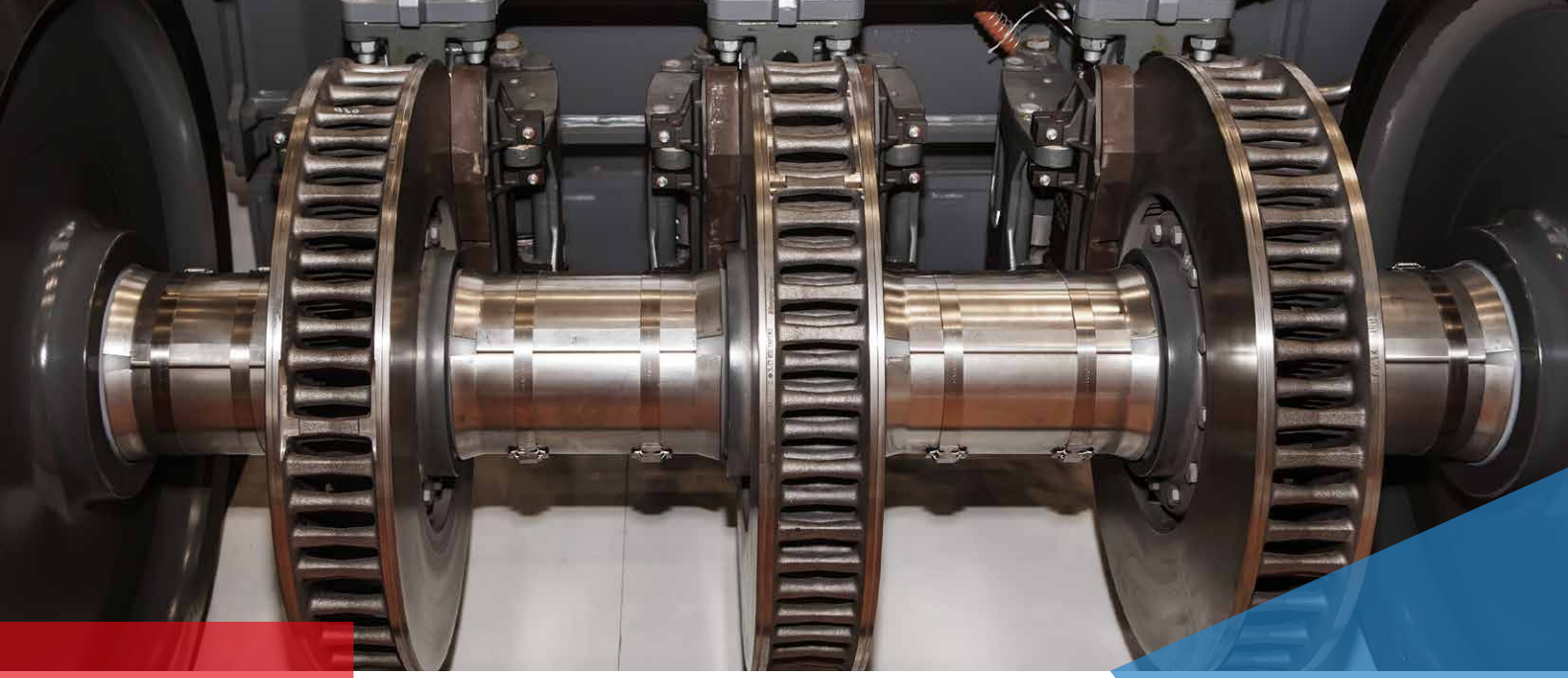
EMP09 (KR: 90°)	**FME04** (KR: 75°)	**FMP03** (KR: 89°)	**EMP13** (KR: 90°)
Face/square shoulder milling system with LNKT12-PNR inserts	Face milling system with LNKT15 inserts	Face/square shoulder milling system with LNKT20 inserts	Face/square shoulder milling system with ANGX11/ANGX15 inserts

Please refer to the **General Catalogue 2019** for more information on these tools:

General Catalogue 2019

Tool solutions for axle manufacturing

Notes



Tool solutions for machining brake discs

Along with wheels, brake discs also need to be remachined, depending on the model and relevant conditions. Special tools are generally used for this purpose. ZCC Cutting Tools offers just the right tool for your specific application. The basic holder can accommodate a range of ISO tool holders, which allows for maximum flexibility in the selection of plate types, chip breakers and cutting materials.

Typical components:

Brake discs

Typical materials:

Cast materials

Challenges:

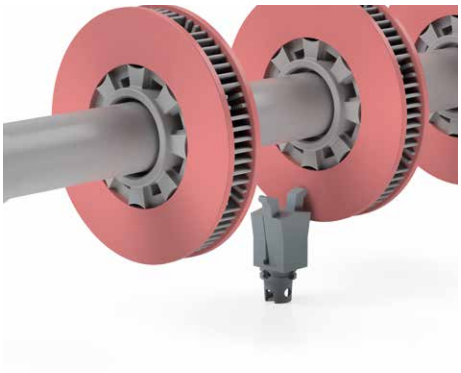
Process reliability
High chip removal rates
Surface quality
Wear resistance

Tool solutions for machining brake discs

Face turning
Face-turning brake discs

Tool solutions for machining brake discs

Face turning
Face-turning brake discs



RCMX2006MO YBD152 The ideal solution to achieve the quality you strive for

MO: Special chip breaker design for high dimensional stability and surface qualities in finishing operations
YBD152: High wear resistance and toughness at higher cutting speeds

Typical application	
Machining type	Roughing
Material	GG25
Insert	RCMX2006MO YBD152
Cutting speed	100–250 m/min
Feed rate	0.3–0.8 mm/rev.
Depth of cut	2–4 mm

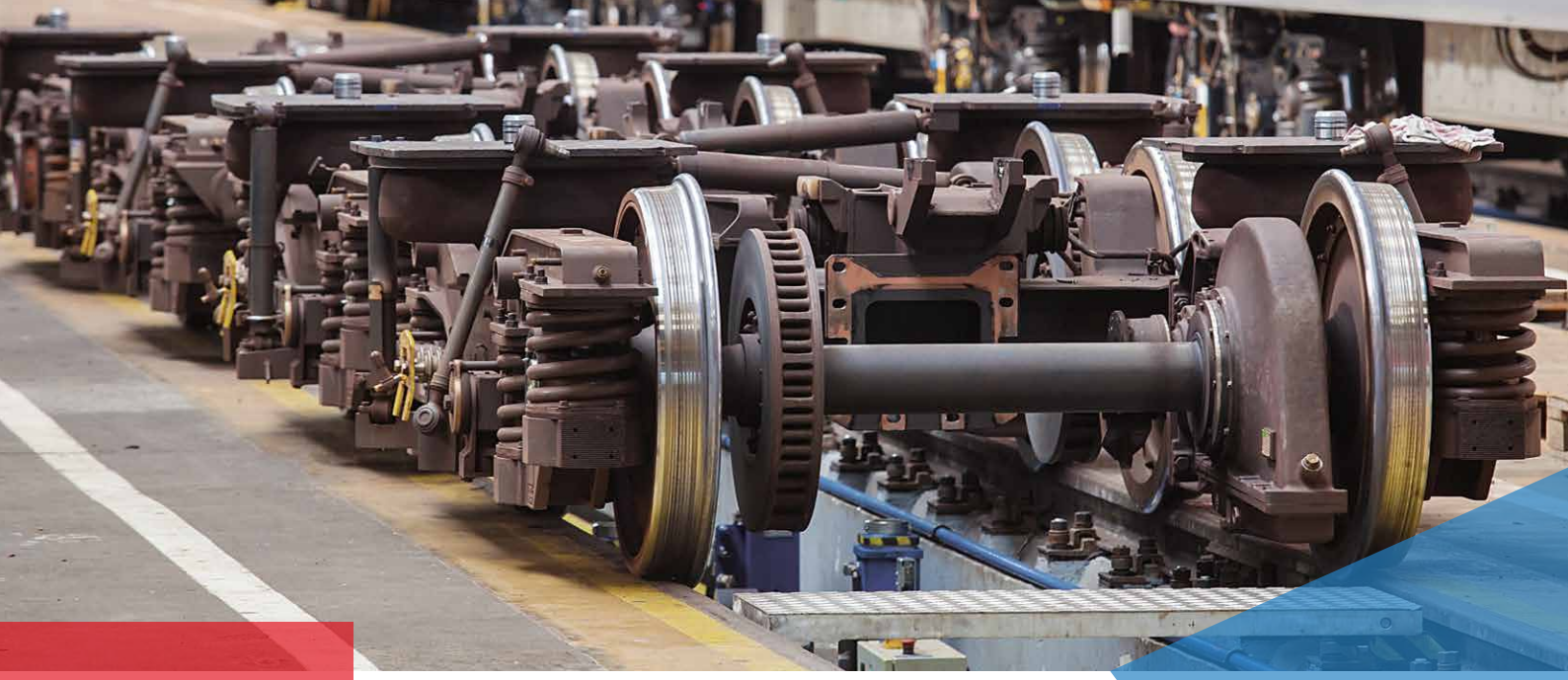
RNGN120700T02020 CN1000 The ideal solution to achieve the quality you strive for

CN1000: Wear-resistant all-ceramic round insert for high cutting speeds

Typical application	
Machining type	Roughing
Material	GG25
Insert	RNGN120700T02020 CN1000
Cutting speed	250–400 m/min
Feed rate	0.3–0.8 mm/rev.
Depth of cut	2–4 mm

Tool solutions for machining brake discs

Notes



Tool solutions for machining bogies

Bogies are the link between the rail, wheelsets and train body. Together with damping systems, they ensure the required level of safety and ride comfort, especially on passenger trains. The bogies are constantly under heavy loads. To counterbalance this, it is critical to choose the right materials and take meticulous care during the manufacturing process.

Typical components:

Forged and welded chassis/ bogie frames

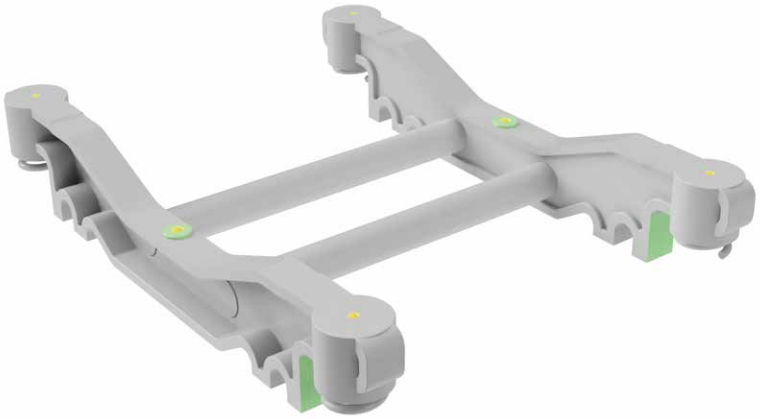
Typical materials:

Steel (alloyed, unalloyed)

Challenges:

Process reliability
High chip removal rates
Surface quality
Wear resistance

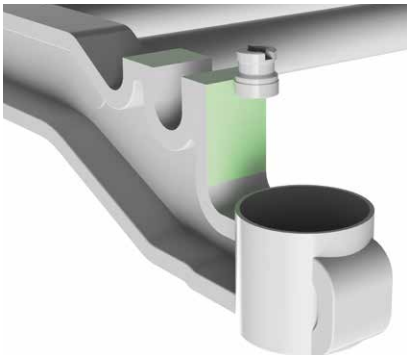
Tool solutions for machining bogies



- **Milling operations**
- **Drilling operations**

Tool solutions for machining bogies

Milling operations



ZCC Cutting Tools offers a number of products used to create fluting and end faces:

EMP09 (KR: 90°)	**EMP13** (KR: 90°)	**QCH series** New	**PM series**
Face/square shoulder milling system with LNKT12-PNR inserts	Face/square shoulder milling system with ANGX11/ANGX15 inserts	Solid carbide indexable heads	Solid carbide mills

Please refer to the **General Catalogue 2019** and **Product Innovations 03/20** for more information on these tools:

General Catalogue 2019

Product Innovations 03/20

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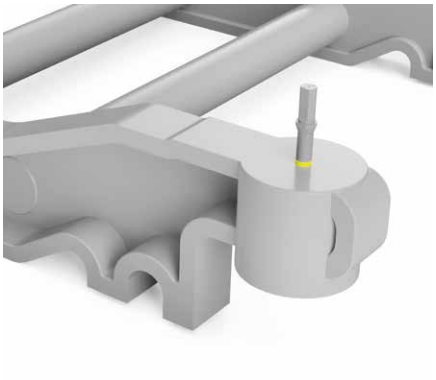
Tool solutions for machining bogies

Drilling operations



ZCC Cutting Tools offers a number of tools for use in drilling applications:

ZSD series New	SU series		GD series New	SL series	Threading tools	
Indexable insert drills with the SPMX insert	Solid carbide step drills (custom-made drills also available)	Solid carbide universal drills	Solid carbide twist drills	Solid carbide deep hole drills	Thread formers	Thread mills

Please refer to the **General Catalogue 2019** and **Product Innovations 09/20** for more information on these tools:

General Catalogue 2019

Product Innovations 09/20

Regrinding service – permanently lower your tool costs

After you're done machining wheels, axles or entire bogies, you now want to regrind the solid carbide drills and mills you used as a way to keep your production costs down. The ZCC Cutting Tools regrinding service makes this easy.

Why regrind solid carbide tools?

The main advantage of regrinding is that it extends the life of your tools, which reduces your tool and production costs while also helping conserve raw materials. After regrinding, your old tool is as good as new and will last just as long. You can continue use the parameters you always do and will not experience any loss of productivity.

What are the advantages of the ZCC Cutting Tools regrinding service?

We offer short processing times, generally in the range of two to three weeks for standard geometries. Thanks to our ultra-fast regrinding service, you need to keep fewer tools in stock. We offer fair flat rates and return your tool to its original state, all while maintaining the same level of quality you would find with a new tool.

Find out more about our **Regrinding Service**.

Special tools – custom-made for you

Special applications call for special solutions. Especially when machining wheels, brake discs or axles, the best option is often to use special tools. ZCC Cutting Tools Europe's R&D department develops a custom solution for you to keep your machining costs as low as possible.

Why opt for special tools from ZCC Cutting Tools?

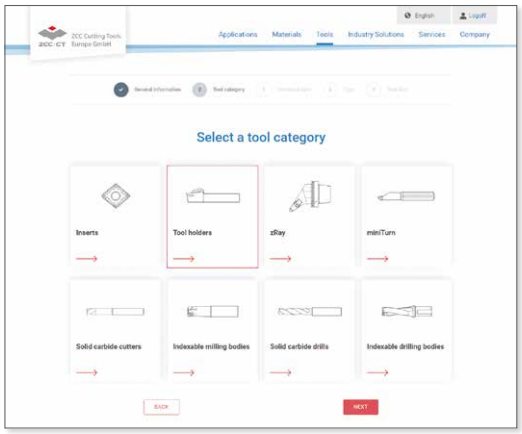
We develop customised tool solutions for you for a range of different machining operations. During the process, we work closely with you and design tools that meet your exact needs. From design and production to logistics, we offer the full range of expert services. Take advantage of our expertise to ensure the long-term success of your company.

Example: special tool holder for machining brake discs (see p. 27)

Example: special solid carbide step drill for machining brake discs (see p. 22)

The easy way to order your custom-made special tool New

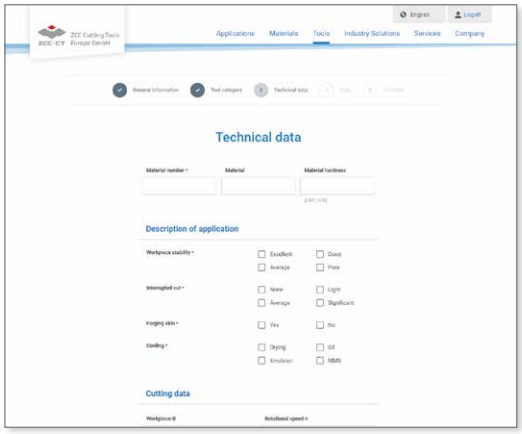
Do you have applications that require a custom-made special tool solution to complete? Then take advantage our new, easy-to-use online tool to order your special tool. You can find this at www.zccct-europe.com.



'Online tool for special tools' launch page where you can select the tool category

Selecting the tool category

Scan the QR code on this page to go directly to the launch page of our online tool where you can request the special tool you need. You can begin by selecting the tool category you need. It's that easy.



Define the relevant tool parameters.

Defining the tool parameters

You are now guided step by step through the process. You can also securely upload your drawings, diagrams and 3D models (where available).

It's the easy way to order your custom-made special tool from ZCC Cutting Tools Europe GmbH.

Now go directly to the new **special tool form** on our website and get started.

Scan for PDF

Rail technology

Tooling solutions from ZCC Cutting Tools

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Europe head office

ZCC Cutting Tools Europe GmbH
www.zccct-europe.com
Wanheimer Str. 57, 40472 Düsseldorf, Germany
Phone: (+49-211) 989240-0
Fax: (+49-211) 989240-111
E-mail: info@zccct-europe.com

France branch office

ZCC Cutting Tools Europe GmbH
Succursale Française
www.zccct-europe.com
14, Allée Charles Pathé, 18000 Bourges, France
Phone: +33 (0) 2 45 41 01 40
Fax: +33 (0) 800 74 27 27
E-mail: ventes@zccct-europe.com

UK branch office

ZCC Cutting Tools Europe GmbH
UK Division
www.zccct-europe.com
4200 Waterside Centre, Solihull Parkway
Birmingham Business Park
Birmingham, West Midlands, B37 7YN, UK
Phone: +44 (0) 121 8095469
Fax: (+49-211) 989240-111
E-mail: infouk@zccct-europe.com