



**BOEHLERIT**

Great know-how  
for more economic  
crankshaft and camshaft  
machining

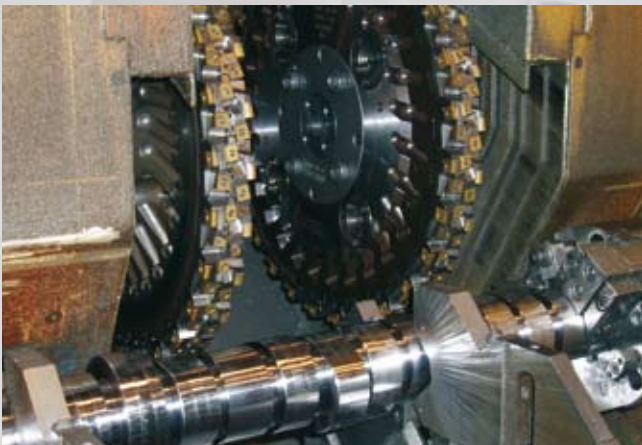


Leitz Metalworking Technology Group  
**BELIN • BILZ • BOEHLERIT •**  
**FETTE • KIENINGER • ONSRUD**

# Camshaft machining and service

## Service

- Initial tooling
- Start-up
- Ongoing process optimisation with regard to cycle time, tool life and workpiece tolerance
- Supply of spare and replacement parts
- Tool repair
- Service engineers (application engineers) world-wide
- Training courses



## Camshaft machining

Special purpose milling tool with block cassettes for machining camshafts from bar material or drop-forged blanks

## Engineering services

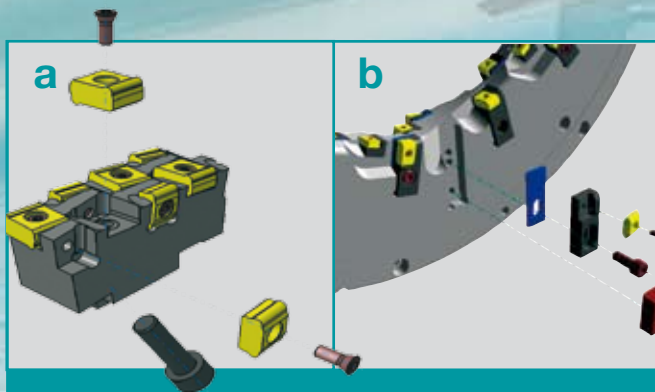
Boehlerit's crankshaft engineering line offers expertise and comprehensive know-how for the machining of crankshafts of any size and camshafts. The tailored solutions range from design to the start-up of tool systems with tailored grades and geometries. We will be happy to make our many years of experience and know-how available to you.



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Passenger car and truck crankshafts – tools for the following operations:

- preparation of shaft ends
- rough machining of main bearings
- rough machining of pin bearings
- milling of counterweight contours
- finish turning of main bearings (with grooves)
- finish turning of pin bearings (with grooves)
- drilling and thread machining of flanges



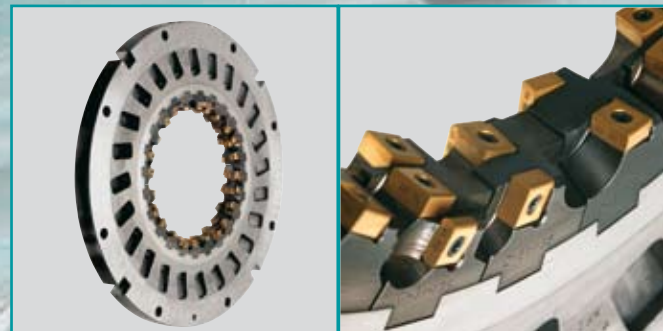
## 1 Cartridge systems

**a)** Block cartridge system for volume production

- highly effective number of teeth
- high machining performance
- simple repair ensured by exchange of cartridge

**b)** Adjustment cassettes for flexible production

- large adjustment range in cutting width and oil collar height
- standardised indexable inserts

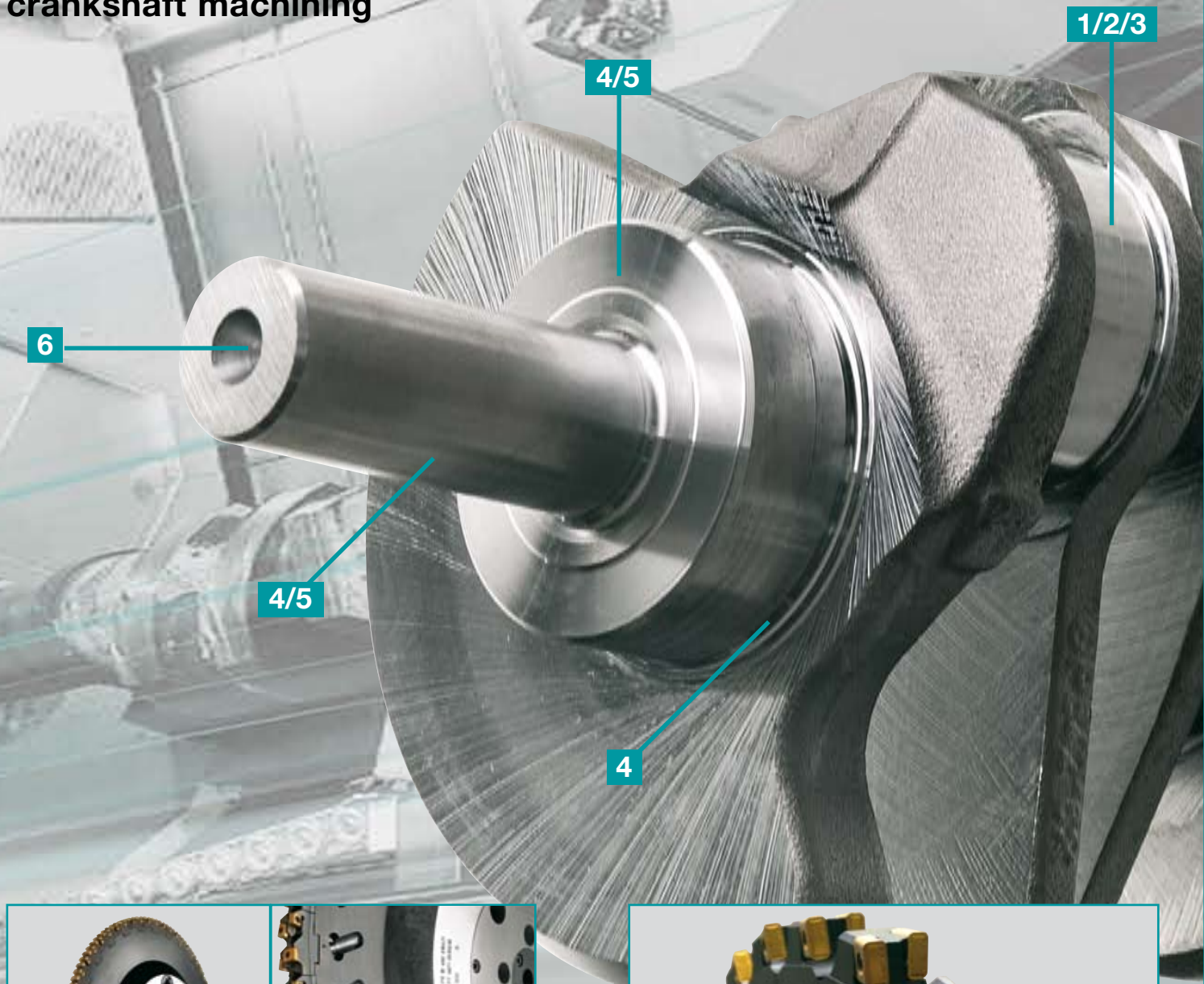


## 2 Interior milling cutter

For the machining of medium-sized crankshafts (trucks) to ship engines made from drop-forged or hammer-forged blanks

- stable cutting conditions
- highest metal removal rate

## End-to-end crankshaft machining



### 3 External milling cutter

For large volume production of small (passenger car) to medium-sized crankshafts – with or without grooves

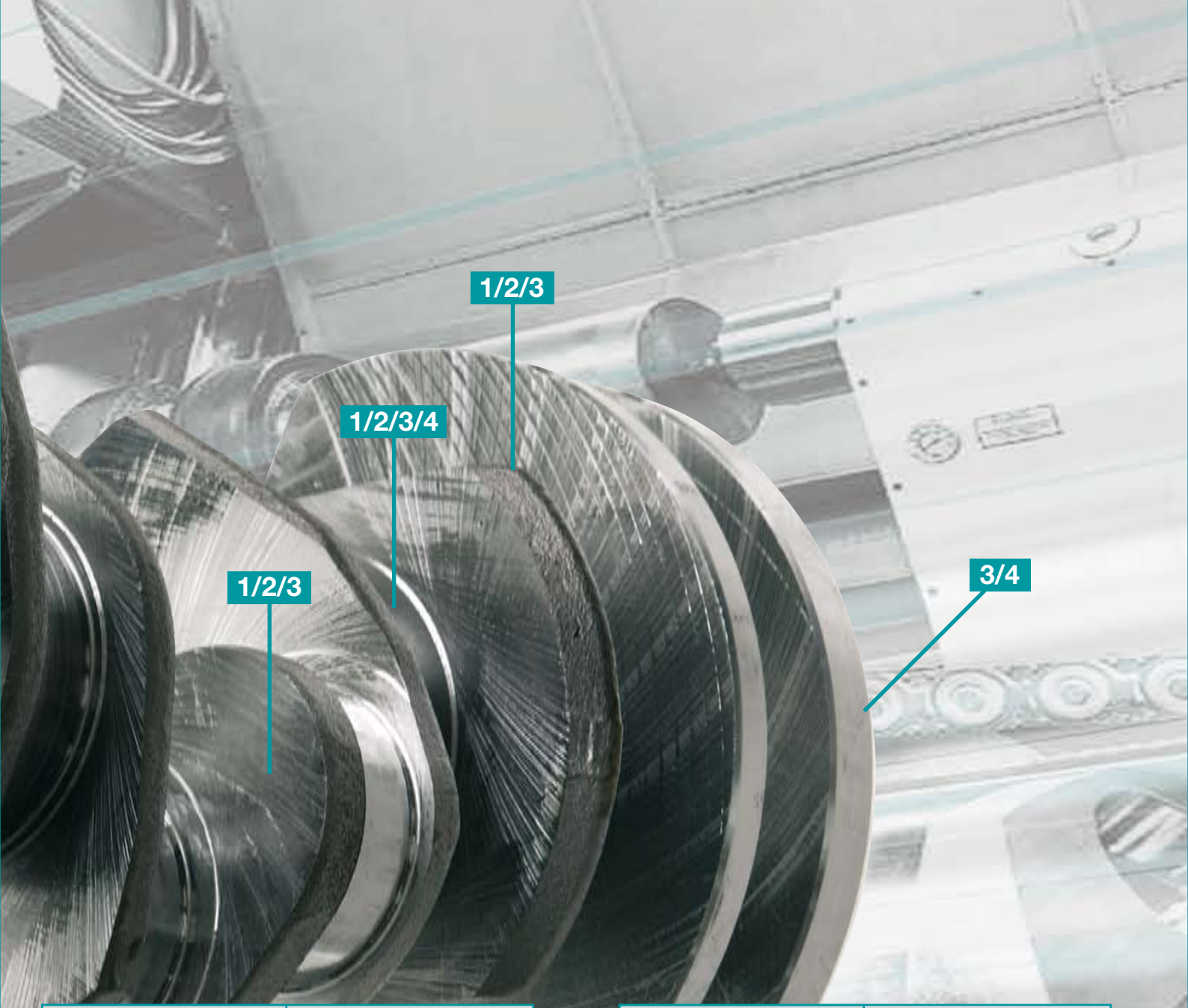
- shortest cycle times
- high cutting speeds



### 4 Turn-turn broaching tools

Tools in modular design for turning or turn-turn broaching the main bearings of passenger car crankshafts; modular design with cartridge

- cartridge can be replaced
- tangential inserts for heavy-duty cutting
- ISO inserts to keep costs low

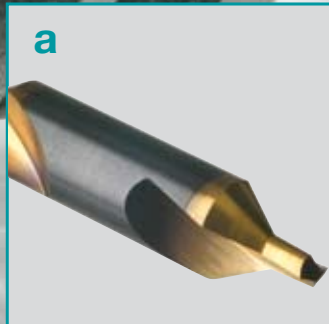
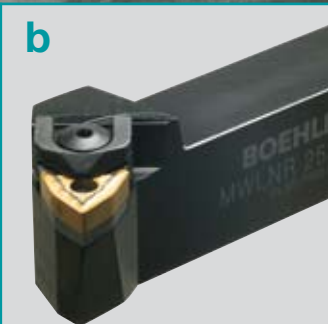
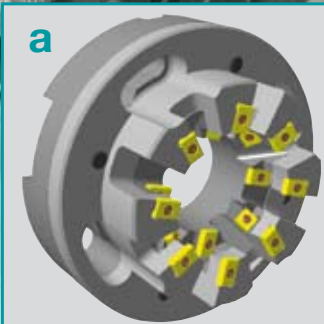


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## 5 Tools for machining of ends

Turning of flange and stub ends

**a)** for stationary workpieces with specific, bell-shaped special-purpose tools

**b)** with ISO standard turning tools for rotating workpieces

## 6 Drilling tools

**a)** spot-drilling

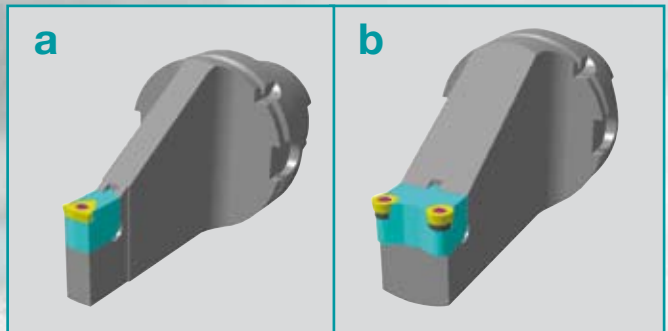
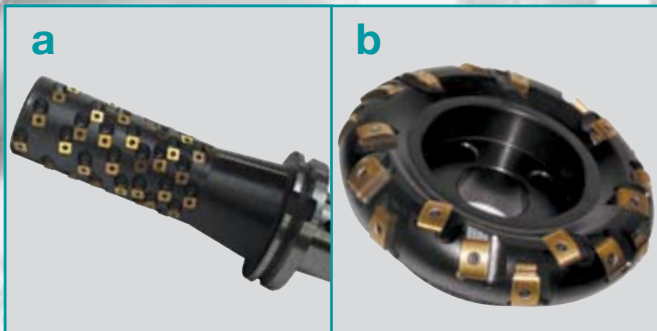
**b)** indexable insert drill and solid carbide drilling tools

# Machining of large-sized crankshafts

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## Milling equipment for large-sized crankshafts

- External milling cutter for diameters up to 2100 mm, for the largest monobloc shafts (marine crankshafts and stationary drives)
- Interior milling cutter for diameters up to 1500 mm for TR and hammer-forged shafts
- Conversion and modernisation of existing tools for large-sized crankshafts



### **A** Turning-milling tools for large-sized crankshafts

- a)** Spiral end mills for rough machining or finishing of web faces
- b)**
  - Form cutter for grooves in main or pin bearings
  - Spherical cutter for web chamfers

### **B** Turning tools

Tailored turning tool holder for crankshaft machining on turning/milling machines

- a)** Holder (HSK, Capto) as required
- b)** Execution with single or double indexable inserts

# Carbide grades and indexable inserts

## Radial inserts

- ISO inserts for turning
- ISO-like inserts for turn-turn broaching
- Special inserts for milling

## Tangential inserts

- negative geometry for milling
- positive geometry for milling
- for heavy duty turning



| Grade            | ISO    | Range of applications            | Group of materials                          |           |                |                               |                            |                | Application    |         |          |           |          |         |
|------------------|--------|----------------------------------|---|-----------|----------------|-------------------------------|----------------------------|----------------|----------------|---------|----------|-----------|----------|---------|
|                  |        |                                  | P   | M         | K              | N                             | S                          | H              | T              | M       | D        | S         | G        | P       |
|                  |        | 01 05 10 15 20 25 30 35 40 45 50 | Steel                                       | Stainless | Grey cast iron | Non ferrous metals (Al, etc.) | High temperature materials | Hard materials | Turning        | Milling | Drilling | Threading | Grooving | Parting |
| LC229T           | HC-P30 |                                  | ■   |           |                |                               |                            |                | ●              |         |          |           |          |         |
| LC239Q           | HC-P35 |                                  | ■   |           |                |                               |                            |                | ●              |         |          |           |          |         |
| LC239E           | HC-P40 |                                  | ■   |           |                |                               |                            |                | ●              |         |          |           |          |         |
| LC609T           | HC-K10 |                                  |   |           | ■              |                               |                            |                | ●              |         |          |           |          |         |
| LC619T           | HC-K20 |                                  |   |           | ■              |                               |                            |                | ●              |         |          |           |          |         |
| Application peak |        |                                  | ■ Main application<br>□ Further application |           |                |                               |                            |                | Standard grade |         |          |           |          |         |
| Range of ISO 513 |        | 01 05 10 15 20 25 30 35 40 45 50 |   |           |                |                               |                            |                |                |         |          |           |          |         |

### ● LW229T (HC-P30)

PVD coated carbide grade for milling easily machinable steel, and for applications with small dimensions and high cutting speeds. This multirange grade stands out with its high resistance to wear.

### ● LC239Q (HC-P35)

Main grade for milling steels at medium cutting speed. This multirange grade stands out with its resistance to wear and excellent toughness properties.

### ● LC239E (HC-P40)

Carbide grade for milling hard to machine steels. For special applications with high demands on wear resistance. Excellent for applications that tend to vibrate and for machining at high feed speeds.

### ● LC609T (HC-K10)

Carbide grade for the milling of grey cast and spheroidal cast iron, for finishing and the medium machining range. This grade stands out with its high resistance to wear.

### ● LC619T (HC-K20)

Main grade for the milling for grey cast and spheroidal cast iron, for medium to heavy-duty machining. This grade stands out with its wear resistance and good toughness properties.



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