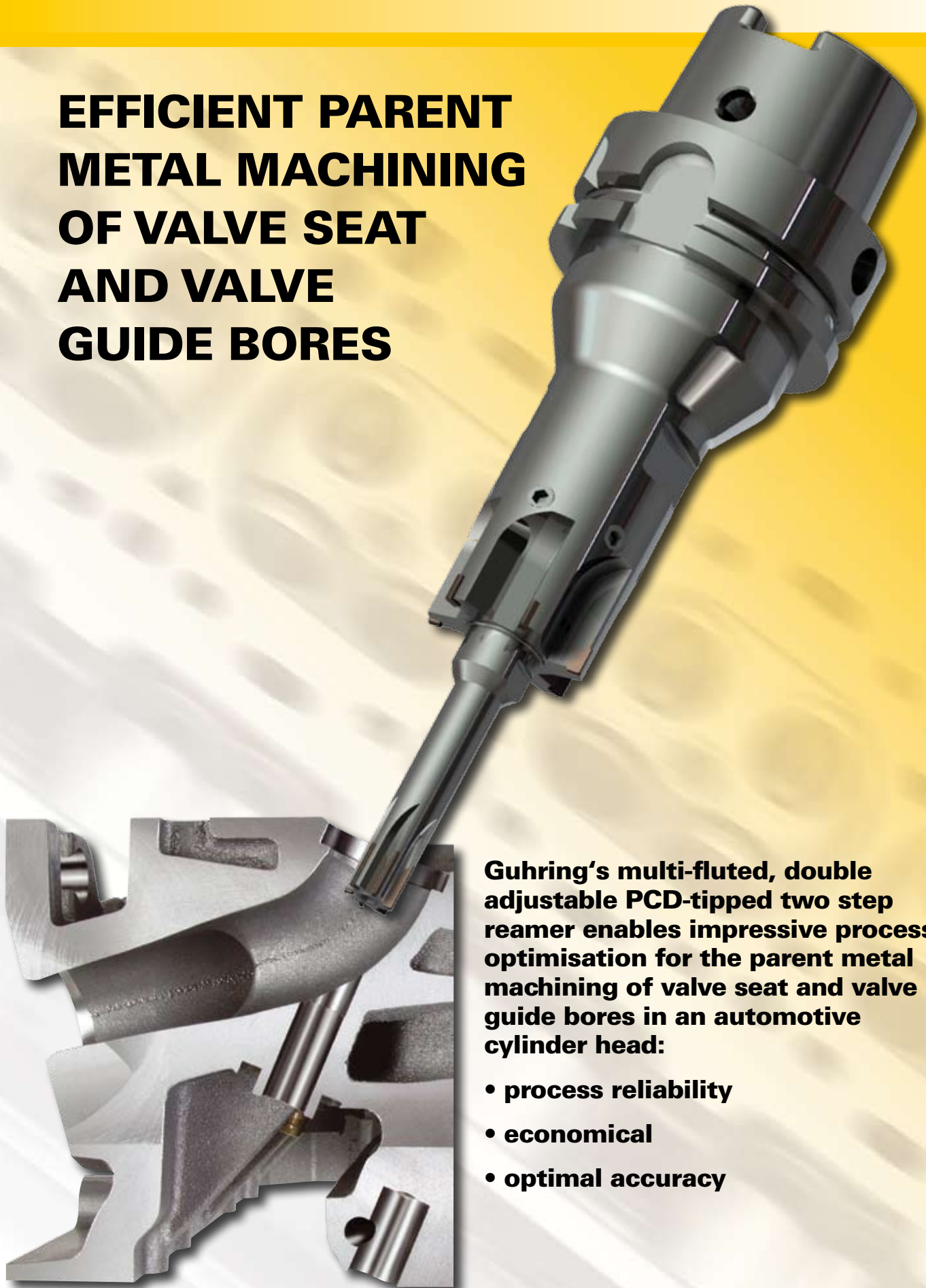


# **GUHRING** HIGHLIGHTS

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## **EFFICIENT PARENT METAL MACHINING OF VALVE SEAT AND VALVE GUIDE BORES**



**Guhring's multi-fluted, double adjustable PCD-tipped two step reamer enables impressive process optimisation for the parent metal machining of valve seat and valve guide bores in an automotive cylinder head:**

- **process reliability**
- **economical**
- **optimal accuracy**

# EFFICIENT PARENT METAL MACHINING OF VALVE GUIDE BORES IN AN AUTOMOTIVE CYLINDER HEAD

## WITH THE APPLICATION OF INNOVATIVE TOOLING TECHNOLOGIES GUHRING OPTIMIZED

The parent metal machining of valve seat and valve guide bores in a cylinder head belongs to the most demanding machining tasks in the automotive industry. Due to the high demands for circularity, form accuracy and concentricity a single-flute, adjustable reamer is the classic tool for this machining task as it guarantees the required precision with a long tool life. The tool, however, has its limits regards satisfying the demand for reducing the cycle time because it has only one flute.

For this reason, Guhring has developed a multi-flute and double adjustable PCD-tipped two step reamer that optimally satisfies the demand for the efficient parent metal machining of valve seat and valve guide bores:

- highest accuracy with an extremely long tool life through the diameter setting at the cutting edges of both steps.
- highest cutting parameters thanks to multiple flutes and optimal cooling.
- simple to operate as the diameter setting of both steps can be carried out while the tool is clamped.



### Perfect results thanks to optimal tool design

A multi-flute, PCD-tipped two step reamer is applied for the parent metal machining of the valve seat and the valve guide bores in one setting. Two tools of identical design are applied for the machining of the inlet and exhaust valve.

- exhaust: Machining of the valve seat bore of 28.5 mm diameter and the valve guide bore of 11 mm diameter, each with 6 flutes. Both step diameters can be adjusted independently of each other.
- inlet: Machining of the valve seat bore of 35.5 mm diameter and the valve guide bore of 11 mm diameter, each with 6 flutes. Both step diameters can be adjusted independently of each other.
- the simple, quick and highly accurate diameter setting when the tool is clamped allows the re-adjustment of both diameters at any time. Subsequently, it also results in increased tool life.
- the design of the reamer provides a reliable and compliant process with the demand for circularity, form accuracy and concentricity and an extremely long tool life with high cutting rates.
- the coolant delivery enables an optimal lubrication of the cutting edges and supports the chip evacuation.

# VALVE SEAT AND VALVE GUIDE BORES

REDUCES THE PARENT METAL MACHINING OF VALVE SEAT AND

**E**specially for the complete machining of cylinder heads, accuracy as well as the economic efficiency are the centre point of demands on the tool supplier. Due to the multi-valve technology a large proportion of the overall cost of cylinder head machining falls on the pre- and finish machining of valve seats and valve guides.

In order to reduce costs with the application of multi-flute reamers with considerably increased cutting speeds while retaining the same accuracy and long tool life in comparison to conventional single-flute tools, Guhring has developed the diameter setting for both steps.

## The patent pending diameter setting of the second step

- the inner tool body acts as expanding screw for the second step.
- inner tool body and outer unit are screwed together.
- the expansion of the step diameter is performed via the integrated taper of the inner tool body.
- simple rotation of the inner tool body leads to the diameter setting of the second step.
- therefore, the diameter setting of the second step can also be carried out when the tool is clamped.
- ground flats on the inner tool body suit an adjusting wrench.

## The expanding screw is integrated in the tool head

- the expanding screw is completely integrated in the tool head.
- the reamer operates - in contrast to conventional solutions with a protrusive expansion screw - down to the base of the hole without problem.
- it enables the machining of through holes as well as blind holes.



# FACTS AND FIGURES: CUTTING SPEEDS AND TOOL LIFE ACHIEVED

The PCD-tipped, double adjustable multi-flute two step reamer is successfully applied for the machining of the initial hole in the following workpiece:

- 6-valve cylinder head for a 3-cylinder engine
- material G-ALSi7Cu3
- horizontal machining on machining centre
- tool holder HSK 63
- internal cooling with soluble oil 6 %
- coolant pressure 20 bar

## Performance data comparison

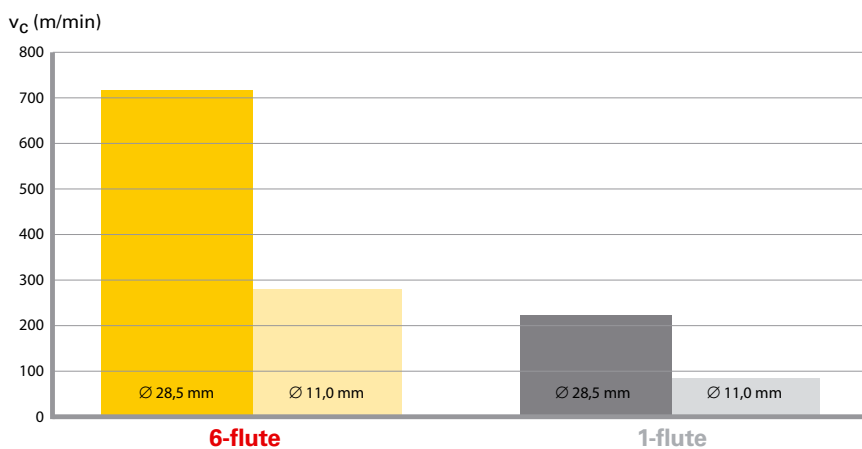
### 6-flute PCD-tipped, double adjustable two-step reamer

- production time: 7.80 seconds per cylinder head
- cutting speeds for machining the initial exhaust valve hole:  
diameter 11 mm = 276.46 m/min  
diameter 28.5 mm = 716.28 m/min
- feed rate  $v_f$ :  
both  $\varnothing v_f = 2400$  mm/min

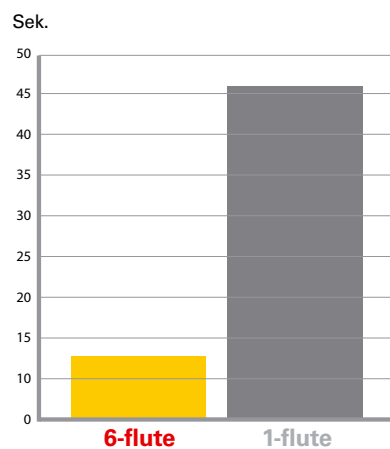
### 1-flute two step reamer with PCD interchangeable insert

- production time: 46.35 seconds per cylinder head
- cutting speeds for machining the initial exhaust valve hole:  
diameter 11 mm = 86,39 m/min  
diameter 28,5 mm = 223,84 m/min
- feed rate  $v_f$ :  
both  $\varnothing v_f = 338$  mm/min

## Cutting speed



## Production time



### Result:

- cutting speed  $v_c$  increased by +320 %
- production time  $v_f$  reduced by -83 %

The new, patent applied for technologies for multi-flute, PCD-tipped reamers can also be applied for the machining of crankcases, transmission, ABS and pump housings as well as many other applications. Please contact us for further information!

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