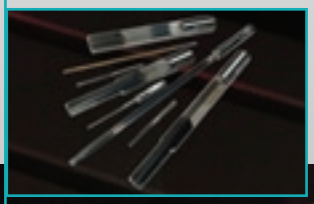
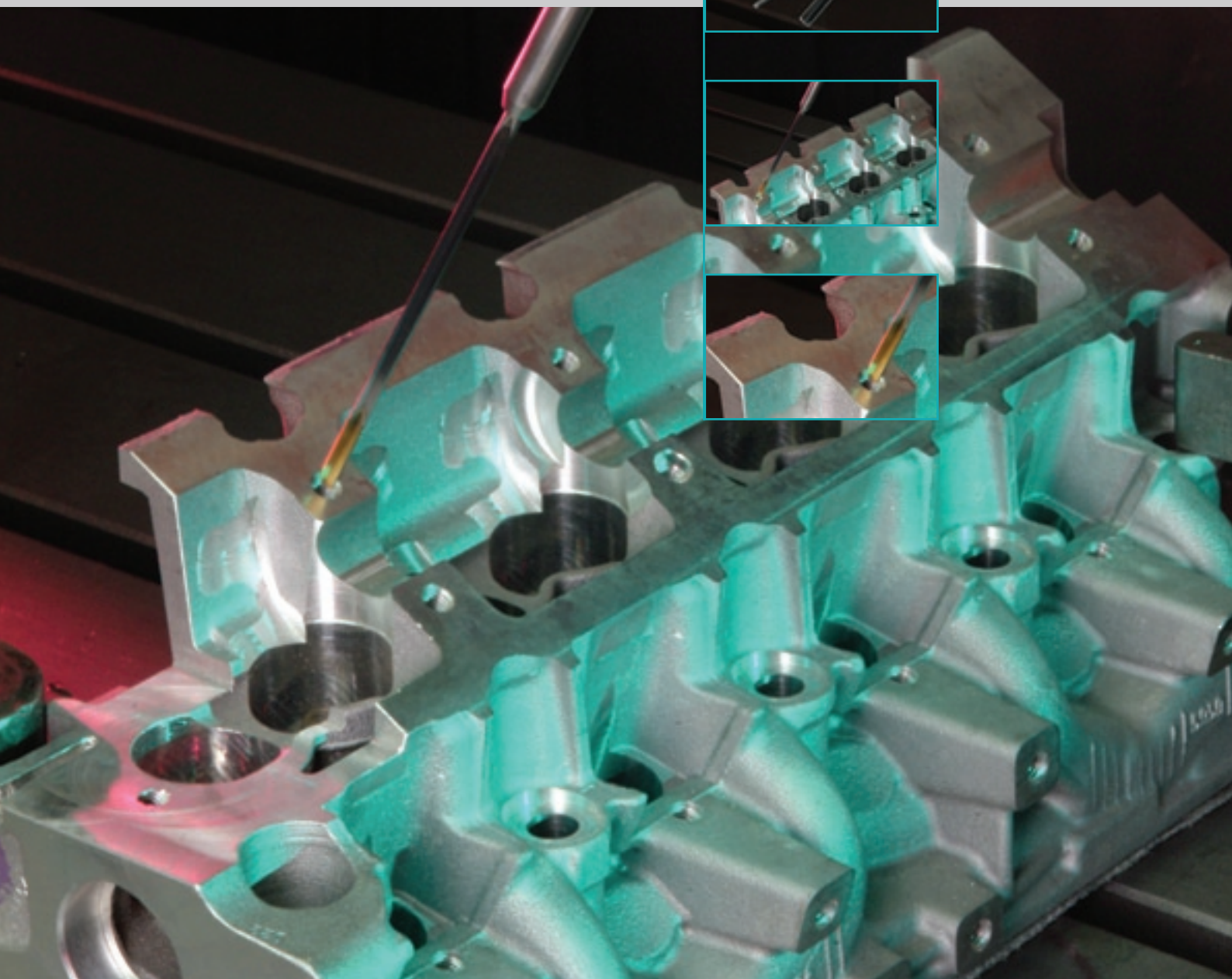
TBT TIEFBOHRTECHNIK

The use of single-lip drills on conventional machine tools



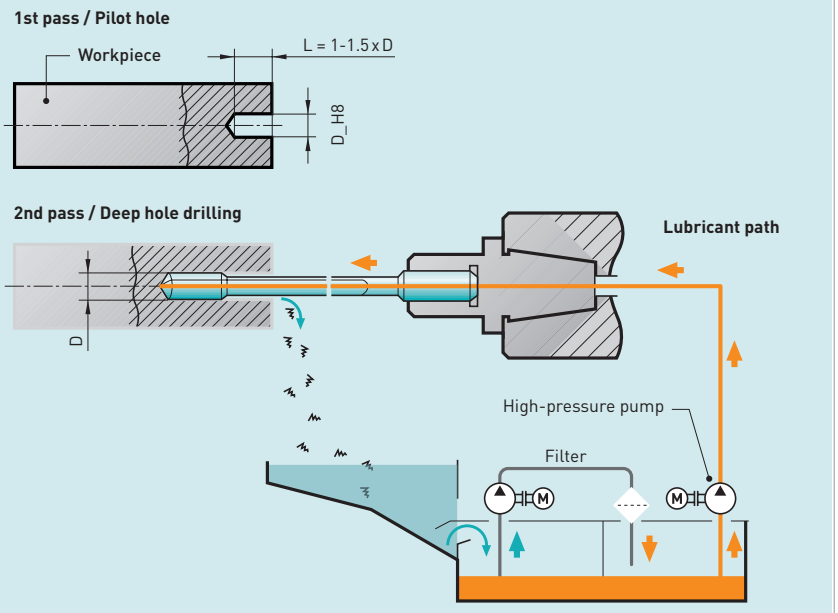


TBT Tiefbohrtechnik –
Deep hole drilling solutions

Company profile

Customers all over the world associate the company TBT Tiefbohrtechnik with reliable standards of quality, precision and customer service. And that has been the case for over 35 years. Founded in 1966 in Dettingen a. d. Erms, the company specialised right from the start in the manufacturing technology of deep hole drilling. The company's aim has always been to supply machines, tools and services from one source with professional expertise.
The company's rise to market leader confirms that our customers appreciate this corporate policy.
TBT combines the flexibility, dedication and customer-oriented approach of a streamlined medium-sized company with global presence.
We have subsidiaries or experienced representatives in virtually every major country in the world. Entrusted to our highly-qualified and dedicated staff, your deep hole drilling tasks are in safe hands.
Quality is a foundational pillar of our corporate philosophy, shaping both our services and our products. It is our stated aim to customise the product to your specific requirements and to meet the highest standards in terms of quality - as the market justifiably expects.
We see ourselves as your partners, always aspiring to a long-term working relationship with you. In seeking open and frank dialogue with you, we believe that our professional expertise and experience will merge with yours to become one unit. The result - integrated, pragmatic solutions.
Thanks to our innovative process control system and our dedicated team we can guarantee precision and punctuality.

Our company's certification conforming to VDA 6.4. demonstrates that the sequences of operation are clearly structured and that our quality management system is practised and fostered at all levels of the company.

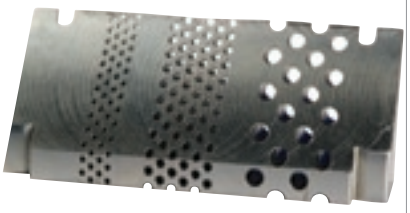


← On account of its combination of precision and high drilling capacity, the single-lip drill is also admirably suited to short and filigree holes. Single-lip drills are one-edged tools which are guided through a jig bush as they bore. Not only can these drills be used on the TBT deep hole drilling machines, but also on, for example, machining centres or automatic lathes. The cooling lubricant travels from the machine through the inside of the tool to its lip.
In addition to cooling and lubricating the boring head, the pressurised cooling lubricant also flushes the chips from the hole.

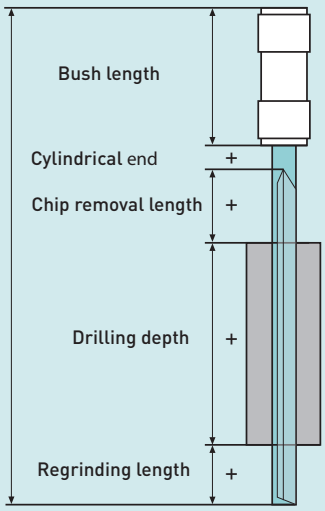
The current trend for multi-station machining has led to increasing use of single-lip drills on conventional machine tools, such as machining centres, transfer lines, boring mills, lathes etc.

The advantage of deep hole drilling is being able to produce holes with drilling depths of up to 40 x D in one pass without having to clear chips. Moreover, the low level of drift, narrow diameter tolerances, very good surface finishes and the minor shape and location deviations also make it possible to produce holes with an I/D ratio of less than 10.
Unlike deep hole drilling machines, it is extremely rare to be able to use jig bushes in conventional machine tools, and for this reason a pilot hole has to be drilled in the workpiece beforehand in order to use a single-lip drill. This hole has to meet specific requirements in terms of, for example, diameter tolerance and guide length (see above).

In addition to manufacturing a large selection of standard clamping sleeves, TBT also customises clamping sleeves to your special requirements (from a diagram or sample).
In order to keep your tool costs as low as possible we also offer a tool reconditioning service, whereby new heads can be fitted on clamping sleeves and tool shanks if they are in a satisfactory condition.



← Precision perforated plate



Deep hole drilling tool for machining centre
Calculation of tool length

Operating sequence

↖ Crankshaft production

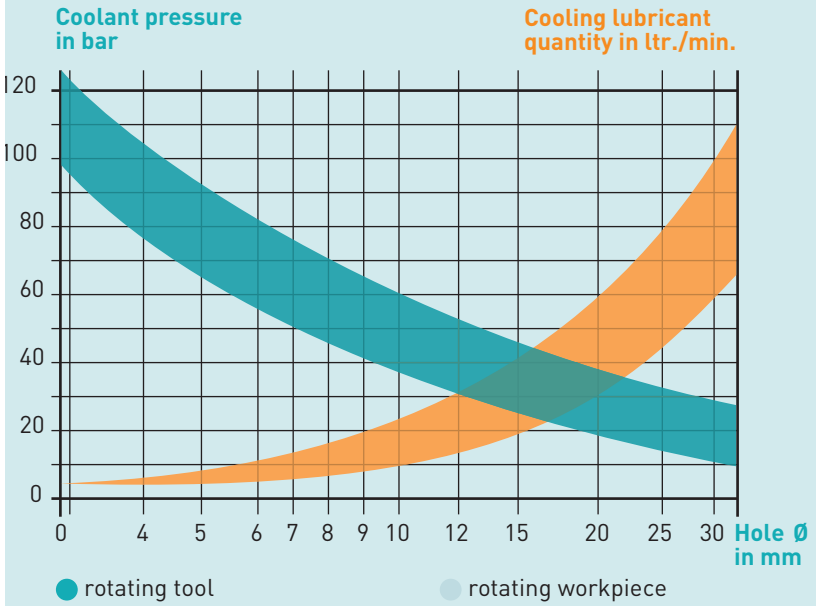
Deep hole drilling operating sequence

- Make the starting hole (pilot hole, see page 3)
- Keeping the spindle stationary or turning slowly, guide the tool into the starting hole
- Cooling lubricant On/ Speed On/ Feed On
- Drill to drilling depth without clearing chips
- Speed Off/ Rapid traverse Back/Cooling lubricant Off

Precise knowledge of the influential factors involved in the machining process is required if high levels of economic viability and safety are to be achieved in the process of deep hole drilling. These factors include optimised tool design with high-performance cutting materials, and the polish and condition of the deep hole drill. In addition to the accuracy of the pilot hole, the process parameters, such as feed, cutting speed and lubricant properties are obviously of vital importance as well.

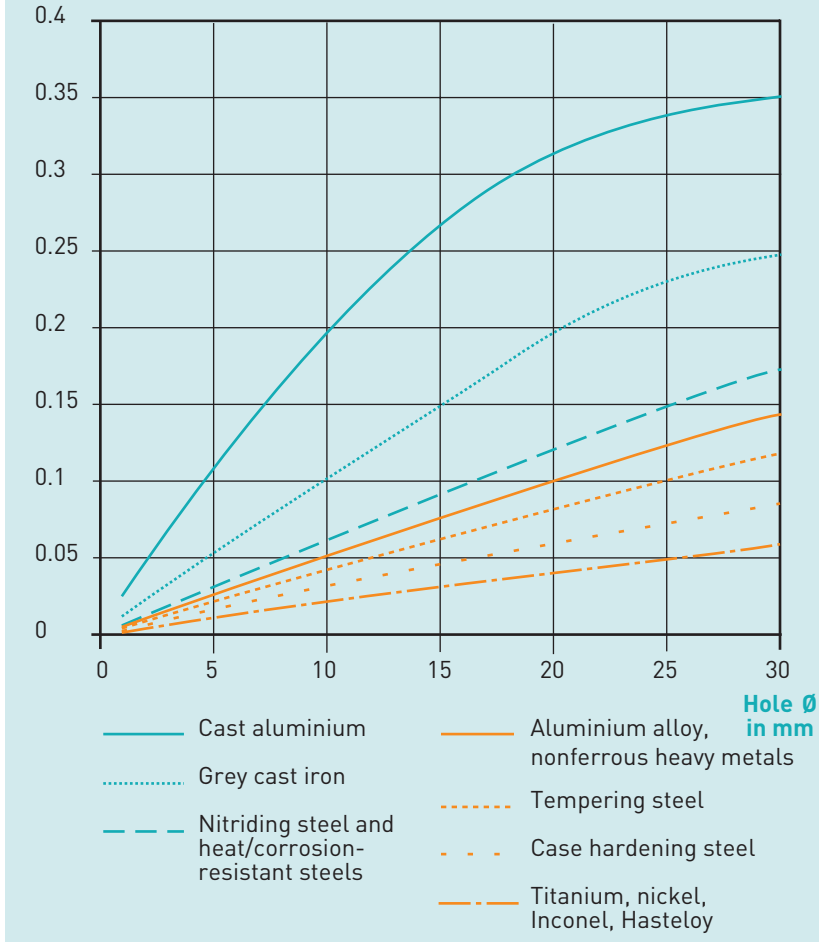
The process should always be monitored by the pressure and quantity of the cooling lubricant. The feed pressure or the torque may also need to be monitored depending on the type and make of the machine.

Play safe and ask the experts.

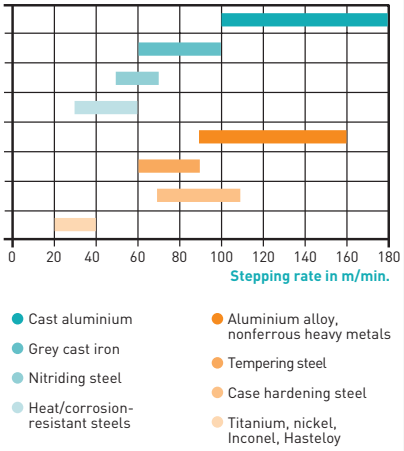


An efficient and correctly dimensioned coolant system with filtering is required to guarantee the economic viability and process reliability of deep hole drilling. Another consideration is the requirement to adhere to a minimum grease content when using emulsion. It is advisable to use deep hole drilling oil for small drill diameters and high-alloy steels.

← Cooling lubricant (standard values):



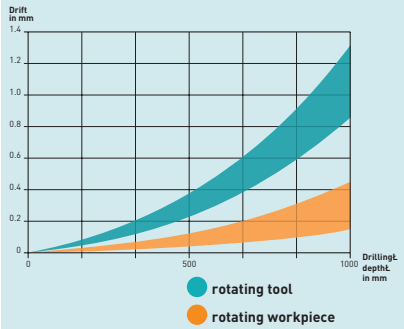
Stepping rate (standard values):



← Feed (standard values):

Results

		→			→→			→→→			→→→→		
Title		N12	N11	N10	N9	N8	N7	N6	N5	N4	N3	N2	N1
Twist drilling				X	X	X							
Reaming						X	X	X	X	X			
Broaching						X	X	X	X				
Honing							X	X	X	X	X	X	
Deep hole drilling								X	X	X	X		
Arithmetical centre line average **Ra**	µm	50	25	12.5	6.30	3.20	1.60	0.80	0.40	0.20	0.10	0.05	0.025



↗ Bore drift [standard values]

← Surface quality [standard values]

Surface quality

The resultant radial shear forces are transmitted to the hole wall via the support bars, thus pressing the surface to give a smooth finish.
This smoothing process can be enhanced even more by adjusting the design of the support bars, giving an outstanding quality to the surface finish.

Diameter tolerance

Diameter tolerances of up to IT 7 are achievable in production with TBT single-lip drills.

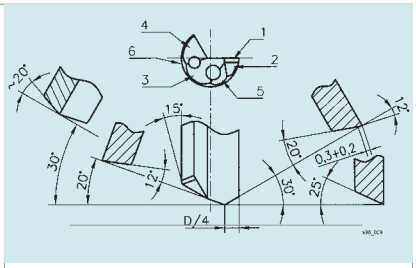
Bore drift

The jig bush on the workpiece or the pilot hole and the hole itself dictate precisely restricted guidance for the single-lip drill thus limiting the drift to a minimum.

↖ Cylinder head workpiece

Symbol	A axis	B axis	C axis	Measuring	Comments
1	-30°	+12°	+5°	> D/4	Set the C axis in such a way that the heel runs parallel to the clamping surface in pass 2. The width of the heel is the same as the width of the spherical grinding heel.
2	-30°	+20°	+6. 5°	Heel 0.3...0.5	
3	+20°	+12°	-5°	D/4	
4	+30°	+12°	+55°		
5	0°	+25°	-5°		
6					Break the edges on the periphery. Do not damage the outer edge corner!

[Deformation of the corners causes minor fluctuations in measurements]



Standard polished section for single-lip drills with D = 5 to 30 mm

Grinding machines

Various resharpening devices allow you to repoint your single-lip drill yourself. Our many years of experience in this area have been positively invested in the design and production of our grinding machines, jigs and associated accessories.

TBT universal chucking fixture

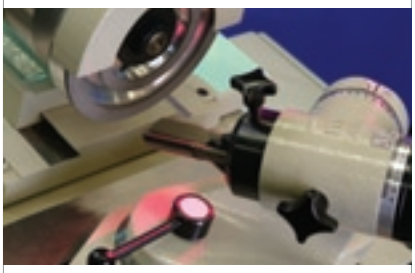
Our universal chucking fixture can be used on conventional tool grinders. The advantages of the chucking fixture, which we also use on our TBT universal grinder, are obvious:

- Compact fixture adjustable in three axes for grinding all standard geometries for single-lip drills
- Fixture supports extra-long single-lip drills
- Two different reaches (2.5 - 32 mm and 5.0 - 45 mm) cover a wide range of tool diameters

For optimum resharpening of your really small single-lip drills (0.7 - 3.5 mm), the TBT universal chucking fixture can also be fitted with a special grinder holder with integrated lighting and 20x measuring microscope.

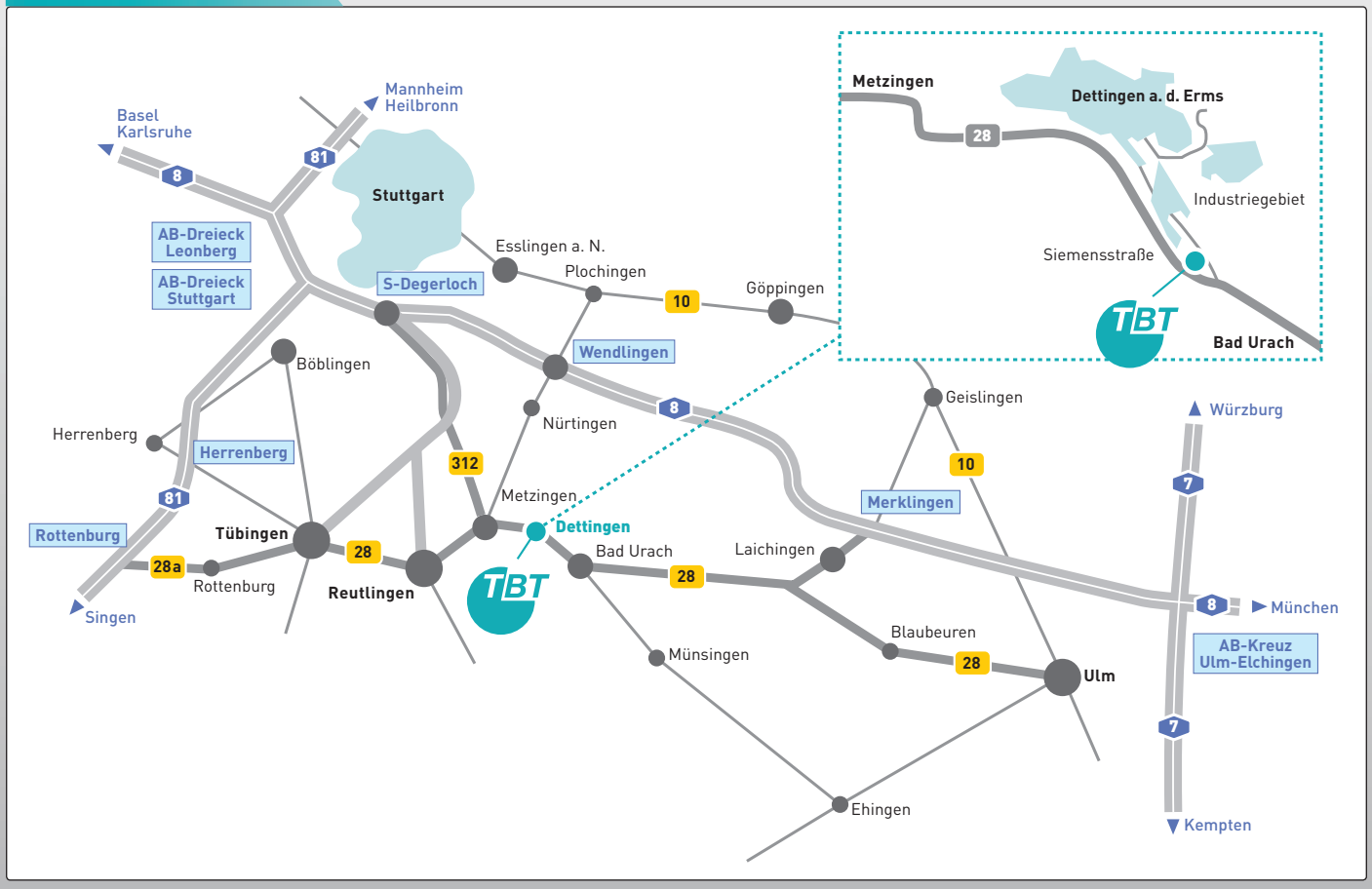
TBT universal grinder

A fully operable device for your specific requirements - the grinding spindle unit and our tried - and - tested TBT universal chucking fixture are mounted together on a solid board, thus allowing optimum repointing quality for excellent drilling results. Matching base and extraction equipment are also available.



↗ Universal grinder

Directions to TBT



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