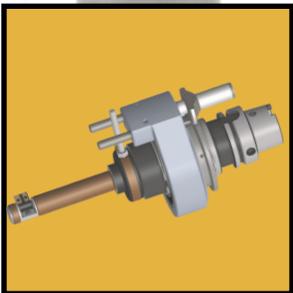


STEINER

INGENIOUS CUTTING TOOLS



AUTOFACER



**IN-STOCK
AUTOFACER**



**MANUAL BACK
COUNTERBORING**



**OFFSET ENTRY
BACK
COUNTERBORING**



**MODULAR FRONT
COUNTERBORING**



Who We Are

Steiner Technologies, Inc., is a family-owned cutting tool manufacturer and importer specializing in reverse machining tools. Our focus is innovative tooling solutions that eliminate costly secondary operations and reduce part process time. As the OEM of the Autofacer since 1968, we continue to be the world leader in automatic reverse machining tools. There are various activation methods available for the Autofacer depending on our customers' specific application needs.

The Steiner Difference

- Broadest product offering in the industry.
- Cutting solutions for a wide range of sizes: Hole diameters of $\varnothing.250''$ and larger.
- Far-reaching support, international network of sales reps, distributors and customer service.
- Flexibility: Multiple configurations for use on CNC machines, transfer lines or manual equipment
- Quick delivery: We stock standard components plus a broad range of manual back counterboring tools.



Our Promise

Steiner Technologies will deliver the world's finest automatic back spot facing solution. Providing 100% client satisfaction isn't just a goal, it's our expectation. Every tool we design and build delivers honest value and guaranteed results. We listen to your needs and tailor the most innovative and cost-effective solution for you. We measure our success by the trusted, long-term partnerships we develop with our clients.

Andy Nolan, President

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STEINER

Autofacer



In-Stock Autofacer

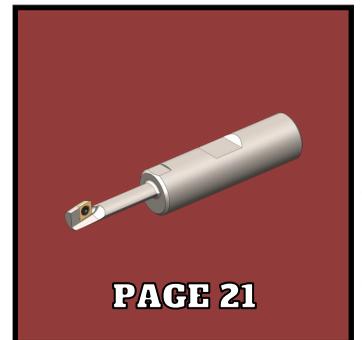
Ready to Ship



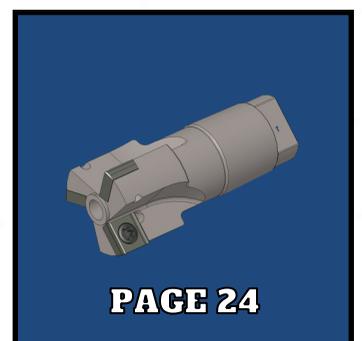
Manual Back Counterboring



Offset Entry Back Counterboring



Modular Front Counterboring Countersinking



Save up to 80 percent part operation cycle time.

Ingenious results, reliability and performance

80% savings or more - Custom guided tools allow aggressive speeds and feeds. Automatic operation eliminates operator intervention as well as costly secondary operations.

Guaranteed tool performance - All tools are designed for a specific application and the machine to be utilized to ensure the highest level of reliability and performance.

We provide local technical support at your facility to set up and prove out the tools. The Autofacer will do the job it was designed to do; we guarantee it.

Improve safety - Eliminates manual tool changes and high-risk processes. No operator climbing into machines changing out two piece systems.

Outstanding product and tech support - Steiner has an international network of trained sales representatives, industrial distributors and an experienced team of in-house application engineers.



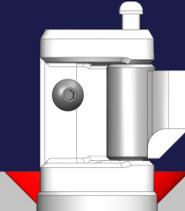
Industries capitalizing on the Autofacer Advantage:

Power Generation	Aerospace	Automotive	Heavy Equipment	Pump & Valve
General Electric	Space X	Allison Transmission	Caterpillar	Goulds Pumps
Siemens	Boeing	Dana Corp.	John Deere	Milwaukee Valve
Solar Turbine	Raytheon	Cummins Engine	Case New Holland	Cooper Cameron
Vestas	Moog	Eaton	Vermeer	Patterson Pumps
Clipper	Bell Helicopters	Ford	Bucryus	Ariel Corp.
Dong Fang Turbine	Rolls-Royce	American Axle		
Voith Hydro				

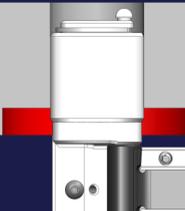
Autofacer Designs & Features:



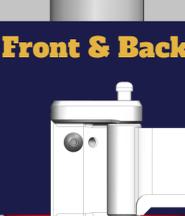
Counterbore



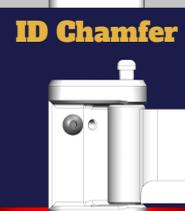
Countersink



Front & Back



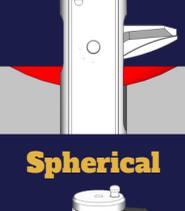
ID Chamfer



OD Chamfer



Special Form



Spherical



Spot Face

Torque Bar Activated Autofacer: Utilizes an anti-rotation mechanism to activate the blade during spindle reversal.

Air or Coolant Style Autofacer: Is activated with thru-spindle coolant or air pressure to open the blade. Spring pressure in the clutch will close the blade when thru-spindle coolant is turned off.

Bump or Cone Style Autofacer: Spring loaded tapered cone grips the face of the work piece to open and close the blade.

Flywheel or Inertia Autofacer: Utilizes machine spindle inertia generated during rapid spindle acceleration or deceleration.

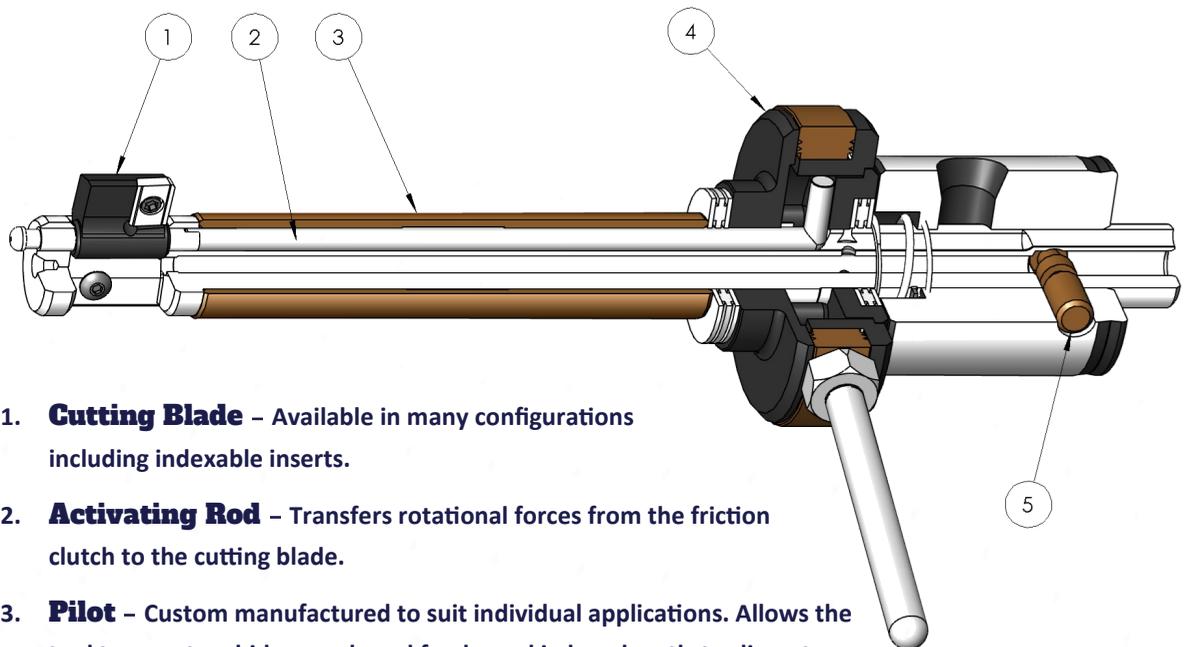
Pad or Ring Style Autofacer: Grips inside diameter of the part hole to activate.



Additional application tools:

Bearing Guided Autofacer: Is a unique solution for most demanding applications where ultra-high precision tolerances are required

Extended range Autofacer: Offers the largest hole to spot face diameter ratio in the industry. This design features a cutting blade that folds out like a jackknife.



1. **Cutting Blade** – Available in many configurations including indexable inserts.
2. **Activating Rod** – Transfers rotational forces from the friction clutch to the cutting blade.
3. **Pilot** – Custom manufactured to suit individual applications. Allows the tool to run at carbide speeds and feeds, and in long length-to-diameter applications.
4. **Friction clutch** – Generated the force necessary to open and close the cutting blade. Ensures the blade is held open and closed when required.
5. **Shear Pin** – Safety feature which provides additional protection against axial overload.

Examples of Autofacer Applications:

STEINER

Application Details:

- 300 SF/Min, .002 IPR (Spherical cut), .004 IPR (Thrust Face cut)
- Thrust gear faces must be parallel within ± 0.002 "
- R2.050" spherical radius must be held within $\pm R.002$ "

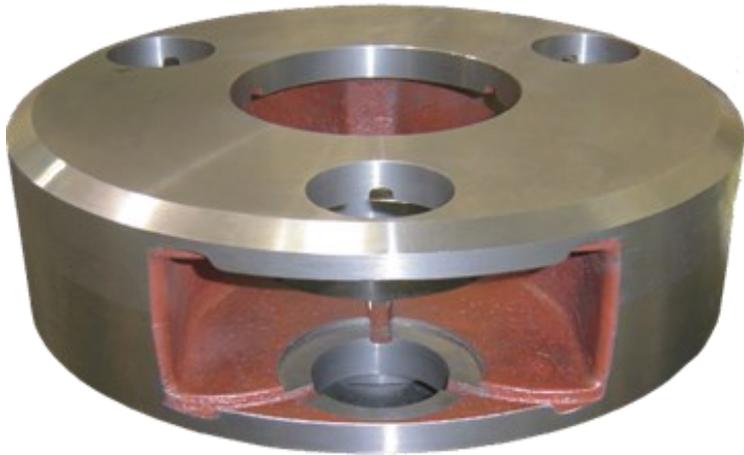
Autofacer Advantage:

- Eliminated costly special purposes machines required by alternative process
- Able to run on standard CNC machines

Differential Case



Planetary Gear Carrier



Application Details:

- 275 SF/Min, .003 IPR
- $\varnothing 2.127$ through hole, $\varnothing 3.638$ spot face
- Must hold ± 0.002 " perpendicularity between front and back faces and through hole with a heavily interrupted cut

Autofacer Advantage:

- Eliminated costly secondary broaching operation
- Machine front and back faces in one operation without indexing part
- Successfully maintained spot face and perpendicularity tolerances through heavily interrupted cut

Application Details:

- 250 SF/Min, .006 IPR
- $\varnothing 3.111$ through hole, $\varnothing 5.018$ spot face
- 17" thick part
- Heavy interrupted cut

Autofacer Advantage:

- Operation process time was reduced from 48 minutes per hole to under 5min per hole

Steam Turbine Housing



In-Stock Flywheel Autofacer

STEINER

Ready to Ship Same Day

Advantages:

- Inch & metric Weldon shanks available.
- Fully supported in pilot hole during cutting.
- Utilizes machine spindle inertia to open/close
- Shear pin design protects the tool investment, workpiece and machine spindle.

Counterbore Ø Range:

- 9.5mm (.375") to 33mm (1.299")

Spare Parts Kits

Includes: Activator Pin, Activating Rod, Retaining Ring, 3pcs Shear Pins, O-Ring, Pivot Pin

Part Number	Tool Sizes	Shear Pin
SPK-AF25	25	203020-02
SPK-AF28	28	203020-02
SPK-AF31-34	31, 34	203020-02
SPK-AF38-40	38, 40	204020-02
SPK-AF44-47	44, 47	204020-02
SPK-AF50-53	50, 53	205020-02
SPK-AF56-59	56, 59	205620-02



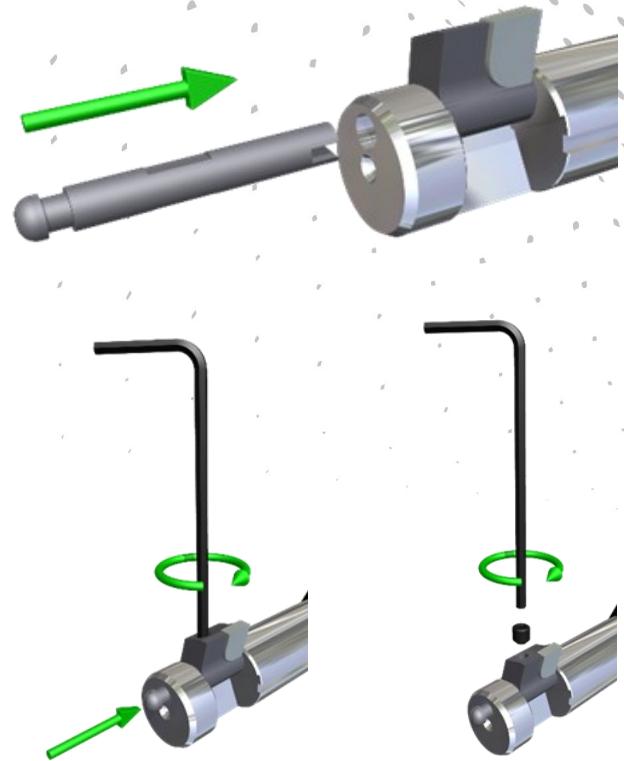
Cutting Data Recommendations: (Max RPM 1500)

	Mild Steel	Prehardened Steel	Stainless Steel	Cast Iron	Aluminum
Speed (SFM)	300	220	150	350	600
Speed (SMPM)	91	67	46	107	183
Feed Rate (IPR)	.001-.002	.001-.002	.001-.002	.0015-.0025	.002-.003
Feed Rate (MMPR)	.028-.038	.028-.038	.025-.038	.038-.050	.050-.063

Cutter Blade Installation:

1. Insert the pivot pin into the cutter body and thru the blade. Rotate the pivot pin until it engages the tang of the activating rod.
2. With the blade in the open position, rotate the clutch of the tool until the alignment mark on the pivot pin is parallel to the hex wrench and set screw in the cutter blade. This will ensure the set screw is aligned with the flat on the pivot pin.
3. Apply a small amount of serviceable Loctite (provided) to threads of screw. Tighten set screw to 6-10 in/lbs., being careful not to overtighten and ensuring set screw is on flat of pivot pin. If second follow up screw is provided, install and tighten to 6 in/lbs.

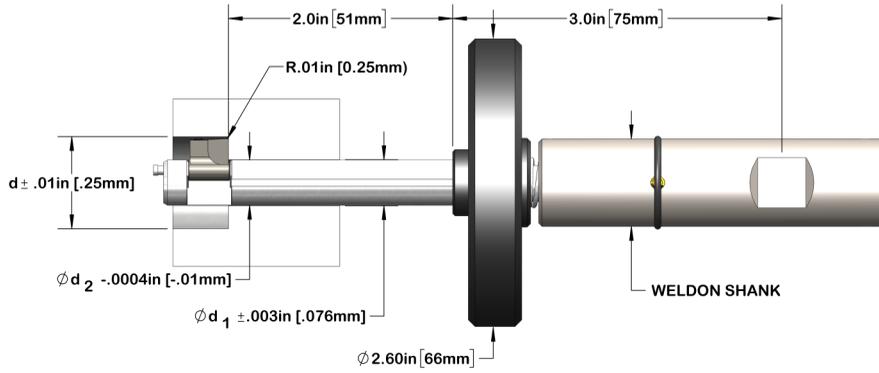
TIP: To verify the set screw is located on the flat of the pivot pin, loosen set screw slightly and attempt to pull pivot pin out of tool. The pin should only be able to slide until the set screw stops on the end of the pivot pin flat.



Operating Sequence:

1. With through coolant **OFF** and flood coolant **ON** enter work hole in **clockwise** rotation at **500-800 rpm**.
2. Feed to open area so blade can be opened completely before cutting.
3. Reverse spindle rotation to **counterclockwise** at **500-800 rpm**. Do not stop spindle between changing rotation. Blade will open. After a 1-3 revolution dwell, increase rpm to proper cutting speed. Turn through coolant **ON**.
4. Back feed to counterbore depth. Dwell for 1-3 revolutions to clean up cut.
5. Feed back to open area to clear part. Turn **OFF** through coolant. Leave flood coolant **ON**.
6. Set spindle to **500-800 rpm** and reverse to **clockwise**. Do not stop spindle between changing rotation. Blade will close. Fast feed out to complete machining cycle.

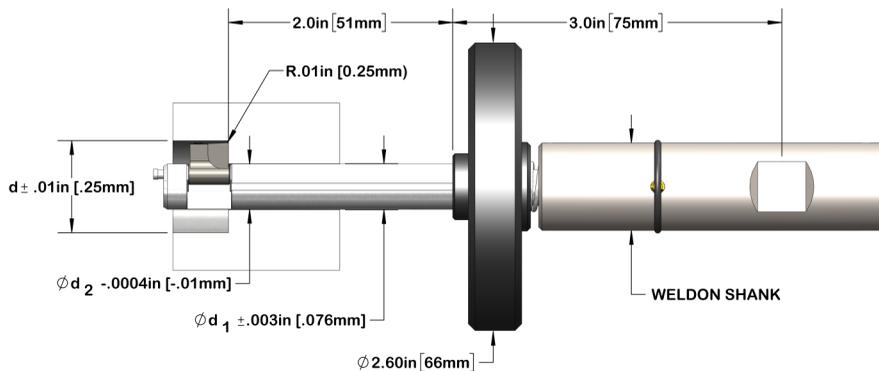
Counterbore Ø | 9.5mm (0.375in) - 15.5mm (0.610in)



Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
9.5	0.374	6.5	0.256	6.4	0.251	Ø20mm	AF25-6.50M	CB25-9.50M
		6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50	
		7.0	0.276	6.9	0.270	Ø20mm	AF25-7.00M	
10.0	0.394	6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50M	CB25-10.00M
		6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50	
		7.0	0.276	6.9	0.270	Ø20mm	AF25-7.00M	
10.5	0.413	6.5	0.256	6.4	0.251	Ø20mm	AF25-6.50M	CB25-10.50M
		6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50	
		7.0	0.276	6.9	0.270	Ø20mm	AF25-7.00M	
11.0	0.433	6.5	0.256	6.4	0.251	Ø20mm	AF25-6.50M	CB25-11.00M
		6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50	
		7.0	0.276	6.9	0.270	Ø20mm	AF25-7.00M	
11.5	0.453	7.5	0.295	7.4	0.290	Ø20mm	AF28-7.50M	CB28-11.00M
		7.5	0.295	7.4	0.290	Ø0.75in	AF28-7.50	
		6.5	0.256	6.4	0.251	Ø20mm	AF25-6.50M	
11.5	0.453	6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50M	CB25-11.50M
		6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50	
		7.0	0.276	6.9	0.270	Ø20mm	AF25-7.00M	
12.0	0.472	7.5	0.295	7.4	0.290	Ø20mm	AF28-7.50M	CB28-12.00M
		7.5	0.295	7.4	0.290	Ø0.75in	AF28-7.50	
		6.5	0.256	6.4	0.251	Ø20mm	AF25-6.50M	
12.5	0.492	6.5	0.256	6.4	0.251	Ø20mm	AF25-6.50M	CB25-12.50M
		6.5	0.256	6.4	0.251	Ø0.75in	AF25-6.50	
		7.0	0.276	6.9	0.270	Ø20mm	AF25-7.00M	
13.0	0.512	7.0	0.276	6.9	0.270	Ø20mm	AF25-7.00M	CB25-13.00M
		7.0	0.276	6.9	0.270	Ø0.75in	AF25-7.00	
		7.5	0.295	7.4	0.290	Ø20mm	AF28-7.50M	
13.0	0.512	7.5	0.295	7.4	0.290	Ø0.75in	AF28-7.50	CB28-13.00M
		8.0	0.315	7.9	0.310	Ø20mm	AF31-8.00M	
		8.0	0.315	7.9	0.310	Ø0.75in	AF31-8.00	
13.0	0.512	8.5	0.335	8.4	0.330	Ø20mm	AF31-8.50M	CB31-13.00M
		8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	
		8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	

Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
13.5	0.531	7.5	0.295	7.4	0.290	Ø20mm	AF28-7.50M	CB28-13.50M
		7.5	0.295	7.4	0.290	Ø0.75in	AF28-7.50	
		8.0	0.315	7.9	0.310	Ø20mm	AF31-8.00M	
13.5	0.531	8.0	0.315	7.9	0.310	Ø0.75in	AF31-8.00	CB31-13.50M
		8.5	0.335	8.4	0.330	Ø20mm	AF31-8.50M	
		8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	
14.0	0.551	9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	CB34-13.50M
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
		7.5	0.295	7.4	0.290	Ø20mm	AF28-7.50M	
14.0	0.551	7.5	0.295	7.4	0.290	Ø0.75in	AF28-7.50	CB28-14.00M
		8.0	0.315	7.9	0.310	Ø20mm	AF31-8.00M	
		8.0	0.315	7.9	0.310	Ø0.75in	AF31-8.00	
14.0	0.551	8.5	0.335	8.4	0.330	Ø20mm	AF31-8.50M	CB31-14.00M
		8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	
		9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	
14.0	0.551	9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	CB34-14.00M
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
		9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	
14.0	0.551	9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	CB38-14.00M
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	
		10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	
14.5	0.571	8.0	0.315	7.9	0.310	Ø20mm	AF31-8.00M	CB31-14.50M
		8.0	0.315	7.9	0.310	Ø0.75in	AF31-8.00	
		8.5	0.335	8.4	0.330	Ø20mm	AF31-8.50M	
14.5	0.571	8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	CB31-14.50M
		9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
14.5	0.571	9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	CB38-14.50M
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	
15.0	0.591	8.0	0.315	7.9	0.310	Ø20mm	AF31-8.00M	CB31-15.00M
		8.0	0.315	7.9	0.310	Ø0.75in	AF31-8.00	
		8.5	0.335	8.4	0.330	Ø20mm	AF31-8.50M	
15.0	0.591	8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	CB31-15.00M
		9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
15.0	0.591	9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	CB38-15.00M
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	
15.5	0.610	8.0	0.315	7.9	0.310	Ø20mm	AF31-8.00M	CB31-15.50M
		8.0	0.315	7.9	0.310	Ø0.75in	AF31-8.00	
		8.5	0.335	8.4	0.330	Ø20mm	AF31-8.50M	
15.5	0.610	8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	CB31-15.50M
		9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
15.5	0.610	9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	CB38-15.50M
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	
15.5	0.610	10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	CB38-15.50M
		10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
15.5	0.610	11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	CB40-15.50M
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	

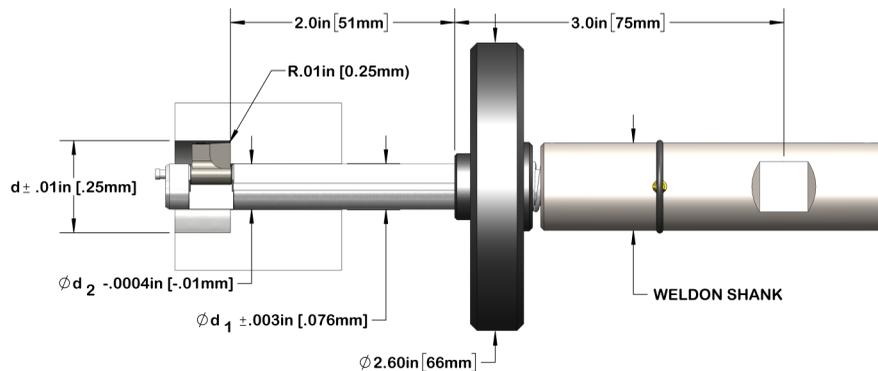
Counterbore Ø | 16mm (0.630in) - 19mm (0.748in)



Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
16.0	0.630	8.0	0.315	7.9	0.310	Ø20mm	AF31-8.00M	CB31-16.00M
		8.0	0.315	7.9	0.310	Ø0.75in	AF31-8.00	
		8.5	0.335	8.4	0.330	Ø20mm	AF31-8.50M	
		8.5	0.335	8.4	0.330	Ø0.75in	AF31-8.50	
		9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	CB34-16.00M
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
		9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	CB38-16.00M
		10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	
		10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	CB40-16.00M		
11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00			
11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M			
11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50			
16.5	0.650	9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	CB34-16.50M
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
		9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	CB38-16.50M
		10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	
		10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	CB40-16.50M
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
17.0	0.669	9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	CB34-17.00M
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
		9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	CB38-17.00M
		10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	
		10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	CB40-17.00M
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
17.5	0.689	9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	CB34-17.50M
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
		9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	CB38-17.50M
		10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	
		10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	CB40-17.50M
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	

Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
18.0	0.709	9.0	0.354	8.9	0.349	Ø20mm	AF34-9.00M	CB34-18.00M
		9.0	0.354	8.9	0.349	Ø0.75in	AF34-9.00	
		9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	CB38-18.00M
		10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	
		10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	CB40-18.00M
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-18.00M		
12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00			
12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M			
12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50			
18.5	0.728	9.5	0.374	9.4	0.369	Ø20mm	AF38-9.50M	CB38-18.50M
		9.5	0.374	9.4	0.369	Ø0.75in	AF38-9.50	
		10.0	0.394	9.9	0.389	Ø20mm	AF38-10.00M	
		10.0	0.394	9.9	0.389	Ø0.75in	AF38-10.00	
		10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	CB40-18.50M
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-18.50M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-18.50M		
12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50			
13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M			
13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00			
19.0	0.748	10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	CB40-19.00M
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-19.00M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-19.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	

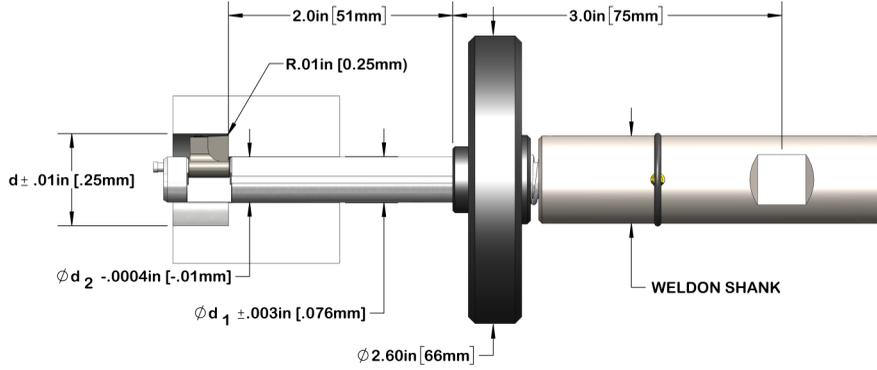
Counterbore Ø | 19.5mm (0.768in) - 22mm (0.866in)



Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
19.5	0.768	10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	CB40-19.50M
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-19.50M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-19.50M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-19.50M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-19.50M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M			
14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00			
20.0	0.787	10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	CB40-20.00M
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-20.00M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-20.00M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-20.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-20.00M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M			
14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00			
20.5	0.807	10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	CB40-20.50M
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-20.50M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-20.50M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-20.50M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-20.50M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M			
14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00			

Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
21.0	0.827	10.5	0.413	10.4	0.408	Ø20mm	AF40-10.50M	CB40-21.00M
		10.5	0.413	10.4	0.408	Ø0.75in	AF40-10.50	
		11.0	0.433	10.9	0.428	Ø20mm	AF40-11.00M	
		11.0	0.433	10.9	0.428	Ø0.75in	AF40-11.00	
		11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-21.00M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-21.00M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-21.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-21.00M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M			
14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00			
21.5	0.846	11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-21.50M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-21.50M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-21.50M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-21.50M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB56-21.50M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
22.0	0.866	11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-22.00M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-22.00M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-22.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-22.00M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB56-22.00M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-22.00M		
15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00			
15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M			
15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50			

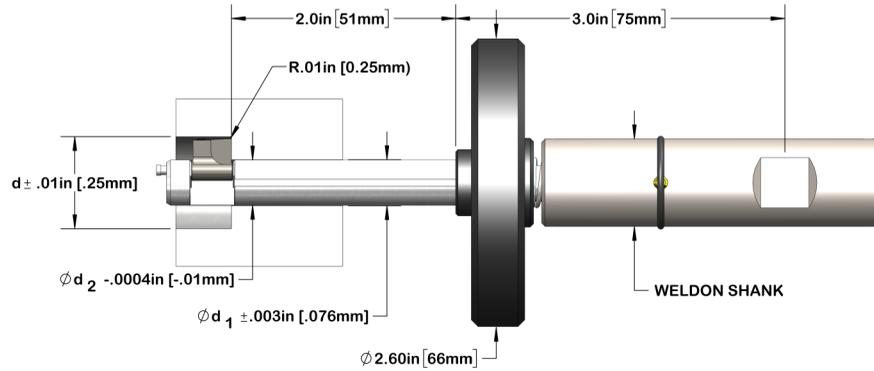
Counterbore Ø | 22.5mm (0.886in) - 24.5mm (0.965in)



Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
22.5	0.886	11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-22.50M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	CB47-22.50M
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	CB50-22.50M
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-22.50M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-22.50M
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB59-22.50M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-22.50M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M			
15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50			
23.0	0.906	11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-23.00M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-23.00M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-23.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	CB53-23.00M
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-23.00M
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB59-23.00M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-23.00M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M			
15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50			

Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
23.5	0.925	11.5	0.453	11.4	0.448	Ø20mm	AF44-11.50M	CB44-23.50M
		11.5	0.453	11.4	0.448	Ø0.75in	AF44-11.50	
		12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	CB47-23.50M
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	CB50-23.50M
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-23.50M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-23.50M
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB59-23.50M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-23.50M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M			
15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50			
24.0	0.945	12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-24.00M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-24.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	CB53-24.00M
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	CB56-24.00M
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB59-24.00M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-24.00M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M	
		15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50	
24.5	0.965	12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-24.50M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-24.50M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	CB53-24.50M
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	CB56-24.50M
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB59-24.50M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-24.50M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M	
		15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50	

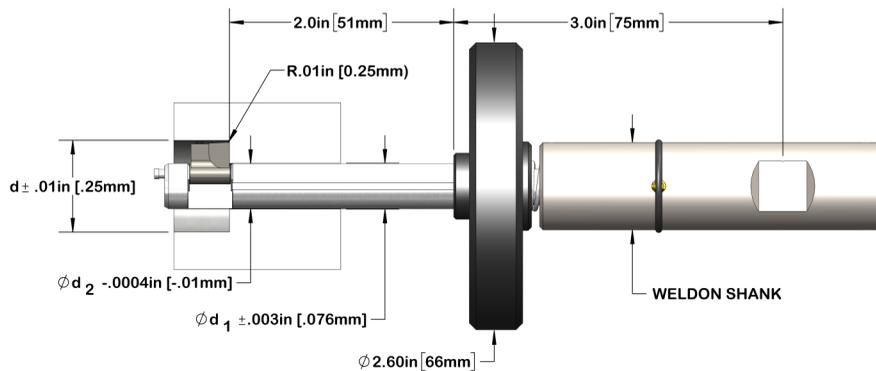
Counterbore Ø | 25mm (0.984in) - 27.5mm (1.083in)



Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
25.0	0.984	12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-25.00M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-25.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	CB53-25.00M
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-25.00M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-25.00M
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB56-25.00M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-25.00M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M	CB59-25.00M
		15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50	
25.5	1.004	12.0	0.472	11.9	0.467	Ø20mm	AF47-12.00M	CB47-25.50M
		12.0	0.472	11.9	0.467	Ø0.75in	AF47-12.00	
		12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-25.50M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	CB53-25.50M
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-25.50M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-25.50M
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB56-25.50M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-25.50M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M	CB59-25.50M
		15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50	
26.0	1.024	12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-26.00M
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	CB53-26.00M
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-26.00M
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-26.00M
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB56-26.00M
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-26.00M
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M	CB59-26.00M
		15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50	

Counterbore		Pilot Hole		Autofacer		Order Number				
d (mm)	d (in)	d₁ (mm)	d₁ (in)	d₂ (mm)	d₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N		
26.5	1.043	12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-26.50M		
		12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50			
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	CB53-26.50M		
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00			
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-26.50M		
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50			
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-26.50M		
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00			
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB56-26.50M		
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50			
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-26.50M		
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00			
		15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M	CB59-26.50M		
		15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50			
		27.0	1.063	12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-27.00M
				12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
13.0	0.512			12.9	0.507	Ø20mm	AF50-13.00M	CB53-27.00M		
13.0	0.512			12.9	0.507	Ø0.75in	AF50-13.00			
13.5	0.531			13.4	0.526	Ø20mm	AF53-13.50M	CB53-27.00M		
13.5	0.531			13.4	0.526	Ø0.75in	AF53-13.50			
14.0	0.551			13.9	0.546	Ø20mm	AF53-14.00M	CB56-27.00M		
14.0	0.551			13.9	0.546	Ø0.75in	AF53-14.00			
14.5	0.571			14.4	0.566	Ø20mm	AF56-14.50M	CB56-27.00M		
14.5	0.571			14.4	0.566	Ø0.75in	AF56-14.50			
15.0	0.591			14.9	0.585	Ø20mm	AF59-15.00M	CB59-27.00M		
15.0	0.591			14.9	0.585	Ø0.75in	AF59-15.00			
15.5	0.610			15.4	0.605	Ø20mm	AF59-15.50M	CB59-27.00M		
15.5	0.610			15.4	0.605	Ø0.75in	AF59-15.50			
27.5	1.083			12.5	0.492	12.4	0.487	Ø20mm	AF50-12.50M	CB50-27.50M
				12.5	0.492	12.4	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.9	0.507	Ø20mm	AF50-13.00M	CB53-27.50M		
		13.0	0.512	12.9	0.507	Ø0.75in	AF50-13.00			
		13.5	0.531	13.4	0.526	Ø20mm	AF53-13.50M	CB53-27.50M		
		13.5	0.531	13.4	0.526	Ø0.75in	AF53-13.50			
		14.0	0.551	13.9	0.546	Ø20mm	AF53-14.00M	CB56-27.50M		
		14.0	0.551	13.9	0.546	Ø0.75in	AF53-14.00			
		14.5	0.571	14.4	0.566	Ø20mm	AF56-14.50M	CB56-27.50M		
		14.5	0.571	14.4	0.566	Ø0.75in	AF56-14.50			
		15.0	0.591	14.9	0.585	Ø20mm	AF59-15.00M	CB59-27.50M		
		15.0	0.591	14.9	0.585	Ø0.75in	AF59-15.00			
		15.5	0.610	15.4	0.605	Ø20mm	AF59-15.50M	CB59-27.50M		
		15.5	0.610	15.4	0.605	Ø0.75in	AF59-15.50			

Counterbore Ø | 28mm (1.102in) - 33mm (1.299in)



Counterbore		Pilot Hole		Autofacer		Order Number		
d (mm)	d (in)	d ₁ (mm)	d ₁ (in)	d ₂ (mm)	d ₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N
28.0	1.102	12.5	0.492	12.37	0.487	Ø20mm	AF50-12.50M	CB50-28.00M
		12.5	0.492	12.37	0.487	Ø0.75in	AF50-12.50	
		13.0	0.512	12.87	0.507	Ø20mm	AF50-13.00M	
		13.0	0.512	12.87	0.507	Ø0.75in	AF50-13.00	
		13.5	0.531	13.37	0.526	Ø20mm	AF53-13.50M	
		13.5	0.531	13.37	0.526	Ø0.75in	AF53-13.50	CB53-28.00M
		14.0	0.551	13.87	0.546	Ø20mm	AF53-14.00M	
		14.0	0.551	13.87	0.546	Ø0.75in	AF53-14.00	
		14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	
		14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	CB59-28.00M
		15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
		15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	
		15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	
28.5	1.122	13.5	0.531	13.37	0.526	Ø20mm	AF53-13.50M	CB53-28.50M
		13.5	0.531	13.37	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.87	0.546	Ø20mm	AF53-14.00M	
		14.0	0.551	13.87	0.546	Ø0.75in	AF53-14.00	CB56-28.50M
		14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	
		14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	CB59-28.50M
		15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
		15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	
29.0	1.142	13.5	0.531	13.37	0.526	Ø20mm	AF53-13.50M	CB53-29.00M
		13.5	0.531	13.37	0.526	Ø0.75in	AF53-13.50	
		14.0	0.551	13.87	0.546	Ø20mm	AF53-14.00M	
		14.0	0.551	13.87	0.546	Ø0.75in	AF53-14.00	CB56-29.00M
		14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	
		14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	CB59-29.00M
		15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
		15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	
29.5	1.161	14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	CB56-29.50M
		14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	CB59-29.50M
		15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
30.0	1.181	14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	CB56-30.00M
		14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50	
		15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	CB59-30.00M
		15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	
		15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
		15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	

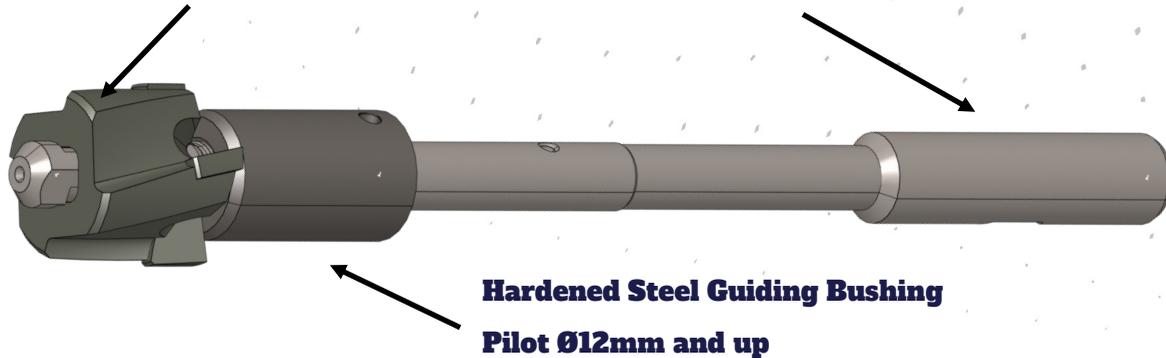
Counterbore		Pilot Hole		Autofacer		Order Number				
d (mm)	d (in)	d ₁ (mm)	d ₁ (in)	d ₂ (mm)	d ₂ (in)	Weldon Shank	Autofacer P/N	Cutter Blade P/N		
30.5	1.201	14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	CB56-30.50M		
		14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50			
		15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M			
		31.0	1.220	15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	CB59-30.50M
				15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
				15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	
31.0	1.220			14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	CB56-31.00M
				14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50	
				15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	
		31.0	1.220	15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	CB59-31.00M
				15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
				15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	
31.5	1.240			14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	CB56-31.50M
				14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50	
				15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	CB59-31.50M
		15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00			
		15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M			
32.0	1.260	14.5	0.571	14.37	0.566	Ø20mm	AF56-14.50M	CB56-32.00M		
		14.5	0.571	14.37	0.566	Ø0.75in	AF56-14.50			
		15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M			
		32.0	1.260	15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	CB59-32.00M
				15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
				15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	
32.5	1.280			15.0	0.591	14.87	0.585	Ø20mm	AF59-15.00M	CB59-32.50M
				15.0	0.591	14.87	0.585	Ø0.75in	AF59-15.00	
				15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
		33.0	1.299	15.5	0.610	15.37	0.605	Ø0.75in	AF59-15.50	CB59-33.00M
				15.5	0.610	15.37	0.605	Ø20mm	AF59-15.50M	
15.5	0.610			15.37	0.605	Ø0.75in	AF59-15.50			

Manual Back Counterboring

Design Features:

**Cutter Head
High Speed Steel or Brazed Carbide**

**Holder with
Weldon or Morse Taper Shank**



**Hardened Steel Guiding Bushing
Pilot Ø12mm and up**

Advantages:

- Manually operated reverse machining.
- Spotfacing or Counterboring due to fully fluted design.
- Universally applicable on all machine types.
- Bayonet style connection on cutter head for quick and reliable manual tool changes.
- Large cutting width up to $2.5 \times \varnothing d$
- Multiple regrinds are possible
- Several diameter combinations of cutter head and holder
- The same basic TUHW holder with multiple TUB bushings can cover multiple guidance diameters.



BRAZED CARBIDE (HM)



HIGH SPEED STEEL

Counterbore Ø | 10mm (0.394in) - 20mm (0.787in)

TU Cutter Head				
Dimensions			Order Number	
d	d ₁	l	HSS	Carbide
10.0	5	28	TU1000501	TU1000505
10.4			TU1040501	TU1040505
11.0			TU1100501	TU1100505
12.0			TU1200501	TU1200505
13.0			TU1300501	TU1300505

TUH Holder Cylindrical Shank						
Dimensions					Order Number	
d	d ₁	e	d ₂	l	Cylindrical Shank	
5.3	5	72	8	162	TUH0530500	
5.5					TUH0550500	
6.4					TUH0640500	
6.6					TUH0660500	
7.0					TUH0700500	

TUH Holder Morse Taper Shank					
Dimensions					Order Number
d	d ₁	e	MT	l	MT Shank
5.3	5	72	1	167	TUH0530501
5.5					TUH0550501
6.4					TUH0640501
6.6					TUH0660501
7.0					TUH0700501

13.5	6	30	TU1350601	TU1350605
14.0			TU1400601	TU1400605
14.5			TU1450601	TU1450605
15.0			TU1500601	TU1500605

8.4	6	70	10	162	TUH0840600
9.0					TUH0900600
9.5					TUH0950600

8.4	6	70	1	167	TUH0840601
9.0					TUH0900601
9.5					TUH0950601

16.0	8	32	TU1600801	TU1600805
16.5			TU1650801	TU1650805
17.0			TU1700801	TU1700805
17.5			TU1750801	TU1750805
18.0			TU1800801	TU1800805
19.0			TU1900801	TU1900805
20.0			TU2000801	TU2000805

8.4	8	88	12	182	TUH0840800
9.0					TUH0900800
10.0					TUH1000800
10.5					TUH1050800
11.0					TUH1100800
11.5					TUH1150800
12.0					TUH1200800
13.0					TUH1300800
13.5					TUH1350800
14.0					TUH1400800

8.4	8	88	2	200	TUH0840802
9.0					TUH0900802
10.0					TUH1000802
10.5					TUH1050802
11.0					TUH1100802
11.5					TUH1150802
12.0					TUH1200802
13.0					TUH1300802
13.5					TUH1350802
14.0					TUH1400802

- All TUH holders are available with oil grooves, when ordering please add "S" to the order number. Ordering Example: TUH1400800S
- Internal coolant and intermediate sizes available on request.
- TUHW holders can be used without bushing for guidance Ød with TU/HSS cutter head only

TU Cutter Head HSS

TU Cutter Head Carbide

d	X*
10-24	0.2
25-71	0.5
72-115	1.0

* GAP BETWEEN HOLE AND CARBIDE CUTTERBLADE

TUH Holder Cylindrical Shank

TUH Holder Morse Taper Shank

Tolerances				
d _x	e6	e8	h6	k8
3 < 6	-0.020/-0.028	-0.020/-0.038	0/-0.008	+0.018/0
6 < 10	-0.025/-0.034	-0.025/-0.047	0/-0.009	+0.022/0
10 < 18	-0.032/-0.043	-0.032/-0.059	0/-0.011	+0.027/0
18 < 30	-0.040/-0.053	-0.040/-0.073	0/-0.013	+0.033/0
30 < 50	-0.050/-0.066	-0.050/-0.089	0/-0.016	+0.039/0
50 < 80	-0.060/-0.079	-0.060/-0.106	0/-0.019	+0.046/0
80 < 120	-0.072/-0.094	-0.072/-0.126	0/-0.022	+0.054/0

TU Cutter Head				
Dimensions			Order Number	
d	d ₁	l	HSS	Carbide
21.0	9	22	TU2100901	TU2100905
22.0			TU2200901	TU2200905
23.0			TU2300901	TU2300905
24.0			TU2400901	TU2400905

TUH Holder Weldon Shank							
Dimensions					Order Number		
d	d ₁	e	d ₂	l	Weldon Shank		
10.5	9	110	12	185	TUHW1050912		
11.0					TUHW1100912		
Holder and Sleeve, 2 Parts (TUHW + TUB)							
Part 1: Holder							
9.0	9	110	12	185	TUHW090912		
Part 2: Sleeve							
					d ₄	l ₂	Sleeve
					>=12	30	TUB(d ₄)0930

TUH Holder Morse Taper Shank					
Dimensions					Order Number
d	d ₁	e	MT	l	MT Shank
10.5	9	118	2	220	TUH1050902
11.0					TUH1100902
12.0					TUH1200902
13.0					TUH1300902
13.5					TUH1350902
14.0					TUH1400902
15.0					TUH1500902
16.0					TUH1600902

25.0	11	24	TU2501101	TU2501105
26.0			TU2601101	TU2601105
27.0			TU2701101	TU2701105
28.0			TU2801101	TU2801105
29.0			TU2901101	TU2901105
30.0			TU3001101	TU3001105

12.0	11	130	12	205	TUHW1201112		
13.0					TUHW1301112		
13.5					TUHW1351112		
Holder and Sleeve, 2 Parts (TUHW + TUB)							
Part 1: Holder							
11.0	11	130	12	205	TUHW111112		
Part 2: Sleeve							
					d ₄	l ₂	Sleeve
					>=14	35	TUB(d ₄)1135

12.0	11	135	3	259	TUH1201103
13.0					TUH1301103
13.5					TUH1351103
14.0					TUH1401103
15.0					TUH1501103
16.0					TUH1601103
17.0					TUH1701103
17.5					TUH1751103
18.0					TUH1801103
19.0					TUH1901103
20.0					TUH2001103

31.0	13	26	TU3101301	TU3101305
32.0			TU3201301	TU3201305
33.0			TU3301301	TU3301305
34.0			TU3401301	TU3401305
35.0			TU3501301	TU3501305
36.0			TU3601301	TU3601305

15.0	13	150	16	230	TUHW1501316		
15.5					TUHW1551316		
Holder and Sleeve, 2 Parts (TUHW + TUB)							
Part 1: Holder							
13.0	13	150	16	230	TUHW131316		
Part 2: Sleeve							
					d ₄	l ₂	Sleeve
					>= 16	40	TUB(d ₄)1340

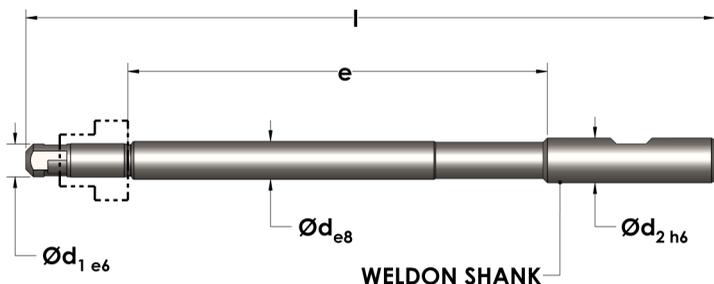
15.0	13	154	3	280	TUH1501303
16.0					TUH1601303
17.0					TUH1701303
17.5					TUH1751303
18.0					TUH1801303
19.0					TUH1901303
20.0					TUH2001303
21.0					TUH2101303
22.0					TUH2201303
23.0					TUH2301303
24.0					TUH2401303
25.0					TUH2501303

37.0	17	28	TU3701701	TU3701705
38.0			TU3801701	TU3801705
39.0			TU3901701	TU3901705
40.0			TU4001701	TU4001705
41.0			TU4101701	TU4101705
42.0			TU4201701	TU4201705
43.0			TU4301701	TU4301705

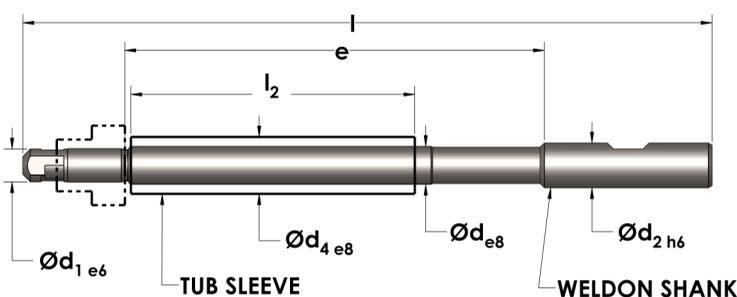
19.0	17	167	20	252	TUHW1901720		
Holder and Sleeve, 2 Parts (TUHW + TUB)							
Part 1: Holder							
17.0	17	167	20	252	TUHW171720		
Part 2: Sleeve							
					d ₄	l ₂	Sleeve
					>= 20	50	TUB(d ₄)1750

19.0	17	172	3	301	TUH1901703
20.0					TUH2001703
21.0					TUH2101703
22.0					TUH2201703
23.0					TUH2301703
24.0					TUH2401703
25.0					TUH2501703
26.0					TUH2601703
28.0					TUH2801703
30.0					TUH3001703

TUHW Holder Weldon Shank



TUHW Holder Weldon Shank With TUB Bushing



Counterbore Ø | 44mm (1.732in) - 62mm (2.441in)

TU Cutter Head				
Dimensions			Order Number	
d	d ₁	l	HSS	Carbide
44.0	19	32	TU4401901	TU4401905
45.0			TU4501901	TU4501905
46.0			TU4601901	TU4601905
47.0			TU4701901	TU4701905
48.0			TU4801901	TU4801905

TUH Holder Weldon Shank					
Dimensions					Order Number
d	d ₁	e	d ₂	l	Weldon Shank
Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
19.0	19	183	20	272	TUHW191920
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>=22	55	TUB(d ₄)1955	

TUH Holder Morse Taper Shank					
Dimensions					Order Number
d	d ₁	e	MT	l	MT Shank
22.0	19	188	3	321	TUH2201903
23.0					TUH2301903
24.0					TUH2401903
25.0					TUH2501903
26.0					TUH2601903
28.0					TUH2801903
30.0					TUH3001903
32.0					TUH3201903
33.0					TUH3301903

49.0	21	34	TU4902101	TU4902105
50.0			TU5002101	TU5002105
51.0			TU5102101	TU5102105
52.0			TU5202101	TU5202105
53.0			TU5302101	TU5302105
54.0			TU5402101	TU5402105

Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
21.0	21	199	25	296	TUHW212125
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>=24	60	TUB(d ₄)2160	

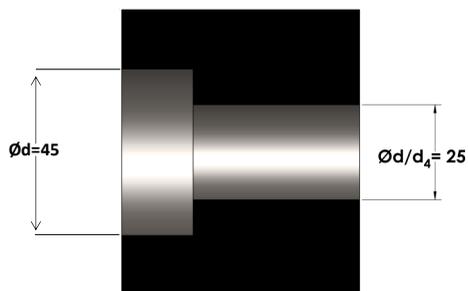
24.0	21	205	4	364	TUH2402104
25.0					TUH2502104
26.0					TUH2602104
28.0					TUH2802104
30.0					TUH3002104
32.0					TUH3202104
33.0					TUH3302104
35.0					TUH3502104
36.0					TUH3602104

55.0	25	36	TU5502501	TU5502505
56.0			TU5602501	TU5602505
57.0			TU5702501	TU5702505
58.0			TU5802501	TU5802505
59.0			TU5902501	TU5902505
60.0			TU6002501	TU6002505
61.0			TU6102501	TU6102505
62.0			TU6202501	TU6202505

Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
25.0	25	218	25	317	TUHW252525
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>= 28	65	TUB(d ₄)2565	

28.0	25	224	4	385	TUH2802504
30.0					TUH3002504
32.0					TUH3202504
33.0					TUH3302504
35.0					TUH3502504
36.0					TUH3602504
39.0					TUH3902504

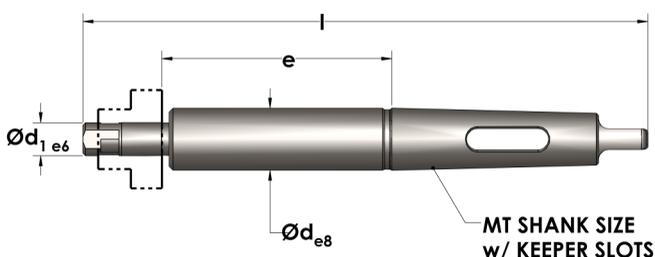
Ordering example for counterbore d = 45 and pilot hole d₄ = 25 +.052/-0 (H9)



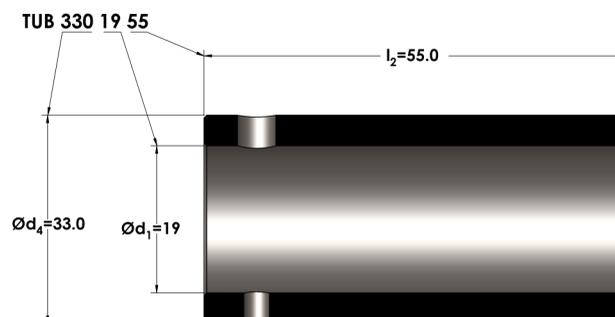
TU Cutter Head	TU <u>450</u> 19 01
d = 45, HSS	
Option 1 (2 Piece w/sleeve, Weldon Shank) *	
TUH Holder	TUHW 19 19 20
d = 19, Weldon	
Sleeve	TUB <u>250</u> 19 55
d4 = 25	
Option 2 (1 Piece, Morse Taper Shank)	
TUH Holder	TUH <u>250</u> 19 03
d = 25, MT 3	

* Option 1 (2 Piece version) comes complete with 4 threaded pins to secure the sleeve. TUB Bushings must be ordered separately. For double guidance length order 2 pcs of the TUB Bushing.

TUH Holder Morse Taper Shank Sizes MT3 and up



TUB Bushing Ordering Example



TU Cutter Head				
Dimensions			Order Number	
d	d ₁	l	HSS	Carbide
63.0	28	38	TU6302801	TU6302805
64.0			TU6402801	TU6402805
65.0			TU6502801	TU6502805
66.0			TU6602801	TU6602805
67.0			TU6702801	TU6702805
68.0			TU6802801	TU6802805
69.0			TU6902801	TU6902805
70.0			TU7002801	TU7002805
71.0			TU7102801	TU7102805

TUH Holder Weldon Shank					
Dimensions					Order Number
d	d ₁	e	d ₂	l	Weldon Shank
Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
28.0	28	235	32	341	TUHW282832
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>=32	70	TUB(d ₄)2870	

TUH Holder Morse Taper Shank					
Dimensions					Order Number
d	d ₁	e	MT	l	MT Shank
32.0	28	241	4	405	TUH3202804
33.0					TUH3302804
35.0					TUH3502804
36.0					TUH3602804
39.0					TUH3902804
40.0					TUH4002804
42.0					TUH4202804
45.0					TUH4502804

74.0	30	50	TU7403001	TU7403005
76.0			TU7603001	TU7603005
78.0			TU7803001	TU7803005
80.0			TU8003001	TU8003005

Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
30.0	30	250	32	364	TUHW303032
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>=33	75	TUB(d ₄)3075	

33.0	30	256	5	460	TUH3303005
36.0					TUH3603005

82.0	35	50	TU8203501	TU8203505
85.0			TU8503501	TU8503505
90.0			TU9003501	TU9003505

Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
35.0	35	250	40	374	TUHW353540
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>= 39	80	TUB(d ₄)3580	

36.0	35	258	5	460	TUH3603505
39.0					TUH3903505
42.0					TUH4203505
45.0					TUH4503505
48.0					TUH4803505

92.0	40	60	TU9204001	TU9204005
95.0			TU9504001	TU9504005
98.0			TU9804001	TU9804005
100.0			TU10004001	TU10004005

Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
40.0	40	260	40	394	TUHW404040
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>=45	85	TUB(d ₄)4085	

42.0	40	266	5	480	TUH4204005
45.0					TUH4504005
48.0					TUH4804005
52.0					TUH5204005

105.0	45	70	TU10504501	TU10504505
107.0			TU10704501	TU10704505
110.0			TU11004501	TU11004505
112.0			TU11204501	TU11204505
115.0			TU11504501	TU11504505

Holder and Sleeve, 2 Parts (TUHW + TUB)					
Part 1: Holder					
45.0	45	250	50	404	TUHW454550
Part 2: Sleeve					
		d ₄	l ₂	Sleeve	
		>=48	90	TUB(d ₄)4590	

48.0	45	256	5	480	TUH4804505
52.0					TUH5204505
62.0					TUH6204505

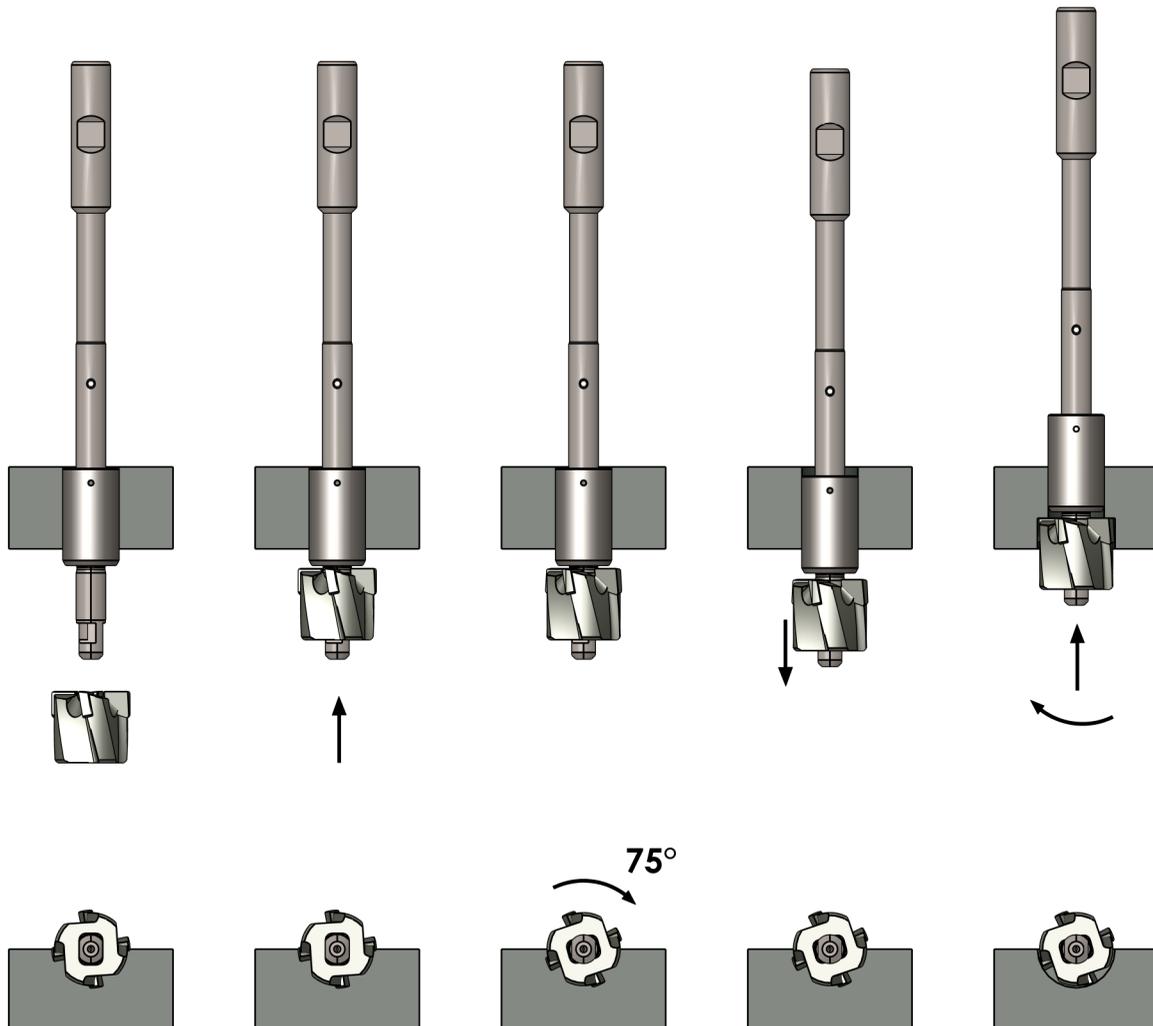
TUH Morse Taper shank holders available with fastening thread on request



Cutting Data Recommendations:

		Mild Steel	Prehardened Steel	Stainless Steel	Cast Iron	Aluminum
HSS	Speed (SFM)	50-70	50-70	25-40	<i>Not Recommended</i>	65-230
HM / Carbide	Speed (SFM)	130-260	100-230	100-230	160-300	130-260
Ø10.0-20.0 (.393-.787)	Feed Rate (IPR)	.0035-.008	.0035-.008	.003-.008	.004-.008	.004-.010
Ø21.0-36.0 (.827-1.417)	Feed Rate (IPR)	.006-.012	.005-.010	.004-.010	.006-.012	.006-.012
Ø37.0-54.0 (1.457-2.125)	Feed Rate (IPR)	.008-.013	.006-.012	.005-.012	.010-.015	.010-.015
Ø55.0-115.0 (2.165-4.528)	Feed Rate (IPR)	.008.013	.007-.014	.006-.012	.012-.024	.012-.024

Operating Sequence:

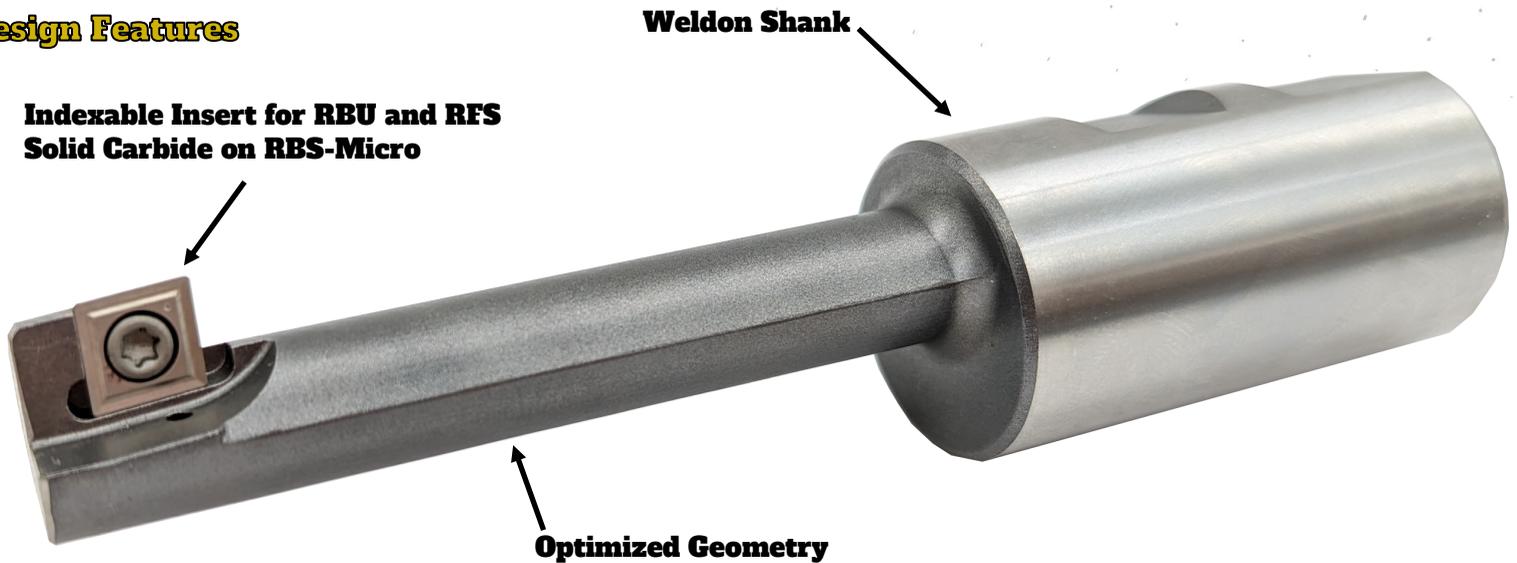


Offset Entry Back Counterboring

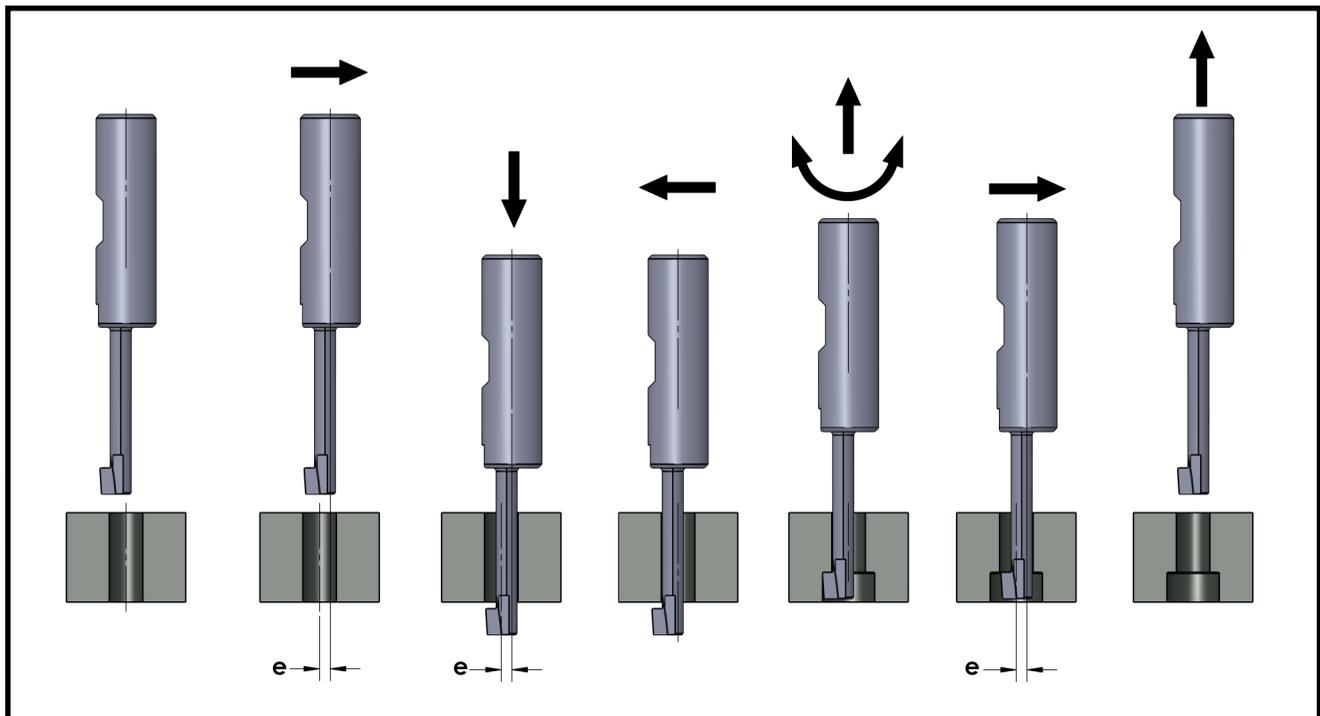
Advantages:

- For spotfacing, chamfering and deep counterboring of areas with difficult access
- For screw head counterbores M3 to M48 in common materials.
- For counterboring up to 1.9 times the bore diameter
- RBU and RFS are very stable and rigid with surface treatment and FEM-optimized geometry.
- Internal Coolant for RBU and RFS starting from $d=18$
- Wide choice of different PCD, Carbide and Indexable inserts
- For requests of specials, ex. larger cutting width, solid carbide or heavy metal, adjustable, radius cutting, grooving and chamfering, please visit www.steiner technologies.com

Design Features



Operation Sequence

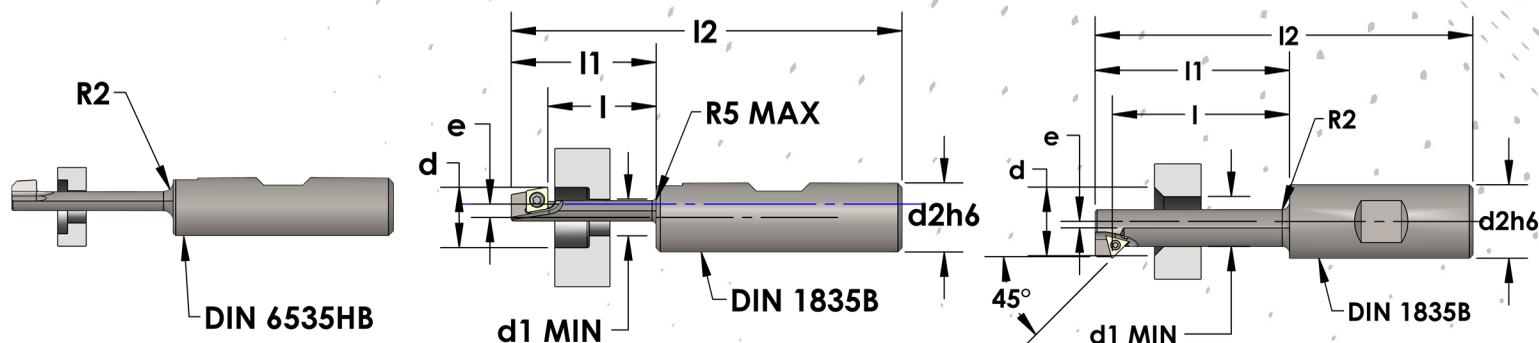


Counterbore Ø | 6.5mm (0.256in) - 50mm (1.969in)

RBSM (Micro Reverse Boring Bar)

RBU (Reverse Boring Bar)

RFS (Reverse Chamfering)



RBSM/RBU/RFS

RBS-Micro: RBSM (Solid carbide, counter clockwise)							
d	d _{1min}	l	d ₂	e	l ₁	l ₂	Order Number
6.5	3.4	12	8	1.7	15.4	51.4	RBSM 34065
8	4.5	19	10	1.9	23	63	RBSM 45080
10	5.5	23	12	2.4	28	73	RBSM 55100
11	6.6	28	12	2.4	33	78	RBSM 66110
15	9	35	16	3.0	42	90	RBSM 90150

RBS-Ultra: RBU (Indexable insert version, counter clockwise)										
d	d _{1min}	l	d ₂	e	l ₁	l ₂	Order Number	*	**	**
15	9	35	20	3.2	45	95	RBU150090035			
18	10.5	40	20	4	52	102	RBU180105040	TX 25050	TX 108-25	06
20	13	45	20	3.7	57	107	RBU200130045	TX 25050	TX 108-25	06
24	15	55	25	4.7	67	123	RBU240150055	TX 25050	TX 108-25	06
26	17	55	25	4.7	67	123	RBU260170055	TX 25050	TX 108-25	06
30	19	65	25	6	77	133	RBU300190065	TX 25050	TX 108-25	06
33	21	70	32	6.5	85	145	RBU330210070	TX 35075	TX 115-35	09
36	23	75	32	7	90	150	RBU360230075	TX 35075	TX 115-35	09
40	25	85	32	8	100	160	RBU400250085	TX 35075	TX 115-35	09
43	30	90	32	7	115	175	RBU430300090	TX 35075	TX 115-35	09
46	30	90	32	8.5	115	175	RBU460300090	TX 35075	TX 115-35	09
48	33	105	32	8	130	190	RBU480330105	TX 35075	TX 115-35	09
50	33	105	32	9	130	190	RBU500330105	TX 35075	TX 115-35	09

RFS (Indexable insert version, clockwise)										
d	d _{1min}	l	d ₂	e	l ₁	l ₂	Order Number	*	**	**
15	10	42	16	2.7	48	96	RFS 01 1015			
20	14	48	20	3.2	53	103	RFS 01 1420	TX 20048	TX 206	06
23	17.5	57	25	3	67	123	RFS 01 1723	TX 22060	TX 207	09
27	21	78	25	3.5	87	143	RFS 01 2127	TX 22060	TX 207	09
31	24	88	25	4	97	153	RFS 01 2431	TX 22060	TX 207	09

* Included with Order Number

** Order Separately

Indexable Inserts for RBU and RFS

RBU		Order Number	Grade									
Precision ground		06	MCEX060204FRH...	AK1		K9	KHX+	P5	P9	PHX+	S6	
indexable inserts		09	MCEX090304FRH...	AK1		K9	KHX+	P5	P9	PHX+	S6	
Precision PCD Inserts		06	MCEW060204FR5...									D1
		09	MCEW090304FR5...									
ISO Indexable Inserts		04	CPGT04T1043...					P5	P9			
		06	MCMT060204EN...			K9	KHX+	P5	P9	PHX+		
		09	MCMT090304EN...			K9	KHX+	P5	P9	PHX+		
RFS		Order Number	Grade									
Precision ground		6	TCEW060104FN...		K1	K9						
Indexable inserts		9	TCEW090204FN...		K1	K9						
Precision ground		6	TCEX060104FL...	AK1	K1	K9						
Indexable inserts		9	TCEX090204FL...	AK1	K1				P9		S6	
ISO Indexable Inserts		9	TCMT090204EN...			K9						

Grades								
Grade	DIN ISO 513	Cutting Material	Steel	Stainless Steel	Cast Iron	Nonferrous Metals	Nickel and Titanium Alloys	Hard Materials
D1	DP-N20	PKD/PCD				+		
AK1	HF-N20	HM/Carbide			o	+	o	
KHX+	HC-K05	HM/Carbide - AlTiN (6µm)		o	++			+
K1	HF-K20	HM/Carbide			+			
K9	HC-K10	HM/Carbide - TiAlN			+			
P2	HF-P30	HM/Carbide	+					
P5	HC-K40/P40	HM/Carbide - TiN	+	+	o			o
P9	HC-P10	HM/Carbide - TiAlN	+	+	o		+	
PHX+	HC-PC5	Carbide - AlTiN (6µm)	++	++	o			
S6	-	HSSE-TiN	+	+	o			

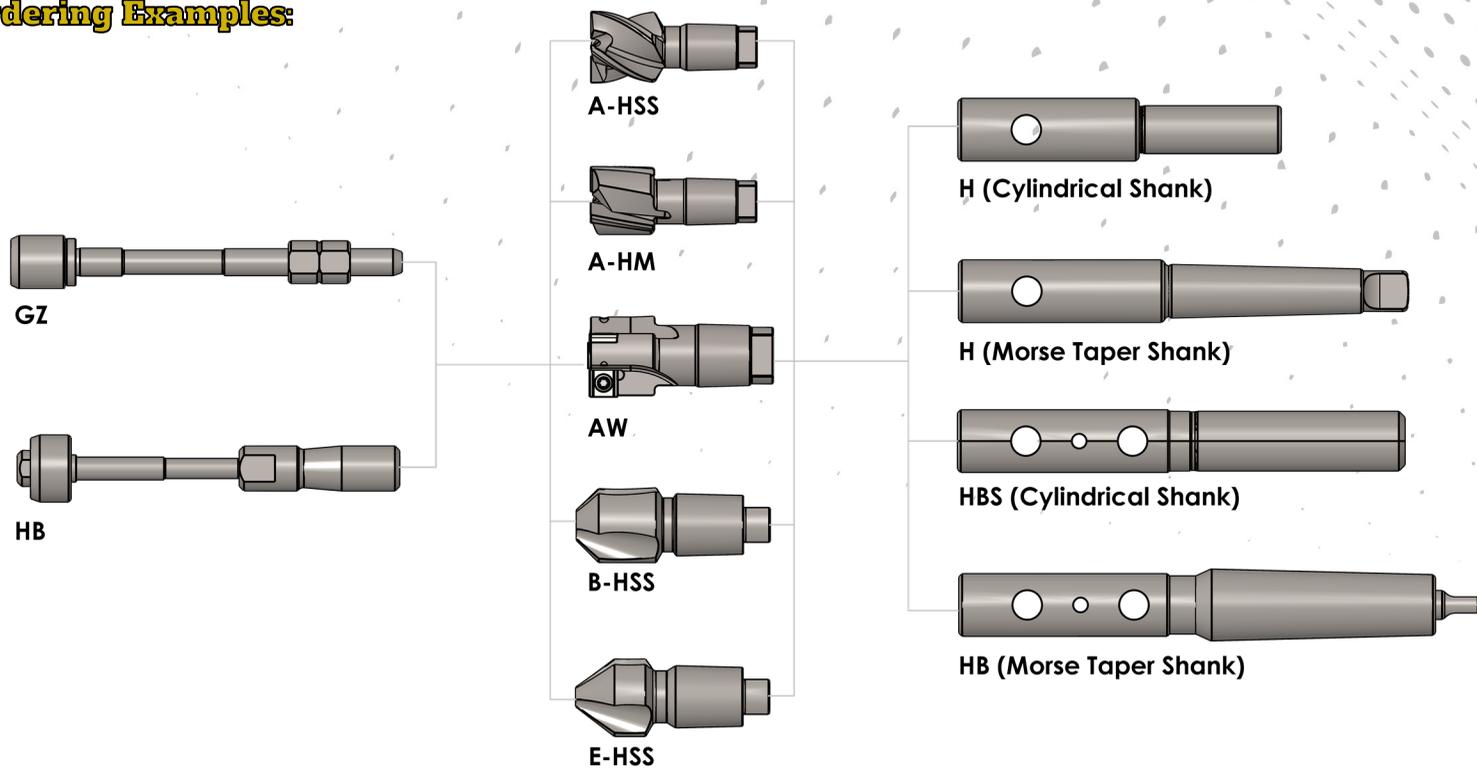
"+" = Main Application "o" = Minor application

Cutting Data Recommendations:

		Mild Steel	Prehardened Steel	Stainless Steel	Cast Iron	Aluminum
HSS	Speed (SFM)	65-130	50-100	50-80	<i>Not Recommended</i>	<i>Not Recommended</i>
HM / Carbide	Speed (SFM)	295-395	330-390	160-300	260-450	330-490
∅6.5-11.0 (.255-.433)	Feed Rate (IPR)	.002-.004	.002-.003	.001-.002	.0015-.004	.002-.006
∅15.0-30.0 (.590-1.181)	Feed Rate (IPR)	.001-.004	.001-.003	.001-.004	.0015-.005	.002-.006
∅33.0-76.0 (1.300-2.992)	Feed Rate (IPR)	.0025-.005	.002-.005	.0025-.005	.003-.006	.003-.007

Modular Front Counterboring

Ordering Examples:

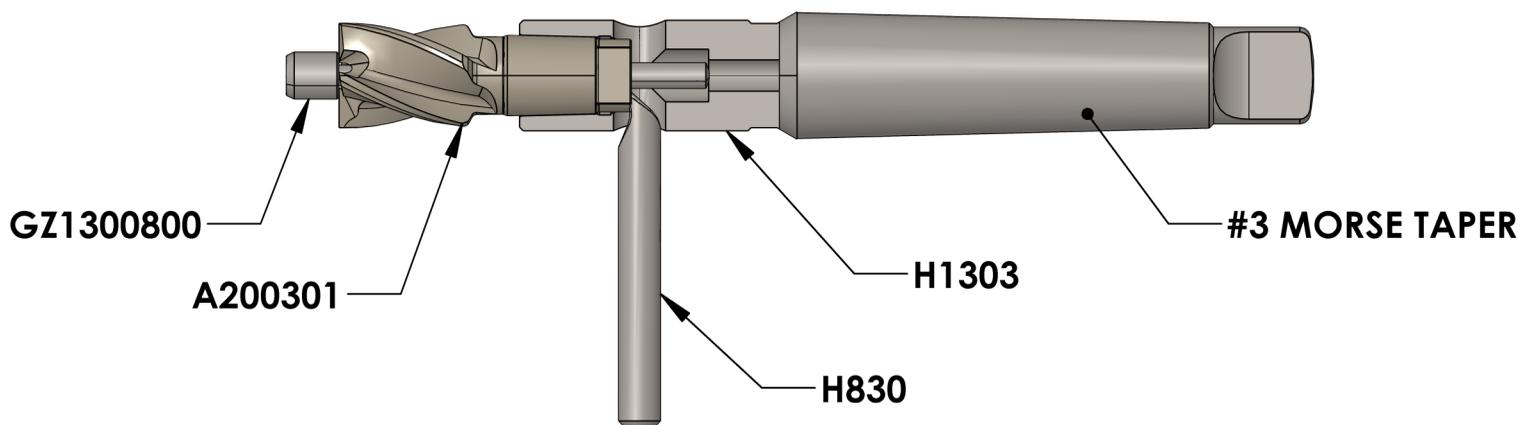


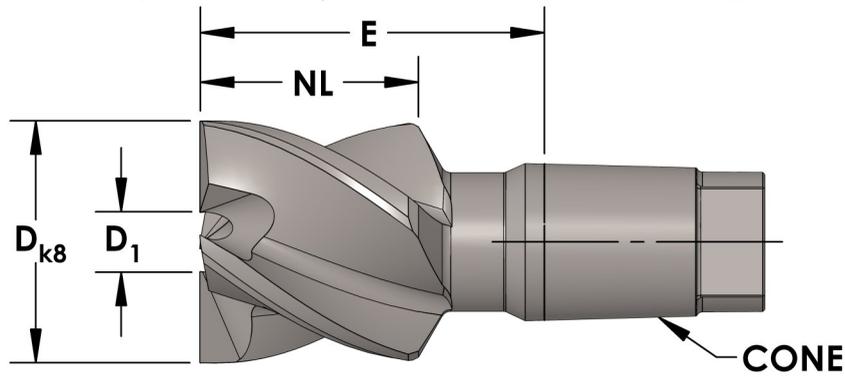
Ordering Example for counterbore with **Cone size = 3**

- Counterbore HSS D=20mm A200301**
- Pilot Set D=8mm GZ1300800**
- Holder with Shank MK3 H1303**
- Extractor H830**

Counterbores with pilots can be locked in the holder. (e.g. in machining centers) by use of HB-/HBS- holders, HB-pilots and extractor closer HB.

All Parts of the Same Cone Size Can Be Combined





Counterbore A-HSS

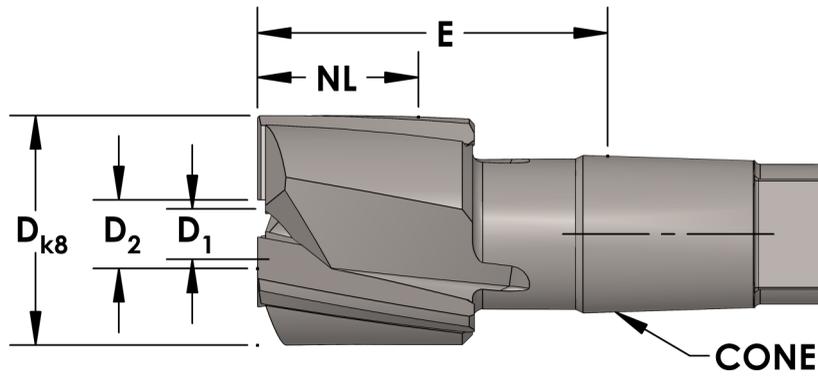
A-HSS															
D	Cone Size	Order Number	D ₁	D	Cone Size	Order Number	D ₁	D	Cone Size	Order Number	D ₁	D	Cone Size	Order Number	D ₁
4.5	00	A045001	1.7	14.3	1	A143101	3.0	28.0	4	A280401	6.0	48.0	5.5	A480551	9.0
4.8	00	A048001	1.7	14.5	1	A145101	3.0	28.5	4	A285401	6.0	49.0	5.5	A490551	9.0
5.0	00	A050001	1.7	14.5	2	A145201	4.0	29.0	4	A290401	6.0	50.0	5.5	A500551	9.0
5.5	00	A055001	1.7	15.0	1	A150101	3.0	30.0	4	A300401	6.0	51.0	5.5	A510551	9.0
5.8	01	A058011	2.0	15.0	2	A150201	4.0	31.0	4	A310401	6.0	52.0	5.5	A520551	9.0
5.9	01	A059011	2.0	15.5	2	A155201	4.0	32.0	4	A320401	6.0	53.0	5.5	A530551	9.0
6.0	01	A060011	2.0	16.0	1	A160101	3.0	33.0	4	A330401	6.0	54.0	5.5	A540551	9.0
6.3	01	A063011	2.0	16.0	2	A160201	4.0	34.0	5	A340501	8.0	55.0	5.5	A550551	9.0
6.4	01	A064011	2.0	16.5	1	A165101	3.0	35.0	5	A350501	8.0	56.0	5.5	A560551	9.0
6.5	01	A065011	2.0	16.5	2	A165201	4.0	36.0	5	A360501	8.0	57.0	5.5	A570551	9.0
6.8	01	A068011	2.0	17.0	2	A170201	4.0	37.0	5	A370501	8.0	58.0	6	A580601	10.0
7.0	02	A070021	2.5	17.5	2	A175201	4.0	38.0	5	A380501	8.0	59.0	6	A590601	10.0
7.4	02	A074021	2.5	18.0	2	A180201	4.0	39.0	5	A390501	8.0	60.0	6	A600601	10.0
7.5	02	A075021	2.5	18.0	3	A180301	5.0	40.0	5	A400501	8.0	61.0	6	A610601	10.0
8.0	02	A080021	2.5	18.5	3	A185301	5.0	41.0	5	A410501	8.0	62.0	6	A620601	10.0
8.3	02	A083021	2.5	19.0	2	A190201	4.0	42.0	5	A420501	8.0	63.0	6	A630601	10.0
8.4	02	A084021	2.5	19.0	3	A190301	5.0	43.0	5	A430501	8.0	64.0	6	A640601	10.0
8.5	02	A085021	2.5	20.0	2	A200201	4.0	44.0	5	A440501	8.0	65.0	6	A650601	10.0
9.0	1	A090101	3.0	20.0	3	A200301	5.0	45.0	5	A450501	8.0	66.0	6	A660601	10.0
9.4	1	A094101	3.0	20.5	3	A205301	5.0	46.0	5.5	A460551	9.0	67.0	6	A670601	10.0
9.5	1	A095101	3.0	21.0	3	A210301	5.0	47.0	5.5	A470551	9.0				
10.0	1	A100101	3.0	22.0	2	A220201	4.0								
10.4	1	A104101	3.0	22.0	3	A220301	5.0								
10.5	1	A105101	3.0	22.5	3	A225301	5.0								
11.0	1	A110101	3.0	23.0	3	A230301	5.0								
11.5	1	A115101	3.0	23.0	4	A230401	6.0								
12.0	1	A120101	3.0	24.0	3	A240301	5.0								
12.5	1	A125101	3.0	24.0	4	A240401	6.0								
13.0	1	A130101	3.0	25.0	3	A250301	5.0								
13.0	2	A130201	4.0	25.0	4	A250401	6.0								
13.5	1	A135101	3.0	26.0	3	A260301	5.0								
13.5	2	A135201	4.0	26.0	4	A260401	6.0								
14.0	1	A140101	3.0	27.0	4	A270401	6.0								
14.0	2	A140201	4.0	28.0	3	A280301	5.0								

A-HSS: Dimensions			
Size	E	NL	Rake Angle
00/01/02	23	8	25°
1	25	12	30°
2	30	14	
3	34	16	
4	38	18	
5	39	20	
5.5	40	24	25°
6	39	24	

Other dimensions, sizes and edge radii available upon request.

Cutting Data Recommendations:

HSS	Speed (SFM)	Steel	Stainless Steel	Cast Iron	Nonferrous Metal
		65-88	26-39	Not Recommended	55-88
Ø4.5-8.5	Feed Rate (IPR)	.002-.003	.002-.003	Not Recommended	.004-.008
Ø9.0-12.5		.004-.008	.004-.008		.008-.012
Ø13.0-22.5		.006-.016	.006-.012		.010-.016
Ø23.0-45.0		.010-.020	.008-.016		.012-.020
Ø46.0-67.0		.016-.028	.012-.024		.016-.028



Counterbore A-HM (Carbide Tipped)

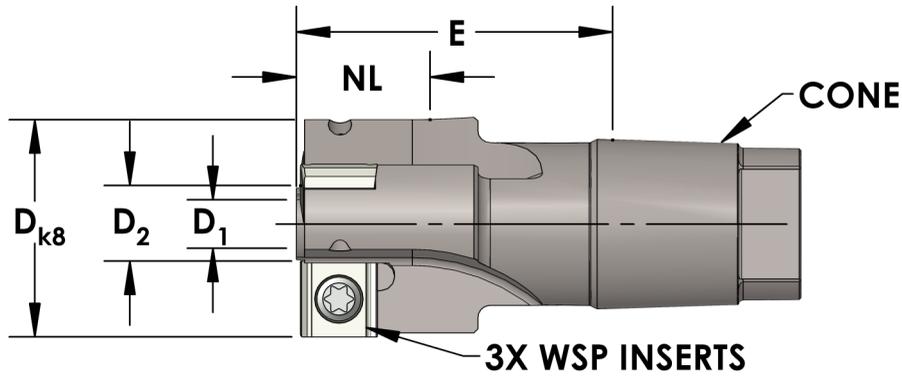
A-HM															
D	Cone Size	Order Number	D ₁	D	Cone Size	Order Number	D ₁	D	Cone Size	Order Number	D ₁	D	Cone Size	Order Number	D ₁
5.9	01	A059015	2.4	16.5	2	A165205	5.5	36.0	5	A360505	10.6	52.0	5.5	A520555	12.7
6.0	01	A060015	2.4	17.0	2	A170205	5.5	37.0	5	A370505	10.6	53.0	5.5	A530555	12.7
6.3	01	A063015	2.4	17.5	2	A175205	5.5	38.0	5	A380505	10.6	54.0	5.5	A540555	12.7
6.4	01	A064015	2.4	18.0	2	A180205	5.8	39.0	5	A390505	10.6	55.0	5.5	A550555	12.7
6.5	01	A065015	2.4	18.0	3	A180305	6.6	40.0	5	A400501	10.6	56.0	5.5	A560555	12.7
6.8	01	A068015	2.4	18.5	3	A185305	6.6	41.0	5	A410505	10.6	57.0	5.5	A570555	12.7
7.0	02	A070025	3.0	19.0	2	A190205	5.8	42.0	5	A420505	10.6	58.0	6	A580605	13.8
7.4	02	A074025	3.0	19.0	3	A190305	6.6	43.0	5	A430505	10.6	59.0	6	A590605	13.8
7.5	02	A075025	3.0	20.0	2	A200205	5.8	44.0	5	A440505	10.6	60.0	6	A600605	13.8
8.0	02	A080025	3.0	20.0	3	A200305	6.6	45.0	5	A450505	10.6	61.0	6	A610605	13.8
8.4	02	A084025	3.0	20.5	3	A205305	6.6	46.0	5.5	A460555	12.7	62.0	6	A620605	13.8
8.5	02	A085025	3.0	21.0	3	A210305	6.6	47.0	5.5	A470555	12.7	63.0	6	A630605	13.8
9.0	1	A090105	4.0	22.0	2	A220205	5.8	48.0	5.5	A480555	12.7	64.0	6	A640605	13.8
9.4	1	A094105	4.0	22.0	3	A220305	6.6	49.0	5.5	A490555	12.7	65.0	6	A650605	13.8
10.0	1	A100105	4.0	22.5	3	A225305	6.6	50.0	5.5	A500555	12.7	66.0	6	A660605	13.8
10.4	1	A104105	4.0	23.0	3	A230305	6.8	51.0	5.5	A510555	12.7	67.0	6	A670605	13.8
11.0	1	A110105	4.0	23.0	4	A230405	7.7								
11.5	1	A115105	4.0	24.0	3	A240305	6.8								
12.0	1	A120105	4.0	24.0	4	A240405	7.7								
12.5	1	A125105	4.0	25.0	3	A250305	6.8								
13.0	1	A130105	4.6	25.0	4	A250405	7.7								
13.0	2	A130205	5.5	26.0	3	A260305	6.8								
13.5	1	A135105	4.6	26.0	4	A260405	7.7								
13.5	2	A135205	5.5	27.0	4	A270405	7.7								
14.0	1	A140105	4.6	28.0	3	A280305	6.8								
14.0	2	A140205	5.5	28.0	4	A280405	7.7								
14.5	1	A145105	4.6	28.5	4	A285405	7.7								
14.5	2	A145205	5.5	29.0	4	A290405	7.7								
15.0	1	A150105	4.6	30.0	4	A300405	7.7								
15.0	2	A150205	5.5	31.0	4	A310405	7.7								
15.5	2	A155205	5.5	32.0	4	A320405	7.7								
16.0	1	A160105	4.6	33.0	4	A330405	7.7								
16.0	2	A160205	5.5	34.0	5	A340505	10.6								
16.5	2	A165105	4.6	35.0	5	A350505	10.6								

A-HM: Dimensions			
Size	E	NL	Rake Angle
01/02	23	8	8°
1	25	12	12°
2	30	14	
3	34	16	
4	38	18	
5	39	20	
5.5	40	24	
6	39	24	

Other dimensions, sizes and edge radii available upon request.

Cutting Data Recommendations:

HM	Speed (SFM)	Steel	Stainless Steel	Cast Iron	Nonferrous Metal
		131-295	65-164	131-328	196-492
∅5.0-8.5	Feed Rate (IPR)	Not Recommended	Not Recommended	.002-.004	.002-.004
∅9.0-12.0		Not Recommended	Not Recommended	.004-.008	.004-.008
∅13.0-22.5		.004-.010	.004-.010	.008-.012	.008-.012
∅23.0-45.0		.008-.020	.008-.020	.012-.020	.012-.020
∅46.0-67.0		.010-.020	.010-.020	.016-.024	.016-.028



Counterbore AW (With Indexable Inserts)

AW										D	E	NL	Screw	Wrench
20	3	AW20000	7.5	6	44	5	AW44000	20	12	20-27	35	22	TX25050	TX108-25
21	3	AW21000	8.5	6	45	5	AW45000	21	12	28-33	39	22	TX35075	TX115-35
22	3	AW22000	9.5	6	46	5.5	AW46000	22	12	34-39	40	25	TX35075	TX115-35
23	4	AW23000	10.5	6	47	5.5	AW47000	23	12	40-45	40	25	TX45115	TX115-45
24	4	AW24000	11.5	6	48	5.5	AW48000	24	12	46-49	42	28	TX45115	TX115-45
25	4	AW25000	12.5	6	49	5.5	AW49000	25	12	50-57	42	28	TX45135	TX115-45
26	4	AW26000	13.5	6	50	5.5	AW50000	21	15	58-67	41	28	TX45135	TX115-45
27	4	AW27000	14.5	6	51	5.5	AW51000	22	15					
28	4	AW28000	9.2	9	52	5.5	AW52000	23	15					
29	4	AW29000	10.2	9	53	5.5	AW53000	24	15					
30	4	AW30000	11.2	9	54	5.5	AW54000	25	15					
31	4	AW31000	12.2	9	55	5.5	AW55000	26	15					
32	4	AW32000	13.2	9	56	5.5	AW56000	27	15					
33	4	AW33000	14.2	9	57	5.5	AW57000	28	15					
34	5	AW34000	15.2	9	58	6	AW58000	29	15					
35	5	AW35000	16.2	9	59	6	AW59000	30	15					
36	5	AW36000	17.2	9	60	6	AW60000	31	15					
37	5	AW37000	18.2	9	61	6	AW61000	32	15					
38	5	AW38000	19.2	9	62	6	AW62000	33	15					
39	5	AW39000	20.2	9	63	6	AW63000	34	15					
40	5	AW40000	16	12	64	6	AW64000	35	15					
41	5	AW41000	17	12	65	6	AW65000	36	15					
42	5	AW42000	18	12	66	6	AW66000	37	15					
43	5	AW43000	19	12	67	6	AW67000	38	15					

* Round ground guiding chamfers on the insert helps to prevent chattering and burnish the bore surface. Well suited for lean tools with 3 or more cutting edges.

** Low cutting and short chip breakers generate short chips already at low feed rates. Well suited for long chipping materials.

Other dimensions, sizes and edge radii available upon request.

AW Boring Inserts		Size	Order Number	Grade						
Ground Chip Breakers		06	SCHX060204 FRH...	AK1	K1	K9	P2	P5	P9	
		09	SCHX090304 FRH...	AK1	K1	K9	P2	P5	P9	S6
		12	SCHX120404 FRH...	AK1	K1	K9	P2	P5	P9	S6
		15	SCHX150604 FRH...	AK1		K9		P5	P9	S6
Guiding Chamfers* Ground Chip Breakers		06	SCHX060204 FRZ...	AK1	K1	K9	P2	P5	P9	S6
		09	SCHX090304 FRZ...	AK1	K1	K9	P2	P5	P9	S6
		12	SCHX 120404 FRZ...	AK1	K1	K9	P2	P5	P9	S6
		15	SCHX 150604 FRZ...	AK1	K1	K9	P2	P5	P9	S6
Guiding Chamfers* Chip Breakers** for short chip		06	SCHX060204 FRZ7...						P9	
		09	SCHX090304 FRZ7...						P9	
		12	SCHX120404 FRZ7...						P9	
AW Spotfacing Inserts		Size	Order Number	Grade						
Without Chip Breakers		06	SCHW060204 FN...		K1	K9				
		09	SCHW090304 FN...		K1	K9	P2			
4 Ground Chip Breakers		06	SCHX060202 FN1...		K1		P2	P5		
		09	SCHX090304 FN1...		K1		P2	P5		
4 Sintered Chip Breakers		06	SCMT060204 EN...		K1	K9	P2	P5		
		09	SCMT090304 EN...		K1	K9	P2	P5		
		12	SCMT120404 EN...		K1	K9		P5		
		15	SCMT150604 EN...		K1	K9		P5		

AW Inserts (...Continued)

AW Indexable Insert Grades								
Grade	DIN ISO 513	Cutting Material	Steel	Stainless Steel	Cast Iron	Nonferrous Metals	Nickel and Titanium Alloys	Hard Materials
AK1	HF-N20	HM/Carbide			o	+	o	
K1	HF-K20	HM/Carbide			+			
K9	HC-K10	HM/Carbide - TiAlN		o	+			o
P2	HF-P30	HM/Carbide	+					
P5	HC-K40/P40	HM/Carbide - TiN	+	+	o			
P9	HC-P10	HM/Carbide - TiAlN	+	+	o			o
S6	-	HSSE-TiN	+	+	o		+	

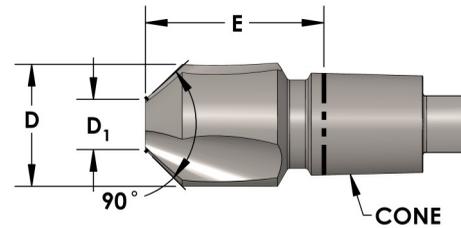
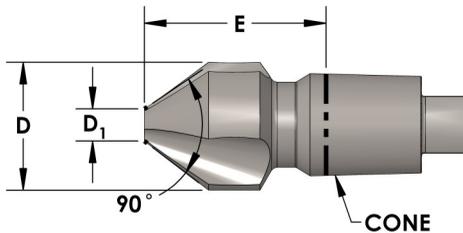
"+" = Main Application

"o" = Minor application

AW Cutting Data Recommendations:

		Steel	Stainless Steel	Cast Iron	Nonferrous Metal
HM/Carbide	Speed (SFM)	196-492	131-295	196-492	328-640
HSSE (S6)	Speed (SFM)	82-164	49-114	<i>Not Recommended</i>	<i>Not Recommended</i>
Ø20-30	Feed Rate (IPR)	.005-.012	.004-.008	.006-.012	.008-.014
Ø31-45		.008-.014	.006-.010	.010-.020	.010-.020
Ø46-67		.010-.016	.008-.012	.012-.024	.012-.024

Countersink E-HSS / B-HSS



E-HSS 90°									
D	Cone Size	Order Number	D ₁	E	D	Cone Size	Order Number	D ₁	E
8	0	E080901	2	23	25	3	E250901	6	39
12	1	E120901	3	25	30	4	E300901	8	39
15	2	E150901	4	30	45	5	E450901	15	40
20	3	E200901	5	34	60	6	E600901	25	39

Rake Angle: 20°

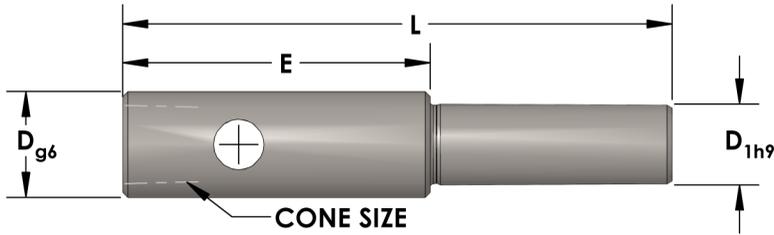
B-HSS 90° With Pilots Used									
D	Cone Size	Order Number	D ₁	E	D	Cone Size	Order Number	D ₁	E
9.4	1	B09411	4.8	20	23	4	B23011	9.8	32
10.0	1	B10011	4.8	20	25	4	B25011	9.8	32
10.4	1	B10411	4.8	20	26	4	B26011	9.8	32
11.5	1	B11511	4.8	20	28	4	B28011	9.8	32
12.4	1	B12411	4.8	20	30	4	B30011	9.8	32
13.4	1	B13411	5.8	20	31	4	B31011	9.8	32
15.0	2	B15011	5.8	21	34	5	B34011	14.8	40
16.5	2	B16511	5.8	21	37	5	B37011	14.8	40
19.0	3	B19011	7.8	27	46	5	B46011	15	40
20.5	3	B20511	7.8	27					

Rake Angle: 20°

E-HSS / B-HSS Cutting Data Recommendations:

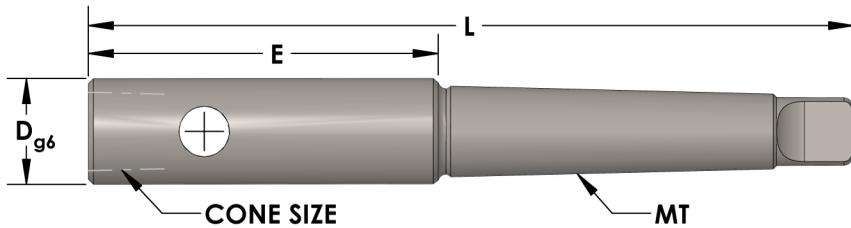
		Steel	Stainless Steel	Cast Iron	Nonferrous Metal
HSS	Speed (SFM)	65-88	26-39	<i>Not Recommended</i>	58-89
Ø8-12.5	Feed Rate (IPR)	.002-.004	.002-.004	<i>Not Recommended</i>	.002-.004
Ø13-22.5		.003-.006	.003-.006		.003-.006
Ø23-45		.004-.010	.004-.008		.005-.012
Ø46-60		.008-.012	.006-.012		.006-.014

Holder H



H (Cylindrical Shank)							
Cone Size	D	D ₁	E	L	Order Number	Ejector H	Ejector HB
0	9.0	6	24	59	H1000		HB900
			50	85	H2000*		
1	12.5	8	25	76	H1100	HB10	HB910
				114	H2100*		
2	17.0	10	30	91	H1200	HB20	HB920
3	21.0	12	34	109	H1300	HB30	HB930
4	28.0	14	30	112	H1400	HB40	HB940
5	32.0	16	34	125	H1500	HB50	HB950

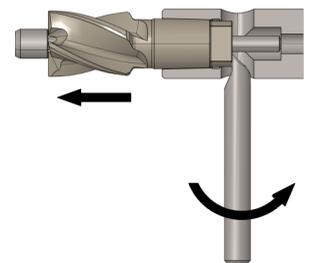
* Long version



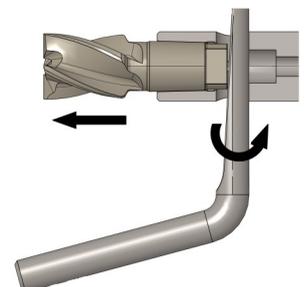
H (Morse Taper Shank)							
Cone Size	D	MT	E	L	Order Number	Ejector H	Ejector HB
1	12.5	1	42	104	H1101	H810	HB910
			80	142	H2101*		
2	17.0	1	47	109	H1201	H820	HB920
			90	152	H2201*		
		2	49	124	H1202		
			92	167	H2202*		
3	21.0	1	55	117	H1301	H830	HB930
			108	170	H2301*		
		2	57	132	H1302		
			110	185	H2302*		
			58	152	H1303		
4	28.0	2	60	135	H1402	H840	HB940
			115	190	H2402*		
		3	61	115	H1403		
			116	210	H2403*		
5	32.0	2	73	148	H1502	H850	HB950
			3	74	168		
		141		235	H2503*		
5.5	37.0	3	84	178	H1553	H855	HB955
			161	255	H2553*		
		4	85	203	H1554		
6	42.0	3	86	180	H1603	H860	HB960
			4	87	205		

* Long version

EJECTOR H FOR COUNTERBORE WITH PILOT



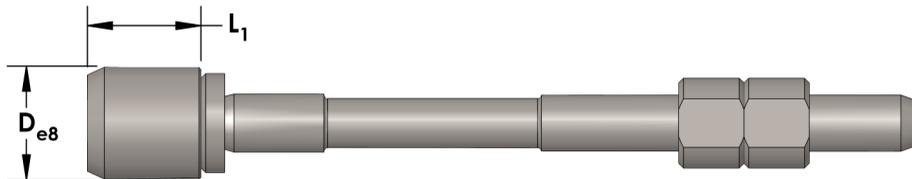
EJECTOR HB FOR COUNTERBORE WITHOUT PILOT





GZ (Pilots, cone size 01-02)			
Cone Size	D	L ₁	Order Number
01	4.0	5.5	GZ3010400
02	3.0		GZ3020300
	4.0		GZ3020400
	4.5		GZ3020450
	5.0		GZ3020500

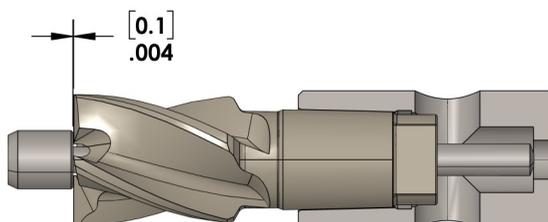
Other diameters upon request



GZ (Pilots, cone size 1-5) Consisting of pilot, washer and 2 screws nuts GZ															
Cone Size	D	L ₁	Order Number	Cone Size	D	L ₁	Order Number	Cone Size	D	L ₁	Order Number	Cone Size	D	L ₁	Order Number
1	4.5	7	GZ1100450	1	9.0	7	GZ1100900	3	6.0	10	GZ1300600	4	9.0	12	GZ1400900
	4.8		GZ1100480		4.0		GZ1200400		6.5		GZ1300650		10.0		GZ1401000
	5.0		GZ1100500		5.0		GZ1200500		7.0		GZ1300700		10.5		GZ1401050
	5.5		GZ1100550		6.0		GZ1200600		8.0		GZ1300800		11.0		GZ1401100
	5.7		GZ1100570		6.3		GZ1200630		8.5		GZ1300850		11.5		GZ1401150
	5.8		GZ1100580		6.5		GZ1200650		9.0		GZ1300900		12.0		GZ1401200
	5.9		GZ1100590		7.5		GZ1200750		9.5		GZ1300950		13.0		GZ1401300
	6.0		GZ1100600		8.0		GZ1200800		10.0		GZ1301000		15.0*		GZ2401500
	6.4		GZ1100640	2	8.3	10	GZ1200830		10.5		GZ1301050	16.0*	GZ2401600		
	6.5		GZ1100650		8.4		GZ1200840		11.0*		GZ2301100	17.0*	GZ2401700		
	6.6		GZ1100660		8.5		GZ1200850		11.5*		GZ2301150	18.0*	GZ2401800		
	6.8		GZ1100680		9.0		GZ1200900		12.0*		GZ2301200	20.0*	GZ2402000		
	7.0		GZ1100700	10.0	GZ1201000	13.0*	GZ2301300		22.0*		GZ2402200				
	7.5		GZ1100750	10.7*	GZ2201070	13.5*	GZ2301350		5		8.5	18	GZ1500850		
	7.8		GZ1100780	11.0*	GZ2201100	14.0*	GZ2301400				10.2		GZ1501020		
	8.0		GZ1100800	11.6*	GZ2201160	8.0	GZ1400800				15.0		GZ1501500		
8.5	GZ1100850	3	5.0	10	GZ1300500	8.5	GZ1400850	17.0	GZ1501700						

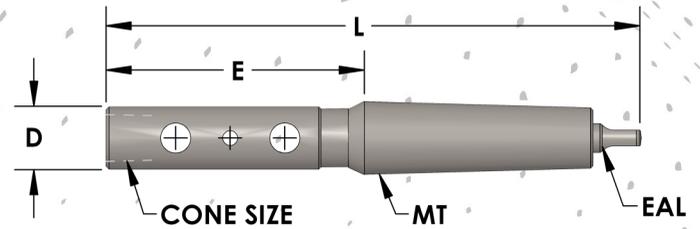
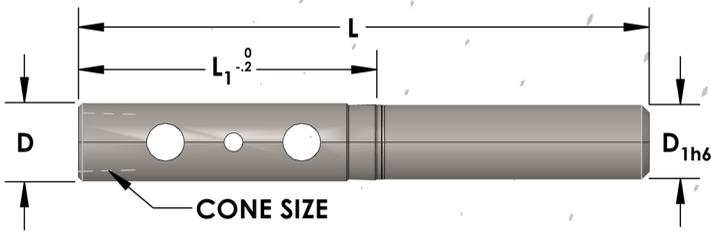
* Two parts

Installation Information



Disc should be assembled with 0.1mm space between pilot and counterbore to protect carbide

Holder HBS/HB



HBS (Cylindrical Shank)						
Cone Size	D	D ₁	L ₁	L	Order Number	Ejector HB
1	12	8	59	95	HBS1008	HB910
2	18	10	69	109	HBS2010	HB920
3	21	12	81	126	HBS3012	HB930
4	28	14	93	138	HBS4014	HB940
5	32	16	107	155	HBS5016	HB950
5.5	37	20	112	162	HBS5520*	HB955

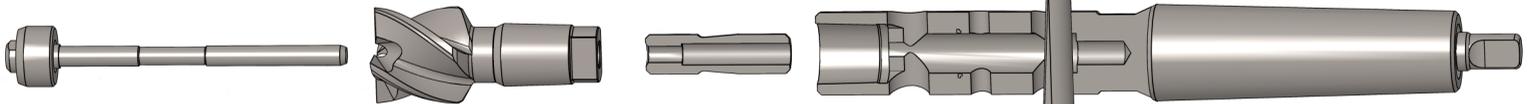
HBS (Morse Taper Shank)							
Cone Size	D	MK	E	L	Order Number	EAL**	Ejector HB
1	12.5	1	65	127	HB1101		HB910
2	18.0	1	75	137	HB1201		HB920
		2	77	152	HB1202	EAL012	
3	21.0	1	87	149	HB1301		HB930
		2	89	164	HB1302	EAL012	
		3	90	184	HB1303	EAL013	
4	28.0	2	101	176	HB1402	EAL012	HB940
		3	102	196	HB1403	EAL013	
5	32.0	2	115	190	HB1502	EAL012	HB950
		3	116	210	HB1503	EAL013	
5.5	37.0	4	117	235	HB1504	EAL014	HB955
		3	121	215	HB1553	EAL013	
6	42.0	4	122	240	HB1554	EAL014	HB955
		3	133	227	HB1603	EAL013	
6	42.0	4	134	252	HB1604	EAL014	HB960

* Weldon Shank DIN 1835-B20

** After removing EAL, Morsetaper can be secured by thread.

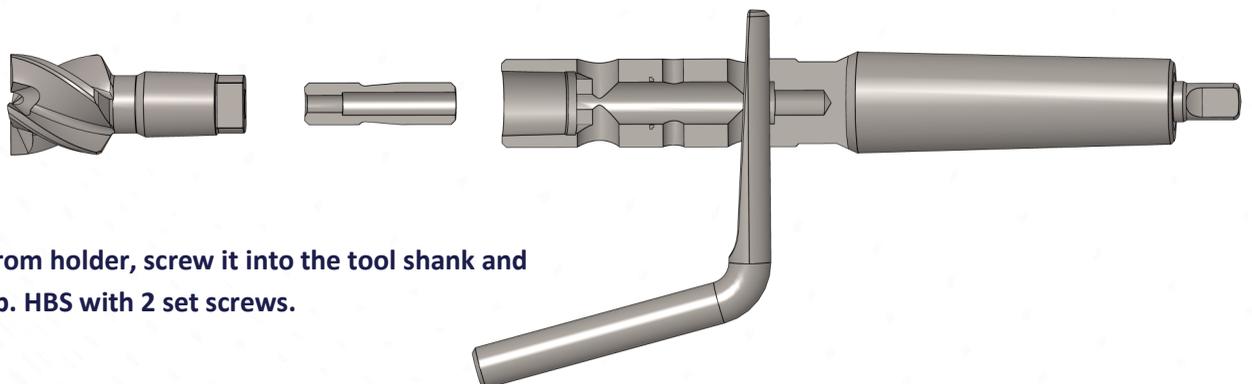
Delivery includes extractor pin HB for tool securing.

Securing Tool with pilot HB

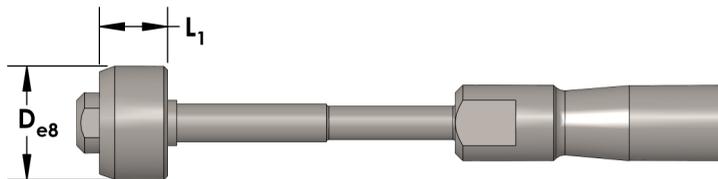


Remove parts from holder-bore. Screw extractor closer HB on the pilot HB installed in the tool and lock it in the holder HB resp. HBS with 2 set screws.

Securing Tool without pilot HB



Remove extractor pin HB from holder, screw it into the tool shank and lock it in the holder HB resp. HBS with 2 set screws.

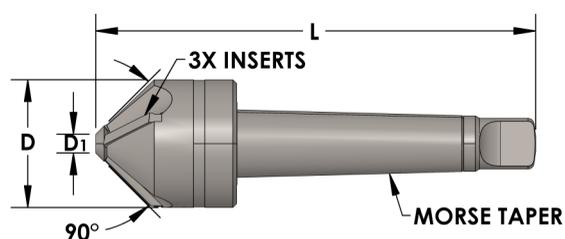
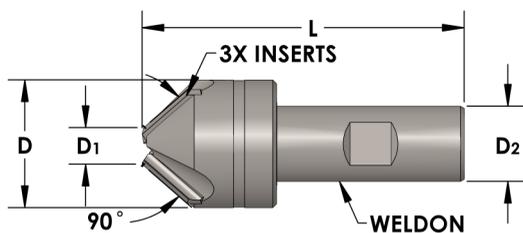


Pilots Set HB															
Consisting of pilot HB and extractor closer HB															
Cone Size	D	L ₁	Order Number	Cone Size	D	L ₁	Order Number	Cone Size	D	L ₁	Order Number	Cone Size	D	L ₁	Order Number
1	8.0	11	HB100800	2	11.6	14	HB201160	3	13.5	14	HB301350	4	18.0	17	HB401800
	8.5		HB100850		14.0		HB301400		20.0		HB402000				
	9.0		HB100900		12.0		HB401200	22.0	HB402200						
2	9.0	14	HB200900	3	10.0	14	HB301000	4	12.0	17	HB401200	5	15.0	23	HB501500
	10.0		HB201000		10.5		HB301050		13.0		HB401300		17.0		HB501700
	10.7		HB201070		11.0		HB301110		15.0		HB401500				
	11.0		HB201100		11.5		HB301150		16.0		HB401600				
					12.0		HB301200		17.0		HB401700				
			13.0	HB301300											

* Additional cone sizes and diameters available upon request

Countersink EW with changeable inserts 90°

- Universally usable for soft and hard materials.
- Relieved ground inserts for chatter free countersinking and deburring.
- Three changeable inserts are fixed by a central screw.



EWZ (Cylindrical Shank)					
D	D ₁	D ₂	L	Order Number	Inserts
35	12	20	88	EWZ3590	EW4...
50	18	25	102	EWZ5090	EW5...
80	25	32	120	EWZ8090	EW6...

EWM (Morse Taper Shank)					
D	D ₁	MK	L	Order Number	Inserts
35	12	2	125	EWM3590	EW4...
50	18	3	151	EWM5090	EW5...
80	25	4	188	EWM8090	EW6...

Changeable Inserts for EWZ and EWM				
Cutting Material				
Inserts	HF-K20	HC-P30-TiN	HSSE-TiN	for Hardox
EW4...	EW4K1	EW4P5	EW456	EW4WP9
EW5...	EW5K1	EW5P5	EW556	EW5WP9
EW6...	EW6K1	EW6P5	EW656	EW6WP9
	KN	PM	PM	H

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