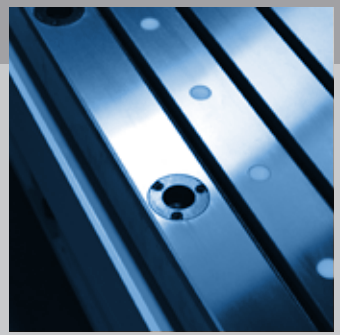
UNISIG

DEEP HOLE DRILLING SYSTEMS

PRODUCT CATALOG






UNISIG® Deep Hole Drilling Systems

Performance and value

We seek to understand our customers' needs and develop exceptional products that achieve high performance and provide value. Durability, reliability and efficient designs are the result of our experience building deep hole drilling systems for over 40 years.

More than machines

Our solutions include the necessary application expertise, automation, training and service to achieve our customers' objectives as soon as the installation is finished.

We stand behind our solutions

UNISIG has a long view of success, and we stay with our customers and solve problems. We strive to be easy to work with and adaptable while always building new strength in our people and in our business. We will be here to support our customers around the world through the life of their investment, and the next ones.

"No other company offers the full service like UNISIG - from machine, to process collaboration, through support."



Deep Hole Drilling

A deep hole is defined by its depth-to-diameter ratio (D:d) of typically 10:1 or greater, sometimes exceeding extreme depths of 400:1. Common CNC machining centers may be retrofitted to perform select deep hole drilling processes. However, this setup is limited in capabilities, requires more involved setup and risks a higher rejection rate.

UNISIG develops specialized drilling equipment, supported by years of experience designing specific machines, to solve specific needs in deep hole drilling applications. These systems, complete with advanced controls programming and precision components, are capable of accurate holes in deep hole drilling applications. Engineered components include durable tooling, which complete a machine.

Please reference pages 30-31 for additional technical information.

Common Industries Benefitting from Deep Hole Drilling

AEROSPACE
BTA or Gundrilling
B-Series, USC, USK, UNI

AUTOMOTIVE
BTA or Gundrilling
UNI

DEFENSE
BTA or Gundrilling
B-Series, USC, USK, UNI

HYDRAULICS
BTA, Gundrilling, Skiving
S-Series, B-Series, USC, USK

JOB SHOPS
Standardized Gundrilling
UNE, USK

MEDICAL
Gundrilling
UNE6, UNI

MOLD
BTA or Gundrilling
USC-M, USK, UNI

OIL & GAS
BTA or Gundrilling
B-Series, USC, USK, UNX

SPECIALIZED PRODUCTION
BTA or Gundrilling
UNE, UNI

STEEL PROCESSING
BTA
B-Series, USC

TUBE SHEETS AND ENERGY
BTA or Gundrilling
USC-TS custom machine






UNISIG Machine Guide

UNE6 Small Diameter Gundrilling Machines

for Medical Manufacturers

Medical manufacturers can maximize production by gundrilling on UNE6 machines after Swiss turning. With superior alignment and precision, you can confidently hold concentricity tolerances and minimize mismatch. UNISIG machines increase throughput and accuracy, and open up possibilities for the way critical parts are made.

STANDARD FEATURES

- Counter-rotating tool and workpiece
- Specialized workholding for small parts
- Exceptional process control
- Integral motor spindles
- Available integrated robotics
- Available worpiece pallet system
- UNISIG Smart Control Interface with program storage

	UNE6		UNE6-2i	
PERFORMANCE				
Number of spindles	1		2 independent	
Hole diameter min	0.8 mm	0.03 in	0.8 mm	0.03 in
Hole diameter max	6.0 mm	0.24 in	6.0 mm	0.24 in
Part length max	750 mm	30 in	750 mm	30 in
Tool spindle speed max	24,000 rpm		24,000 rpm	
Work spindle speed max	4,000 rpm		4,000 rpm	
Combined drilling speed max	28,000 rpm		28,000 rpm	
Coolant pressure max	207 bar	3,000 psi	207 bar	3,000 psi

Specifications are subject to change without notice | Performance ratings may vary based on actual tooling and materials used. Modular construction allows additional configurations not listed, contact UNISIG

UNE6 configurations offer single-spindle, or two independent spindle layouts, with optional robot ready or robotic automation.



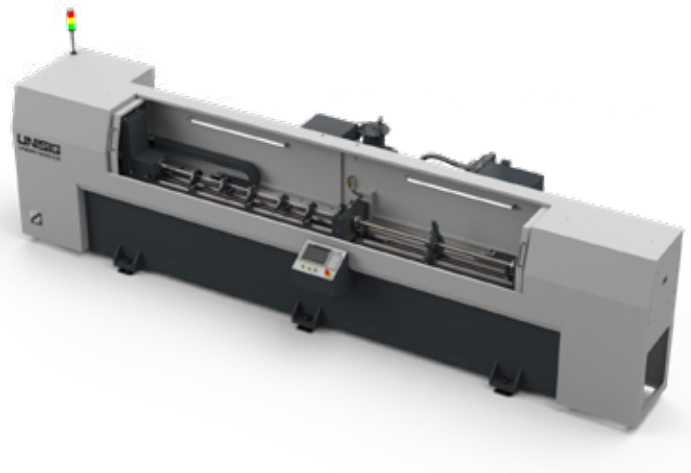


UNE Gundrilling Machines

for Job Shop and Production Environments

UNE series gundrilling machines are optimized to allow anyone to bring deep hole drilling into their machine shop.

Standard machine models balance high-performance components and engineering with a lower overall investment, to make the UNE machines a reliable compliment to CNC machining cells.



STANDARD FEATURES

- Cast iron headstock and chipbox components
- Cartridge spindles with premium quality bearings
- High precision preloaded ballscrew feed
- Programmable coolant delivery
- Digital servo drives with absolute encoders
- Process monitoring with automatic interrupt
- Part program storage with USB transfer
- Compact construction for quick installation
- Twin spindle machines have single spindle mode for extended drilling diameter range

	UNE12-2	UNE20-2	UNE25	UNE32-2	UNE40
PERFORMANCE					
Number of spindles	2	2	1	2	1
Drill diameter max	12 mm 0.5 in	20 mm 0.8 in	25 mm 1.0 in	32 mm 1.26 in	40 mm 1.57 in
Drill diameter max, single spindle mode	19 mm 0.75 in	25 mm 1.0 in	-	40 mm 1.57 in	-
Drill diameter min	1.4 mm 0.06 in	2.0 mm 0.08 in	2.0 mm 0.08 in	3.0 mm 0.12 in	3.0 mm 0.12 in
Tool max speed	12,000 RPM	8,000 RPM	8,000 RPM	6,000 RPM	6,000 RPM
Work max speed	900 RPM	600 RPM	600 RPM	400 RPM	400 RPM
Rated workpiece designation options	750 mm 29.5 in 1,000 mm 39.4 in 1,500 mm 59.1 in	750 mm 29.5 in 1,000 mm 39.4 in 1,500 mm 59.1 in	750 mm 29.5 in 1,000 mm 39.4 in 1,500 mm 59.1 in	1,000 mm 39.4 in 1,500 mm 59.1 in 2,000 mm 78.7 in 3,000 mm 118.1 in	1,000 mm 39.4 in 1,500 mm 59.1 in 2,000 mm 78.7 in 3,000 mm 118.1 in

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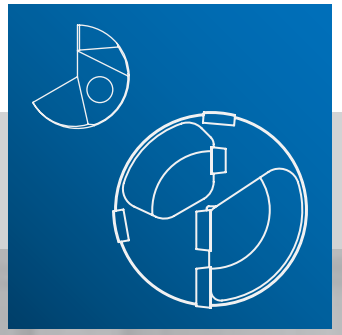


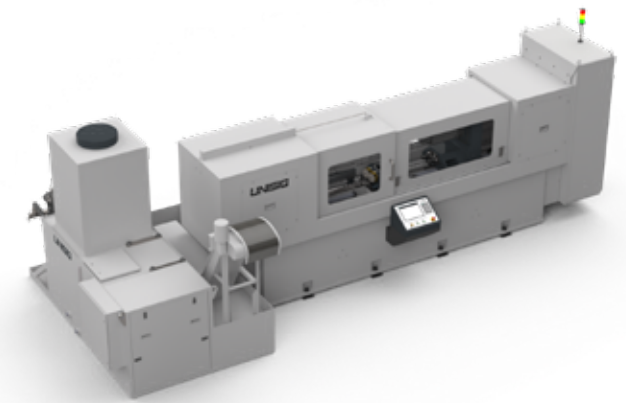
UNI Production Drilling Machines

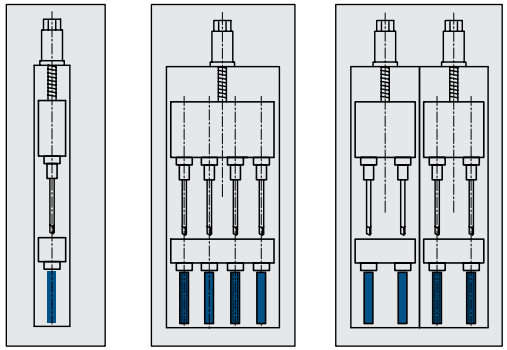
for High-Volume and High-Accuracy Deep Hole Drilling

UNI series deep hole drilling machines are used in demanding high production or high accuracy applications. Modular construction allows build-to-order flexibility from standard components. Customization or specialized configurations are common and engineered for reliability.

UNISIG's experience with automation and tooling provides a full system with complete documentation and support.

See following pages for examples of UNI machines.





Single spindle, single axis

Multiple spindle single axis

Multiple spindle multiple axis

	UNI-6	UNI-12	UNI-20	UNI-25	UNI-32	UNI-50
Tooling type	Gundrill	Gundrill	Gundrill	Gundrill, BTA option	Gundrill, BTA option	BTA, Gundrill option
Number of spindles	2, 4	2, 4	2, 4	2, 4	2, 4	1
Max drilling diameter	6 mm 0.25 in	12 mm 0.50 in	20 mm 0.80 in	25 mm 1.00 in	32 mm 1.25 in	50 mm 2.00 in
Max counterbore diameter						65 mm 2.50 in
Drilling depths	150 mm 6 in 250 mm 10 in 500 mm 20 in	500 mm 20 in 750 mm 30 in 1,000 mm 40 in	500 mm 20 in 750 mm 30 in 1,000 mm 40 in	750 mm 30 in 1,000 mm 40 in 1,500 mm 60 in	750 mm 30 in 1,000 mm 40 in 1,500 mm 60 in	1,000 mm 40 in 1,500 mm 60 in 2,000 mm 80 in 3,000 mm 120 in

Specifications are subject to change without notice | Performance ratings may vary based on actual tooling and materials used. Modular construction allows additional configurations not listed, contact UNISIG

Specifications represent standardized program. Optional configurations and modifications of standards may be available upon application review. Contact UNISIG for more information.

UNI-20-2-250-CR

High-volume 2-spindle gundrilling of valve guides up to 250 mm [9.8 in] in depth, diameters from 4 to 15 mm [0.16 - 0.59 in], with integrated robotic part handling.

FEATURES

- Automated dual simultaneous part exchange for increased efficiency
- Bulk feeder input, finished parts discharged via chute; lights-out manufacturing ready
- Hydraulic workholding chucks
- Counter-rotation of tool and workpiece for drilling accuracy
- Rapid gundrilling of short parts

UNI-20-2-250-CR SPECIFICATIONS				
Number of spindles	2			
Minimum drilling diameter	4	mm	0.16	in
Maximum drilling diameter	15	mm	0.59	in
Drill depth	250	mm	10	in
Power per spindle (480V)	4.5	kw	6	hp
Tool spindle speed	8,000 rpm			
Power per work spindle (480V)	1.1	kw	1.5	hp
Work spindle speed	600 rpm			

Modular construction allows alternate specifications and configurations not listed.

UNI-25-2i-250

Two independent spindles perform separate drilling operations simultaneously on two different parts. High production rates with carefully coordinated drilling operations.

FEATURES

- Independent spindle operation, with programmable feed, speed and coolant
- Firewall separates spindles; window allows full visibility for operator
- Automatic door system allows robotic workpiece placement
- Duplex filtration system allows filter change during continual machine operation

UNI-25-2i-250 SPECIFICATIONS				
Number of spindles	2 independent			
Minimum drilling diameter	12	mm	0.47	in
Maximum drilling diameter	25	mm	1.0	in
Drill depth	250	mm	10	in
Power per spindle (480V)	15.0	kw	20	hp
Tool spindle speed	3,000 rpm			

Modular construction allows alternate specifications and configurations not listed.

Additional models, configurations, and options are available, contact UNISIG.

UNI-20-XY

Gundrill machine for off-center drilling from both ends of the part. Flexible part fixturing allows for variable part dimensions.

FEATURES

- CNC programmable workpiece table, X-axis and Y-axis travel
- Indexing workpiece pallet, 180 degrees with universal top plate for fixturing
- Headstock has 300 mm approach axis travel to accommodate varied workpiece lengths
- Servo driven tool feed system; chip box has mechanically advanced bushing
- Hydraulic actuation of workpiece pallet and swing clamp assemblies for workholding

UNI-20-XY SPECIFICATIONS		
Number of spindles	2	
Minimum drilling diameter	4 mm	0.16 in
Maximum drilling diameter	20 mm	0.80 in
Drill depth max	500 mm	20 in
Workpiece length max	1,000 mm	40 in
Power per spindle (480V)	5.6 kw	7.5 hp
Tool spindle speed	6,000 rpm	

Modular construction allows alternate specifications and configurations not listed.

UNI-50BTA-1500-CR

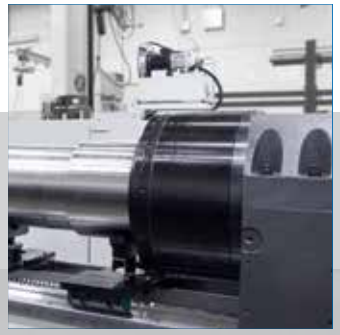
Versatile, high-precision machine for centerline bores up to 65 mm [2.6 in] dia and 1,500 mm [60 in] deep in the toughest materials using gundrill and BTA tooling

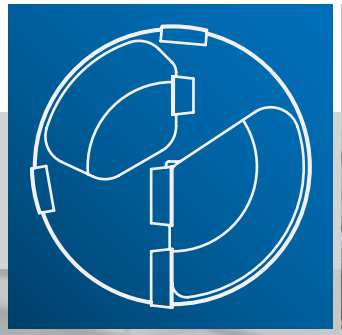
FEATURES

- Rapid changeover from BTA to Gundrill tooling
- Counter-rotation for minimized centerline drift
- High-pressure coolant with programmable flow rate for optimized chip evacuation
- Lantern chuck assembly facilitates pull boring operation for shaft finishing
- Process monitoring and graphical display of critical information
- Automatic process interruption for unattended operation

UNI-50BTA-1500-CR SPECIFICATIONS		
Tooling type	Gundrill and BTA	
Minimum drilling diameter	8 mm	0.31 in
Maximum drilling diameter	50 mm	1.97 in
Maximum counterbore diameter	65 mm	2.56 in
Drill depth	1,500 mm	59 in
Power per spindle (480V)	28 kw	38 hp
Tool spindle speed	3,000 rpm	
Power per work spindle (480V)	20 kw	27 hp
Work spindle speed	2,200 rpm	

Modular construction allows alternate specifications and configurations not listed.

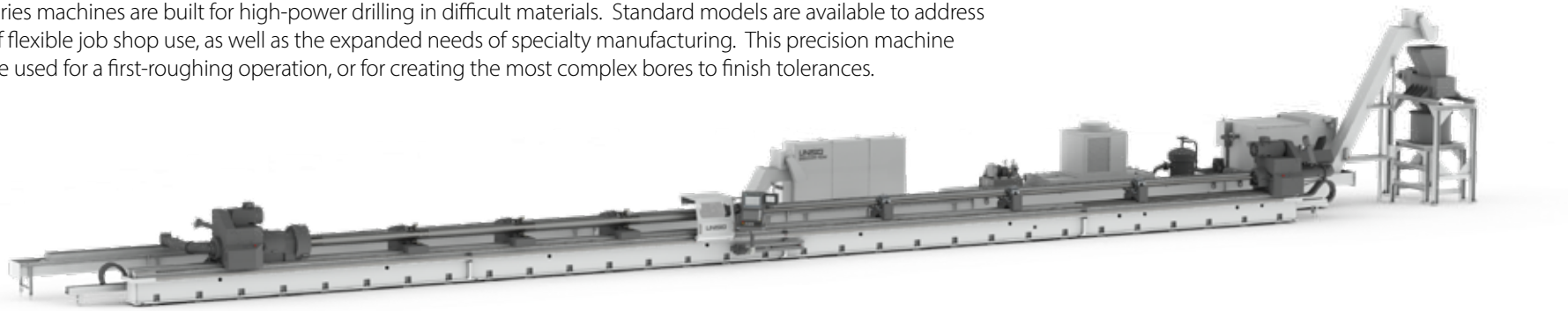




B-Series BTA Drilling Machines < 800 mm Swing

for On-Center Deep Hole Drilling of Cylindrical Workpieces

UNISIG B-Series machines are built for high-power drilling in difficult materials. Standard models are available to address the range of flexible job shop use, as well as the expanded needs of specialty manufacturing. This precision machine series can be used for a first-roughing operation, or for creating the most complex bores to finish tolerances.



	B380		B500		B600		B700	
DIMENSION								
Swing over bed	380 mm	15.0 in	500 mm	19.7 in	600 mm	23.6 in	700 mm	27.6 in
Drilling depths - Ballscrew drive	1.5, 2, 3 m	5, 6, 10 ft	2, 3, 4, 6 m	6, 10, 13, 20 ft	2, 3, 4, 6 m	6, 10, 13, 20 ft	2, 3, 4, 6 m	6, 10, 13, 20 ft
Drilling depths - Rack and pinion drive	-	-	8, 10 m and longer	26, 32 ft and longer	8, 10 m and longer	26, 32 ft and longer	8, 10 m and longer	26, 32 ft and longer
PERFORMANCE								
Max drilling diameter from solid (Nickel Alloy)	65 mm	2.6 in	100 mm	4.0 in	125 mm	5.0 in	180 mm	7.0 in
Max drilling diameter from solid (Carbon Steel)	80 mm	3.1 in	125 mm	5.0 in	150 mm	6.0 in	200 mm	8.0 in
Maximum tool diameter	100 mm	4.0 in	160 mm	6.3 in	200 mm	8.0 in	300 mm	12.0 in
WORKPIECE HEADSTOCK (STANDARD)								
Spindle nose	ISO 702/1 A2-8		ISO 702/1 A2-8		ISO 702/1 A2-11		ISO 702/1 A2-15	
Spindle bore	110 mm	4.3 in	92 mm	3.6 in	160 mm	6.3 in	215 mm	8.5 in
Power, continuous S1 (400/480 VAC)	13/16 kW	17/22 hp	25/30 kW	34/40 hp	44/50 kW	59/67 hp	58/67 kW	78/90 hp
Spindle speed range	1-700 rpm		1-275 rpm		1-343 rpm (1-900 rpm option)		1-270 rpm (1-850 rpm option)	
Headstock transmission	single reduction		single reduction		geared transmission (2 range option)		geared transmission (2 range option)	
WORKPIECE HEADSTOCK (LARGE BORE OPTION)								
Spindle nose	-	-	ISO 702/1 A2-15		ISO 702/1 A2-15		ISO 702/1 A2-20	
Spindle bore	-	-	215 mm	8.5 in	215 mm	8.5 in	280 mm	11.0 in
TOOL HEADSTOCK								
Spindle nose	ISO 702/1 A2-6		ISO 702/1 A2-8		ISO 702/1 A2-11		DIN 55027 size 15	
Spindle bore	60 mm	2.4 in	92 mm	3.6 in	128 mm	5.0 in	200 mm	7.9 in
Power, continuous S1 (400/480 VAC)	31/34 kW	42/46 hp	58/67 kW	78/90 hp	58/67 kW	78/90 hp	85/94 kW	114/126 hp
Spindle speed range	1-1,800 rpm		1-1,000 rpm		1-1,000 rpm		1-900 rpm	
Headstock transmission	single reduction		single reduction		geared transmission, 2 range		geared transmission, 2 range	
COOLANT SYSTEM								
Maximum programmable flow	284 L/min	75 gpm	529 L/min	140 gpm	756 L/min	200 gpm	945 L/min	250 gpm
ACCESSORY SPECIFICATION								
Roller steady diameter capacity (1)	150 mm	5.9 in	260 mm	10.2 in	360 mm	14.2 in	500 mm	19.7 in
Roller steady diameter capacity (2)	200 mm	7.9 in	350 mm	13.8 in	475 mm	18.7 in	630 mm	25.0 in
WORKPIECE WEIGHT								
Between centers	1.0 t	2,210 lbs	3.0 t	6,620 lbs	3.0 t	6,620 lbs	4.5 t	9,920 lbs
(1) Workpiece steady	1.5 t	3,310 lbs	4.0 t	8,820 lbs	4.0 t	8,820 lbs	6.8 t	14,990 lbs
(2) Workpiece steady	2.0 t	4,410 lbs	5.0 t	11,030 lbs	5.0 t	11,030 lbs	9.0 t	19,850 lbs

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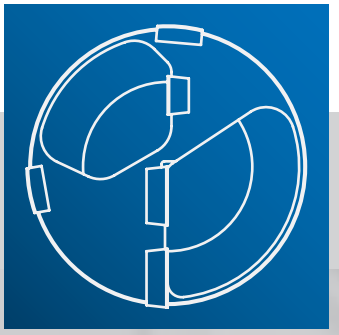
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B-Series BTA Drilling Machines > 800 mm Swing

for On-Center Deep Hole Drilling of Cylindrical Workpieces

B-Series machines with over 800 mm swing are designed to handle the largest bores and heaviest parts, while holding the close tolerances UNISIG built its reputation on.

Incredible power and torque are delivered through a modern powertrain. UNISIG builds these machines to take advantage of the latest CNC motion control technologies, while simplifying mechanical systems for improved performance and reliability.

	B850		B1000		B1200		B1600		B2000	
DIMENSIONS										
Swing over bed	850 mm	33.5 in	1,000 mm	39.4 in	1,200 mm	47.2 in	1,600 mm	63.0 in	2,000 mm	78.7 in
Swing over optional gap	2,000 mm	78.7 in	2,200 mm	86.6 in	2,400 mm	94.5 in	2,800 mm	110.2 in	3,200 mm	126.0 in
Drilling depths	2 -10 m and longer	6 - 32 ft and longer	2 -10 m and longer	6 - 32 ft and longer	2 -10 m and longer	6 - 32 ft and longer	2 -10 m and longer	6 - 32 ft and longer	2 -10 m and longer	6 - 32 ft and longer
PERFORMANCE										
Max solid drill diameter (Nickel Alloy)	180 mm	7.1 in	220 mm	9.0 in	300 mm	11.8 in	400 mm	15.7 in	400 mm	15.7 in
Max solid drill diameter (Carbon Steel)	220 mm	8.7 in	255 mm	10.0 in	350 mm	13.8 in	500 mm	19.7 in	500 mm	19.7 in
Max tool diameter (1) high load PH	254 mm	10.0 in	400 mm	15.7 in	400 mm	15.7 in	550 mm	21.7 in	550 mm	21.7 in
Max tool diameter (2) large bore PH	320 mm	12.6 in	460 mm	18.1 in	500 mm	19.7 in	630 mm	24.8 in	630 mm	24.8 in
WORKPIECE HEADSTOCK										
Spindle nose	ISO 702/1 A2-15		ISO 702/1 A2-15		ISO 702/1 A2-20		ISO 702/1 A2-20		ISO 702/1 A2-28	
Spindle bore	160 mm	6.3 in	200 mm	7.9 in	250 mm	9.8 in	250 mm	9.8 in	250 mm	9.8 in
Power, continuous S1 (400/480 VAC)	95/124 kW	127/166 hp	130/153 kW	174/205 hp	130/153 kW	174/205 hp	150/175 kW	200/235 hp	150/175 kW	200/235 hp
Spindle speed range	1-700 rpm		1-500 rpm		1 - 500 rpm		1 - 483 rpm		1 - 363 rpm	
Headstock transmission	3 ranges, automatic		3 ranges, automatic		4 ranges, automatic		4 ranges, automatic		4 ranges, automatic	
TOOL HEADSTOCK										
Spindle nose	DIN 55027 size 15		DIN 55027 size 15		DIN 55027 size 15		DIN 55027 size 20		DIN 55027 size 20	
Spindle bore	160 mm	6.3 in	200 mm	7.9 in	200 mm	7.9 in	250 mm	9.8 in	250 mm	9.8 in
Power, continuous S1 (400/480 VAC)	95/124 kW	127/166 hp	130/153 kW	174/205 hp	130/153 kW	174/205 hp	150/175 kW	200/235 hp	150/175 kW	200/235 hp
Spindle speed range	1-900 rpm		1-700 rpm		1 - 750 rpm		1 - 500 rpm		1 - 500 rpm	
Headstock transmission	3 ranges, automatic		3 ranges, automatic		4 ranges, automatic		4 ranges, automatic		4 ranges, automatic	
WORKPIECE WEIGHT										
Between centers	5.5 t	12,130 lbs	6.0 t	13,230 lbs	8.0 t	17,640 lbs	15.0 t	33,080 lbs	20.0 t	44,100 lbs
(1) workpiece steady	6.8 t	14,990 lbs	8.0 t	17,640 lbs	14.0 t	30,870 lbs	30.0 t	66,150 lbs	40.0 t	88,200 lbs
(2) workpiece steady	9.0 t	19,850 lbs	10.0 t	22,050 lbs	22.0 t	48,510 lbs	40.0 t	88,200 lbs	50.0 t	110,250 lbs
(3) workpiece steady	10.0 t	22,050 lbs	12.0 t	26,460 lbs	30.0 t	66,150 lbs	50.0 t	110,250 lbs	60.0 t	132,300 lbs

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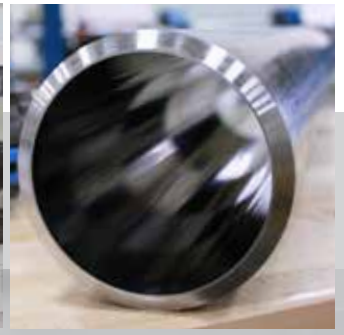
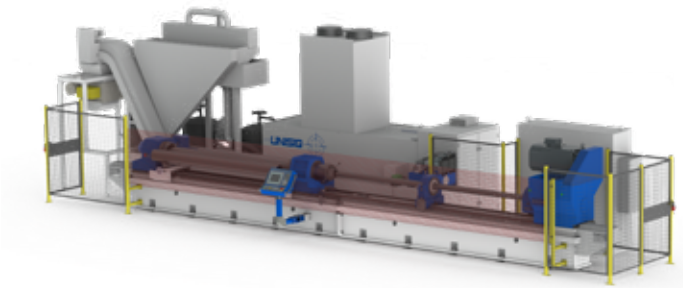


S-Series Skiving and Roller Burnishing Machines

for Hydraulic Cylinder Manufacturing and Tube Finishing

Skiving and roller burnishing is an extremely productive method for manufacturing hydraulic cylinders. UNISIG S-Series machines are engineered to maximize tooling performance and give the operator precise control in every aspect of the process.



FEATURES

- Straightforward setup and operation
- Quick changeover between workpieces and tools
- Use for high production and job shop applications
- Automation ready

PROCESS CONTROL

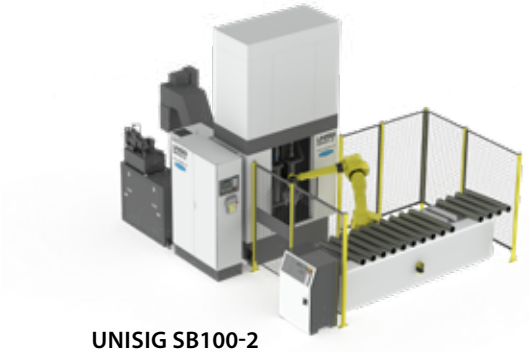
- Programmable coolant flow and maximum pressures
- Servo positioned workpiece length setup
- Torque and thrust monitoring with trip points
- Part program storage for all process data

UNIVERSAL TOOLING APPLICATION

- Skiving and roller burnishing
- Counter-boring, skiving and roller burnishing
- Standard and pressure compensated tools

DESIGN

- Robust coolant filtration and temperature controls
- High powered spindles for greatest productivity
- Standardized workholding and tool connections



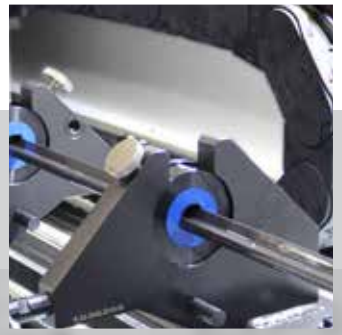
UNISIG SB100-2
Vertical skive burnish system with robotic automation for high volume production of hydraulic cylinders

	S500		S600		S700	
DIMENSION						
Swing over bed	500 mm	19.7 in	600 mm	23.6 in	700 mm	27.6 in
Drilling depths - Ballscrew drive	2, 3, 4, or 6 m	6, 10, 13, or 20 ft	2, 3, 4, or 6 m	6, 10, 13, or 20 ft	2, 3, 4, or 6 m	6, 10, 13, or 20 ft
Drilling depths - Rack and pinion drive	8, 10 m and longer	26, 32 ft and longer	8, 10 m and longer	26, 32 ft and longer	8, 10 m and longer	26, 32 ft and longer
PERFORMANCE						
Rated skiving and burnishing diameter	140 mm	5.5 in	203 mm	8.0 in	305 mm	12.0 in
TOOL HEADSTOCK						
Spindle nose	ISO 702/1 A2-6		ISO 702/1 A2-8		ISO 702/1 A2-11	
Power, continuous S1 (400/480 VAC)	50/67 kW	67/90 hp	85/94 kW	114/126 hp	95/124 kW	127/166 hp
Spindle speed maximum	1,500 rpm		1,500 rpm		1,200 rpm	
Headstock transmission	single reduction		3 ranges, automatic selection		3 ranges, automatic selection	
COOLANT SYSTEM						
Maximum programmable flow	529 L/min	140 gpm	756 L/min	200 gpm	1,134 L/min	300 gpm

Specifications are subject to change without notice | Performance ratings may vary based on actual tooling and materials used | Modular construction allows additional configurations not listed, contact UNISIG

Actual results from UNISIG skiving and roller burnishing machine





USK Series CNC Drilling Machines

for High-Accuracy Off-Center Drilling

USK machines gundrill deep holes in workpieces using a CNC programmable table for off-center positioning. These machines have a compact footprint to conserve floor space.

Single and twin spindle machines are available for job shop and production use. UNISIG USK machines have a versatile operating range and are designed to drill deep holes in the toughest materials.

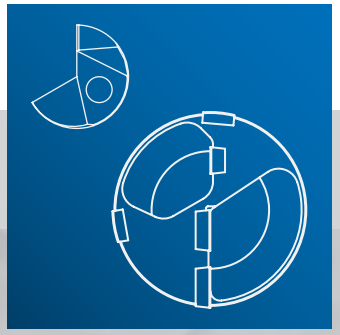
FEATURES

- Simple operation with CNC flexibility
- Heavy duty, precision workpiece table
- Standard drilling headstock enclosure
- Programmable coolant system

	USK12-2		USK20-2		USK25		USK40	
DIMENSION								
Tooling type	Gundrill		Gundrill		Gundrill		Gundrill	
Number of spindles	2		2		1		1	
Drilling diameter max	12 mm	0.5 in	20 mm	0.8 in	25 mm	1.0 in	40 mm	1.57 in
Drilling diameter max single spindle mode	19 mm	0.75 in	25 mm	1.0 in	-		-	
Rated drill depths	750 mm	29.5 in	1,000 mm	39.4 in	1,000 mm	39.4 in	1,000 mm	39.4 in
	1,000 mm	39.4 in	1,500 mm	59.1 in	1,500 mm	59.1 in	1,500 mm	59.1 in
Table top dimensions	1,000 x 1,000 mm	39.4 x 39.4 in	1,000 x 1,000 mm	39.4 x 39.4 in	1,000 x 1,000 mm	39.4 x 39.4 in	1,000 x 1,000 mm	39.4 x 39.4 in
Table capacity	1,000 kg	2,205 lbs	1,000 kg	2,205 lbs	1,000 kg	2,205 lbs	1,000 kg	2,205 lbs
X-travel (horizontal)	500 mm	20.0 in	500 mm	20.0 in	500 mm	20.0 in	500 mm	20.0 in
Y-travel (vertical)	350 mm	14.0 in	350 mm	14.0 in	350 mm	14.0 in	350 mm	14.0 in

Specifications are subject to change without notice | Performance ratings may vary based on actual tooling and materials used | Modular construction allows additional configurations not listed, contact UNISIG



UNX Series Off-Center Drilling Machines

for Extreme Depth Drilling

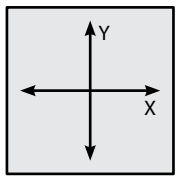
The UNX machines meet the challenge of off-center holes with extreme depth-to-diameter ratios. These machines automatically drill deep holes in long, heavy workpieces without a loss of accuracy.

UNISIG process monitoring and controls technology work in conjunction with a precision machine structure enabling users to confidently tackle problematic drilling applications every day.

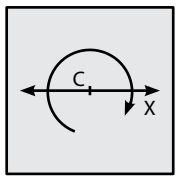
	UNX20	UNX25	UNX40	UNX50
DIMENSION				
Tooling type	Gundrill	Gundrill	Gundrill	Gundrill/BTA
Drilling diameter max	20 mm 0.79 in	25 mm 1.00 in	40 mm 1.57 in	50 mm 2.0 in
Counterbore max	-	-	-	65 mm 2.6 in
Motion profile	Cartesian + Polar [CP]	Cartesian [C] or Polar [P]	Polar [P]	Polar [P]
Single stroke drilling depth	1,500 mm 59 in	1,500 mm [C] 59 in	1,500 mm 59 in	1,500 mm 59 in
		2,000 mm [P] 79 in	2,000 mm 79 in	2,000 mm 79 in
		3,000 mm [P] 118 in	3,000 mm 118 in	3,000 mm 118 in
Workpiece length	2,000 mm 79 in	2,000 mm 79 in	2,000 mm 79 in	2,000 mm 79 in
	3,000 mm 118 in	3,000 mm 118 in	3,000 mm 118 in	3,000 mm 118 in
	4,000 mm 158 in	4,000 mm 158 in	4,000 mm 158 in	4,000 mm 158 in
	6,000 mm 236 in	6,000 mm 236 in	6,000 mm 236 in	6,000 mm 236 in
	10,000 mm 394 in	10,000 mm 394 in	10,000 mm 394 in	10,000 mm 394 in

Specifications are subject to change without notice | Performance ratings may vary based on actual tooling and materials used | Modular construction allows additional configurations not listed, contact UNISIG

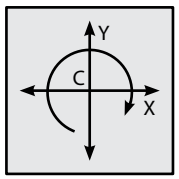
MOTION PROFILES



Cartesian
UNX-C



Polar
UNX-P



Cartesian + Polar
UNX-CP

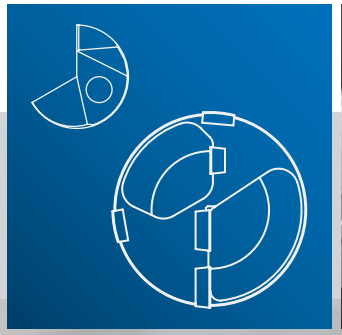
OFF-CENTER DRILLING

Cartesian positioning **[C]** maintains a stationary workpiece and moves the drilling headstock in the X and Y axis.

Polar positioning **[P]** rotates a cylindrical part on its axis, with an X-axis to position the drilling headstock distance from center.

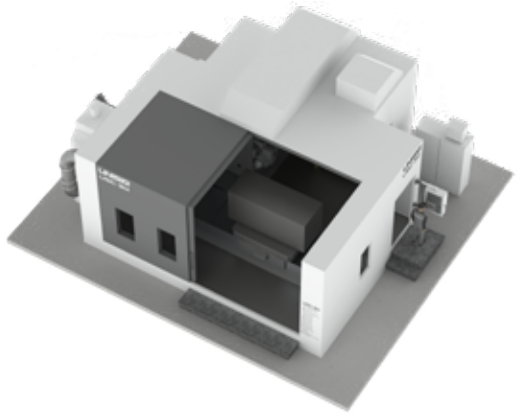
Cartesian and Polar positioning **[CP]** are combined with advanced motion control to achieve the highest accuracy in small diameter, extreme depth drilling.



USC-M Milling and Drilling Machines

for Mold Manufacturing



THREE MODEL FAMILIES TO MEET THE NEEDS OF THE MOLD INDUSTRY

USC-2M | USC-3M Universal Spindle for Machining and Gundrilling | Above-Floor Installation

USC-2M-BTA | USC-3M-BTA Dedicated Spindle for Machining | Additional Spindle for BTA/Gundrilling | Above-Floor Installation

USC-M38 | USC-M50 Dedicated Geared Spindle for Machining | Additional Spindle for BTA/Gundrilling | Below-Floor Installation

	USC-2M	USC-3M	USC-2M-BTA	USC-3M-BTA	USC-M38	USC-M50
PERFORMANCE						
Spindle Type	Universal	Universal	Dedicated	Dedicated	Dedicated	Dedicated
Nominal drilling depth	1,500 mm 59.1 in	1,800 mm 70.9 in	1,650 mm 65.0 in	1,650 mm 65.0 in	1,500 mm 59.1 in	1,830 mm 72.0 in
Gundrilling diameter	50 mm 2.00 in	50 mm 2.00 in	50 mm 2.00 in	50 mm 2.0 in	50 mm 2.00 in	50 mm 2.00 in
BTA drilling diameter	-- --	-- --	38 mm 1.50 in	38 mm 1.50 in	38 mm 1.50 in	50 mm 2.00 in
TRAVELS						
X-axis (horizontal)	2,100 mm 82.7 in	3,100 mm 122.0 in	2,100 mm 82.7 in	3,100 mm 122.0 in	2,200 mm 86.6 in	3,100 mm 122.0 in
Y-axis (vertical)	1,750 mm 68.9 in	1,750 mm 68.9 in	1,750 mm 68.9 in	1,750 mm 68.9 in	1,700 mm 66.9 in	2,500 mm 98.4 in
Z-axis (horizontal)	850 mm 33.5 in	1,300 mm 51.2 in	850 mm 33.5 in	1,300 mm 51.2 in	1,000 mm 39.4 in	1,550 mm 61.0 in
A-axis (inclination)	-30 °/ +15 °	-30 °/ +15 °	-30 °/ +15 °	-30 °/ +15 °	-30 °/ +15 °	-30 °/ +20 °
B-axis (rotary table)	360,000 positions	360,000 positions	360,000 positions	360,000 positions	360,000 positions	360,000 positions
Drilling or Universal spindle	2,300 mm 90.6 in	2,700 mm 106.3 in	2,000 mm 78.7 in	2,000 mm 78.7 in	1,830 mm 72.0 in	2,450 mm 96.5 in
Machining spindle	-	-	500 mm 19.7 in	500 mm 19.7 in	500 mm 19.7 in	500 mm 19.7 in
TABLE						
Top surface	1,250 x 1,600 mm 49.2 x 63.0 in	1,600 x 2,000 mm 63.0 x 78.7 in	1,250 x 1,600 mm 49.2 x 63.0 in	1,600 x 2,000 mm 63.0 x 78.7 in	1,000 x 1,200 mm 39.4 x 47.2 in	1,250 x 1,600 mm 49.2 x 63.0 in
Weight capacity	20 t 44,100 lbs	30 t 66,615 lbs	20 t 44,100 lbs	30 t 66,615 lbs	15 t 33,069 lbs	23 t 50,715 lbs
MACHINING SPINDLE						
Spindle nose	SK 50 / CAT 50	SK 50 / CAT 50	SK 50 / CAT 50	SK 50 / CAT 50	SK 50 / CAT 50	SK 50 / CAT 50
Maximum speed	4,500 rpm	4,500 rpm	4,500 rpm	4,500 rpm	4,500 rpm (2-range, geared)	4,500 rpm (2-range, geared)
Power (480V S1 100% / S6 60%)	24 kW / 30 kW 32 hp / 40 hp	24 kW / 30 kW 32 hp / 40 hp	20 kW / 25 kW 27 hp / 34 hp	20 kW / 25 kW 27 hp / 34 hp	20 kW / 25 kW 27 hp / 34 hp	24 kW / 30 kW 32 hp / 40 hp
DRILLING SPINDLE						
Spindle nose	-- --	-- --	DHD	DHD	DHD	DHD
Maximum speed	-- --	-- --	4,500 rpm	4,500 rpm	5,000 rpm	5,000 rpm
Power (S1 100% / S6 60%)	-- --	-- --	15 kW / 20 kW 20 hp / 27 hp	15 kW / 20 kW 20 hp / 27 hp	15 kW / 20 kW 20 hp / 27 hp	24 kW / 30 kW 32 hp / 40 hp
TOOL CHANGER						
Automatic tool changer	60 position	60 position	40 position	40 position	120 position	120 position
CONTROLS						
CNC	Heidenhain CNC	Heidenhain CNC	Heidenhain CNC	Heidenhain CNC	Heidenhain CNC	Heidenhain CNC

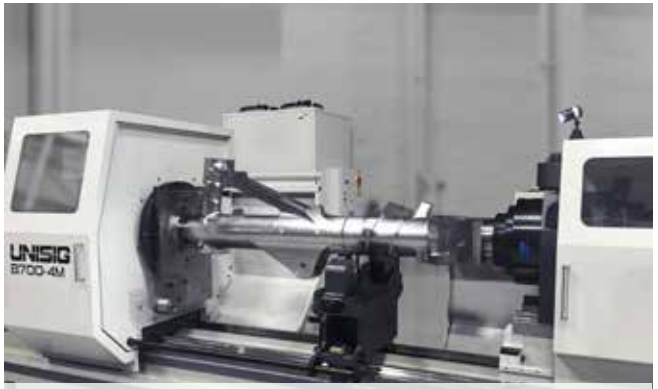
Specifications are subject to change without notice. Some specifications represent optional configurations.

Custom Machines are Standard

UNISIG takes a modular approach to machine design, allowing us to offer customized solutions when one of our many standard machines does not match our customers' unique applications.

Most custom machines start with components and design concepts from our library of standard machines, reducing costs, lead times and ensuring reliability.

Every custom-built UNISIG machine has a solid engineering basis and carries the same quality standards and long-term spare parts and service commitment as our standard models.



UNISIG B700 BTA machine with drop bed to increase swing-over bed to 1,600 mm [63 in] for commercial landing gear

UNISIG UNI-Series automated machine for high volume production cell to manufacture powertrain components

UNISIG USC BTA drilling machine with 50-taper milling spindle and special capacity table

UNISIG USC-100 large table machine for BTA drilling up to 100 mm [4 in] diameter off-center holes in large workpieces

UNISIG USC-TS multi-spindle BTA and gundrilling machine for drilling heat exchanger tube sheets

UNISIG UNI-25-2-3000-CR gundrilling 3,000 mm [120 in] long parts, with automated workpiece clamping and positioning

Extended Range Machines

Certain industries require extreme deep hole drilling applications or highly specialized machining processes. UNISIG has the experience to understand the theoretical limits of tooling and machines, maximizing their useful range for production.

UNISIG B850-12M extreme depth BTA drilling machine, designed to drill 12.2 meters [40 ft] deep

UNISIG S-Series skiving and roller burnishing machine, designed to produce precision bores up to 13 meters [42 ft] deep

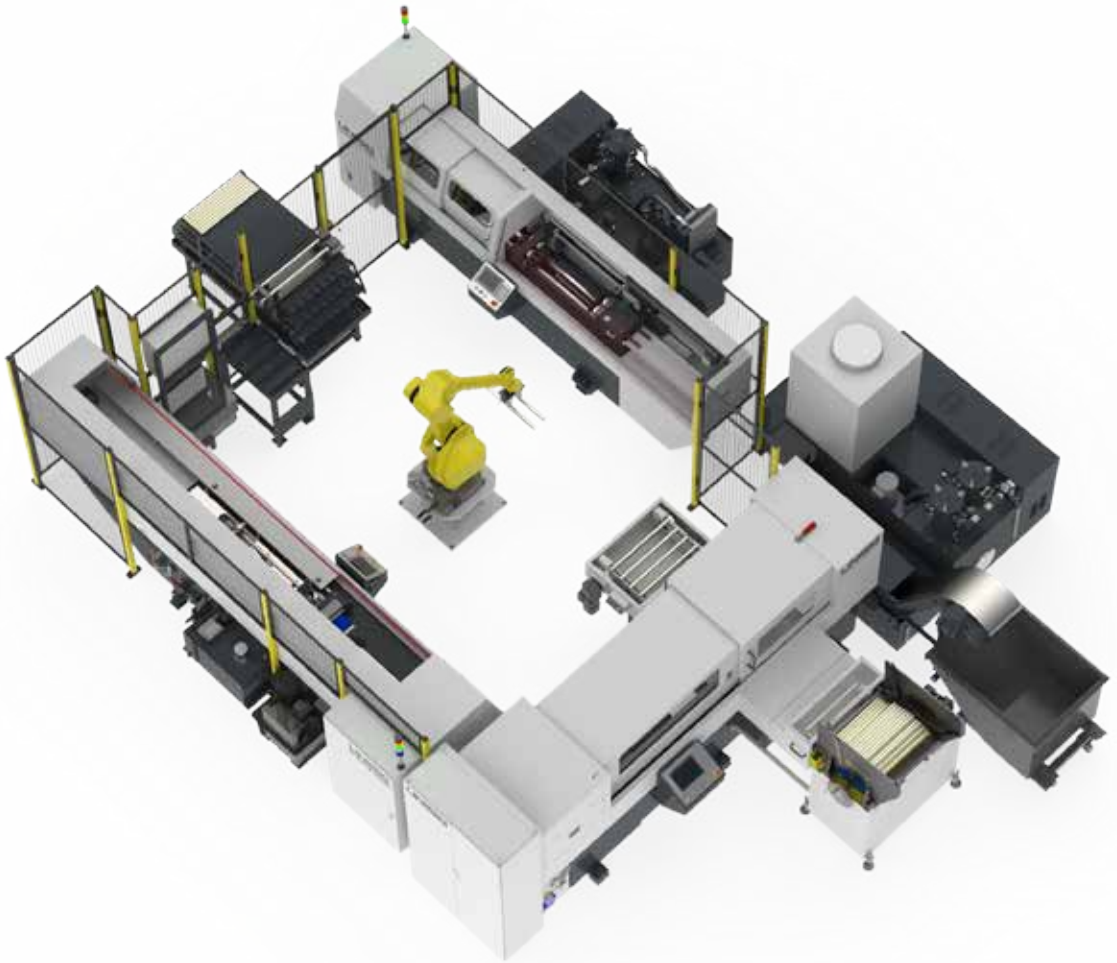
Deep Hole Drilling Automation

Automation

UNISIG routinely provides automation for gundrilling and BTA deep hole drilling systems. Automation can be machine-mounted or used to combine multiple machines or operations.

To achieve the levels of reliability demanded in these applications, expertise and attention must be given to both design and implementation.

When automation is required, our design engineering staff will develop the most simple and effective approach.



Automation Connectivity

Ethernet Communications

MT Connect Industry 4.0

Remote Diagnostics

UNISIG Automated Cell Controller

Robotically tended automated cells are easy to operate and keep running with the UNISIG cell controller. All of the machine interfaces and the robot status are visible from a single panel.

Machine setup, automation recovery, and robot troubleshooting are menu driven and easy to understand. Operator training is simplified and visual, utilizing an intuitive interface.

Gundrilling Machine

Gundrill Durable Tooling and Accessories

Gundrill presetting screw and seal

Gundrill drivers and collets

Whip guide adapters

Whip guide inserts

Gundrill bushing holder

Gundrill bushing insert

Gundrill Driver Extension

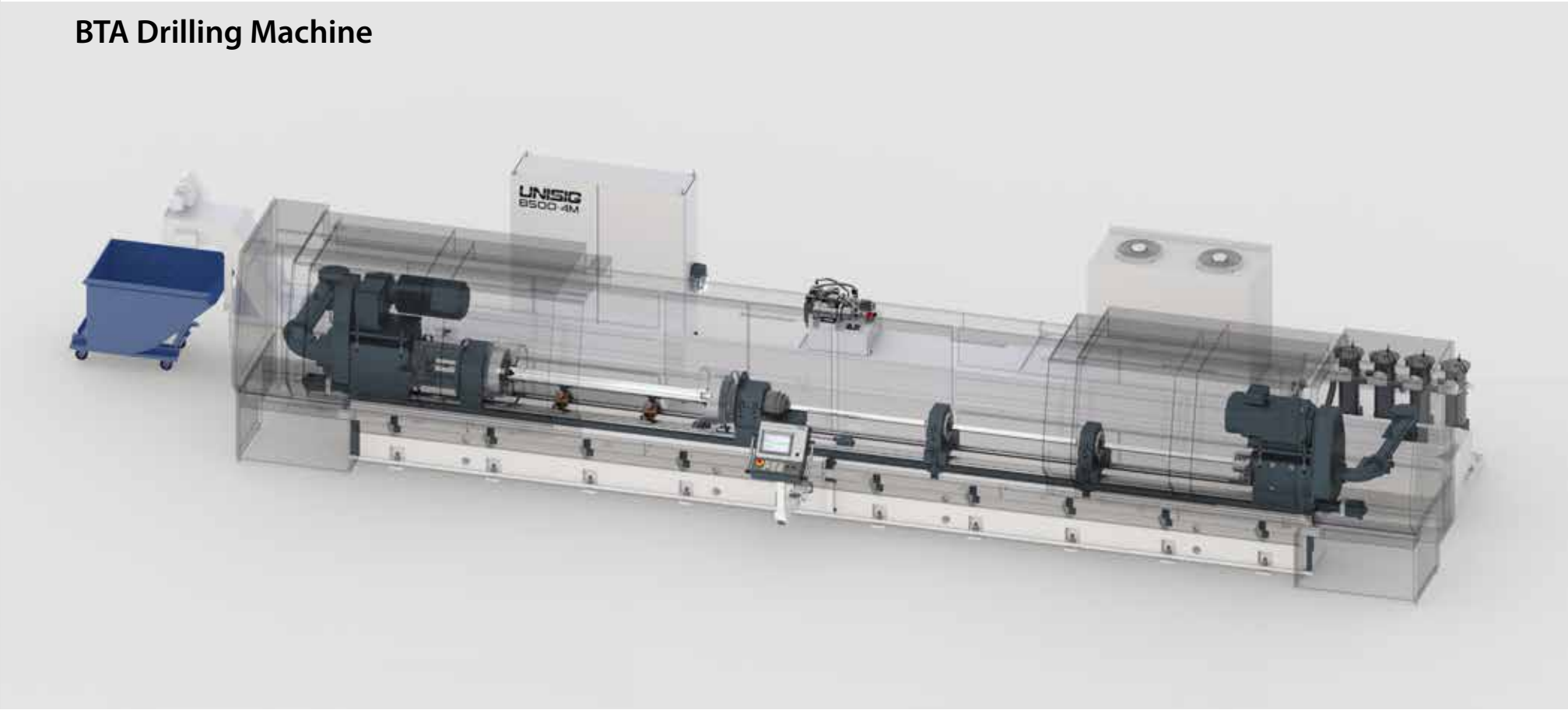
Centering cone - workholding

Collet - workholding

Workholding chucks

Special fixtures

BTA Drilling Machine



BTA Durable Tooling and Accessories

BTA drill tube clamps

Precision drill tubes and thread adapters

Vibration dampeners

Packing glands

Pressure heads

BTA master bushing systems

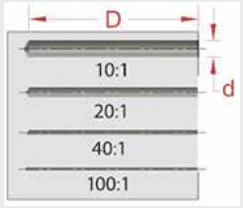
Workholding components

Workpiece support accessories

Lantern chucks

Breakthrough seal

Deep Hole Definition

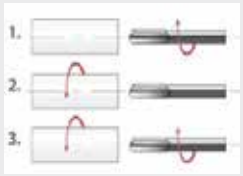


Depth to diameter ratio

HOLE DEPTH : DIAMETER (D:d)

5:1	Common twist drills
10:1	High performance twist drills with through-tool coolant
20:1	Special deep hole drilling tools with through-tool coolant
40:1	Deep hole drilling tools on dedicated deep hole drilling machines
100:1	Gundrilling tools on high performance gundrilling machines
400:1	Extreme drilling range, proprietary processes and equipment required

Drilling Process



Tool and workpiece rotation

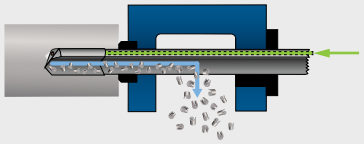
1. ROTATING TOOL - Typically used for non-symmetrical components, or off-center hole requirements

2. ROTATING WORKPIECE - Used for round parts with a deep on-center hole, and allows for a reduction in drill drift.

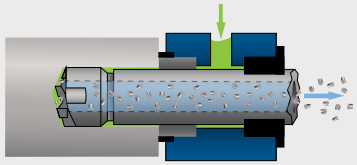
3. COUNTER-ROTATING TOOL AND WORKPIECE - Used for round parts with a deep on-center hole, provides the best hole straightness and concentricity.

Deep Hole Drilling Systems

GUNDRILL
Internal Coolant Delivery
External Chip Exhaust



BTA
External Coolant Delivery
Internal Chip Exhaust



Deep hole drilling is accomplished productively using a variety of different tools, determined by finished tolerance objectives and starting condition of parts.

In addition to the machine dimensions, power and dynamics, compatibility of these tools with various machines is primarily determined by the fluid delivery and chip exhaust systems. The two most common deep hole drilling systems are gundrilling and BTA.

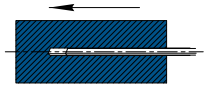
Innovations by tooling manufacturers have caused machines to require an array of specialized options to support various fluid delivery and discharge strategies.

UNISIG will provide application advice after reviewing part drawings, tolerance requirements and production volume. Feed and speed recommendations are made by UNISIG based on reputable tooling manufacturer's technical data and our experience drilling many varieties of standard and exotic materials.

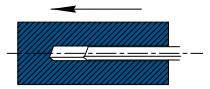
Deep Hole Drilling Methods

GUNDRILLING TOOLING

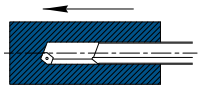
Solid Carbide
0.5 - 12 mm
[0.02 – 0.47 in]



Brazed
2 - 50 mm
[0.08 – 2.00 in]

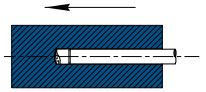


Indexable
13.5 - 50 mm
[0.53 – 2.00 in]

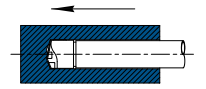


BTA DRILLING TOOLING

Brazed
12 - 65 mm
[0.47 – 2.56 in]



Indexable
25 - 630 mm
[1.0 – 24.8 in]

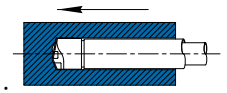


These tooling application ranges are generalized and will vary by tooling manufacturers

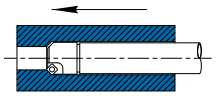
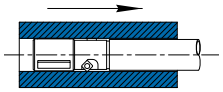
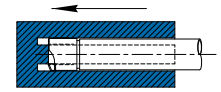
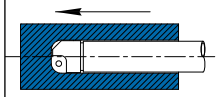
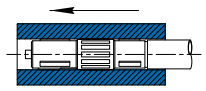
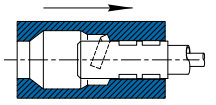
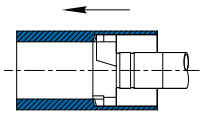
EJECTOR DRILLING - LESS COMMON, TWO-TUBE SYSTEM

- Coolant is introduced via the space between the inner and outer tubes
- Chips are discharged through the inside diameter of the inner tube and exhausted through an adapter mounted to the front of the machining spindle

Ejector
20 - 200 mm
[0.79 – 7.87 in]



Secondary Machining and Finishing Tools / Operations

PUSH- COUNTERBORING / REAMING 20 - 630 mm [0.79 – 24.8 in] *External coolant*		• Counterboring enlarges an existing hole that is drilled or cast • Push configuration tools pilot off a finished bore They can also be designed to pilot off the pre-bore for stringent concentricity requirements
PULL BORING 20 - 630 mm [0.79 – 24.8 in] *External coolant*		• Enlarges the existing bore as it is pulled through the workpiece • Boring bar is in tension rather than compression, providing better control over hole straightness • Can be used to straighten a hole with specialized tools
TREPANNING 20 - 500 mm [0.79 – 20.0 in] *External coolant*		• Process performed on blank material without a pre-drilled hole. • The tool leaves a solid core in the middle of the hole • Consumes less power than solid drilling the same hole diameter • Trepanning in blind hole applications may not be practical due to the difficulty in removing the core
BOTTOM FORMING 20 - 500 mm [0.79 – 20.0 in] *External coolant*		• Form tooling operation for finishing off the base of a hole • Tools are guided with wear pads along the finished hole diameter, and have very specific designs depending on customer needs • Radius, steps, and flat bottom forms are common
SKIVING AND ROLLER BURNISHING 20 - 500 mm [0.79 – 20.0 in] *External coolant*		• A skiving tool is used to finish the surface when close diameter and roundness tolerances are required • Rapid stock removal; high penetration rates and low radial DOC • Burnishing cold works the workpiece surface; one or more rollers pressed against the surface plasticize the material's top layer
BOTTLE BORING Special application *External coolant*		• Also known as internal profiling or chamber boring • The boring tool extends and retracts to produce the intended contour inside the workpiece. • The internal profile is then larger than the entry and exit • CNC programming is used to achieve desired profiles
TUBE FINISHING LARGE DIAMETER COUNTERBORE 300 - 1200 mm [12.0 - 4 8.0 in] *Internal coolant*		• Requires specially configured counter boring tools • Think of it as a push counter boring operation with internal coolant supply, and BTA type indexable tooling • Extreme diameters need extreme amounts of coolant flow

The tooling application ranges above are generalized and will vary by tooling manufacturers

Applications and Tolerances

APPLICATION	OBJECTIVE
Solid drilling	Large stock removal.
Counterboring / Reaming	Large stock removal; may be used for finishing operations
Trepanning	Large stock removal at lower horsepower; usable core-slug is left
Pull counterboring	Straighten the hole or achieve uniform wall thickness
Skiving	Create a geometrically true round hole
Roller burnishing	Create a mirror-surface finish or impart desired surface qualities
Skive-burnishing	Combines skiving & burnishing applications to increase productivity
Honing	Eliminate the residual stress layer left by machining process and control the hole diameter.

PROCESS	CONFIGURATION	HOLE SIZE	HOLE STRAIGHTNESS		SURFACE FINISH	
			(inch/foot)	(mm/meter)	µ-inch Ra	µ-m Ra
Gundrilling	Tool rotate-Work rotate	IT6-IT11 (heavily influenced by work material)	0.001-0.004	0.08-0.33	8-248	0.2-6.3
	Tool stationary-Work rotate		0.002-0.006	0.16-0.5		
	Tool rotate-Work stationary		0.012	1.00		
BTA • Solid drilling • Trepanning • Counterboring	Tool rotate – Work rotate	IT8-IT10	0.001-0.010	0.08-0.254	60-125	1.5-3.2
	Tool stationary – Work rotate		0.003-0.015	0.25-0.381		
	Tool rotate – Work stationary		0.025	0.635		
Pull boring	Tool rotate-Work rotate	IT7-IT9	0.001	0.08	32-125	1.5-3.2
Skive-burnishing	Tool rotate-Work stationary	IT8-IT9	as received	as received	< 8.0	< 0.2

Deep Hole Drilling Process Parameters

Cutting Speed (m/min or SFM)
Chip Load (mm/rev or in/rev)

Determined by material type, hardness, condition, tool type, substrate, and coating. Use tool manufacturer or UNISIG engineering recommendations.

Spindle Speed (rev/min)

Calculated by machine or operator using cutting speed and tool diameter

Metric	Inch
m/min. = RPM x 0.0031 x Dia. (mm) **RPM** = m/min x 318.3 / Dia. (mm) **m/min** = FPM x 0.305	**SFM** = RPM x 0.262 x Dia. (inches) **RPM** = FPM x 3.820 / Dia. (inches) **FPM** = m/min x 3.281

Feed Rate (mm/min or in/min)

Calculated by machine or operator using spindle speed and chip load

Metric	Inch
mm/min = mm/rev x RPM **mm/min** = in/min x 25.4	**in/min** = in/rev x RPM **in/min** = mm/min / 25.4

Cutting Fluid Flow Rate (L/min or gpm)

The amount of cutting fluid that passes through the tool, and carries chips and heat from the process. Parameter values change by tooling type.

Approximate metric starting value:	Approximate inch starting value:
3.7 - 4.5 L/min per mm of tool diameter	25 - 30 gal/min per inch of tool diameter

Cutting Fluid Pressure (bar or PSI)

Pressure is developed due to the restriction of flow through process. Pressure is typically monitored for safety and tool condition and programmed for a maximum value. Coolant flow is of primary importance.

BTA Drill Tube Size and Solid Drill Diameter Standards

Tube OD (mm)	Ref. Size	Drilled Hole Diameter (mm)	Drilled Hole Diameter (inch)
11	794	12.6 - 13.6	0.496 - 0.535
12	795	13.6 - 14.6	0.536 - 0.575
13	796	14.6 - 15.6	0.576 - 0.614
14	797	15.6 - 16.7	0.615 - 0.657
15	798	16.7 - 17.7	0.658 - 0.696
16	799	17.7 - 18.9	0.697 - 0.744
17	800	18.9 - 20.0	0.745 - 0.787
18	801	20.0 - 21.8	0.788 - 0.858
20	802	21.8 - 24.1	0.859 - 0.948
22	803	24.1 - 26.4	0.949 - 1.039
24	804	26.4 - 28.7	1.040 - 1.129
26	805	28.7 - 31.0	1.130 - 1.220
28	806	31.0 - 33.3	1.221 - 1.311
30	807	33.3 - 36.2	1.312 - 1.425
33	808	36.2 - 39.6	1.426 - 1.559
36	809	39.6 - 43.0	1.560 - 1.692
39	810	43.0 - 47.0	1.693 - 1.850
43	811	47.0 - 51.7	1.851 - 2.035
47	812	51.7 - 56.2	2.036 - 2.212
51	813	56.2 - 65.0	2.213 - 2.559
56	813E	60.6 - 65.0	2.386 - 2.559
56	814	65.0 - 67.0	2.559 - 2.637
62	815	67.0 - 73.0	2.638 - 2.873
68	816	73.0 - 80.0	2.874 - 3.149
75	817	80.0 - 87.0	3.150 - 3.424
82	818	87.0 - 100.0	3.425 - 3.936
94	819	100.0 - 112.0	3.937 - 4.408
106	820	112.0 - 124.0	4.409 - 4.881
118	821	124.0 - 136.0	4.882 - 5.353
130	822	136.0 - 148.0	5.354 - 5.826
142	823	148.0 - 160.0	5.827 - 6.298
154	824	160.0 - 171.9	6.299 - 6.767
166	825	172.0 - 183.9	6.772 - 7.240
178	826	184.0 - 195.9	7.244 - 7.712
190	827	196.0 - 207.9	7.717 - 8.185
202	828	208.0 - 219.9	8.189 - 8.657
214	829	220.0 - 231.9	8.661 - 9.130
226	830	232.0 - 243.9	9.134 - 9.602
238	831	244.0 - 255.9	9.606 - 10.075
250	832	256.0 - 267.9	10.079 - 10.547
262	833	268.0 - 279.9	10.551 - 11.020
274	834	280.0 - 291.9	11.024 - 11.492
286	835	292.0 - 303.9	11.496 - 11.964
298	836	304.0 - 315.9	11.968 - 12.436
310	837	316.0 - 327.9	12.440 - 12.909

DIAMETER RANGE		IT6	IT7	IT8	IT9	IT10	IT11
over	incl	tolerance - millimeters					
0	3	0.006	0.010	0.014	0.025	0.040	0.060
3	6	0.008	0.012	0.018	0.030	0.048	0.075
6	10	0.009	0.015	0.022	0.036	0.058	0.090
10	18	0.011	0.018	0.027	0.043	0.070	0.110
18	30	0.013	0.021	0.033	0.052	0.084	0.130
30	50	0.016	0.025	0.039	0.062	0.100	0.160
50	80	0.019	0.030	0.046	0.074	0.120	0.190
80	120	0.022	0.035	0.054	0.087	0.140	0.220
120	180	0.025	0.040	0.063	0.100	0.160	0.250
180	250	0.029	0.046	0.072	0.115	0.185	0.290
250	315	0.032	0.052	0.081	0.130	0.210	0.320
315	400	0.036	0.057	0.089	0.140	0.230	0.360
400	500	0.040	0.063	0.097	0.155	0.250	0.400

DIAMETER RANGE		IT6	IT7	IT8	IT9	IT10	IT11
over	incl	tolerance - inches					
0	0.1181	0.0002	0.0004	0.0006	0.0010	0.0016	0.0024
0.1181	0.2362	0.0003	0.0005	0.0007	0.0012	0.0019	0.0030
0.2362	0.3937	0.0004	0.0006	0.0009	0.0014	0.0023	0.0035
0.3937	0.7087	0.0004	0.0007	0.0011	0.0017	0.0028	0.0043
0.7087	1.1811	0.0005	0.0008	0.0013	0.0020	0.0033	0.0051
1.1811	1.9685	0.0006	0.0010	0.0015	0.0024	0.0039	0.0063
1.9685	3.1496	0.0007	0.0012	0.0018	0.0029	0.0047	0.0075
3.1496	4.7244	0.0009	0.0014	0.0021	0.0034	0.0055	0.0087
4.7244	7.0866	0.0010	0.0016	0.0025	0.0039	0.0063	0.0098
7.0866	9.8425	0.0011	0.0018	0.0028	0.0045	0.0073	0.0114
9.8425	12.4016	0.0013	0.0020	0.0032	0.0051	0.0083	0.0126
12.4016	15.7480	0.0014	0.0022	0.0035	0.0055	0.0091	0.0142
15.7480	19.6850	0.0016	0.0025	0.0038	0.0061	0.0098	0.0157

The tolerances provided are estimates, commonly quoted by tool manufacturers for applications with depth to diameter ratio up to 40:1 and under optimal conditions. As with any machining process, achieved tolerances depend on several factors; process parameters, workpiece condition or dimensions, tool geometry, desired trade-offs between productivity and tool life, cutting oil, etc. Individual results may vary.

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