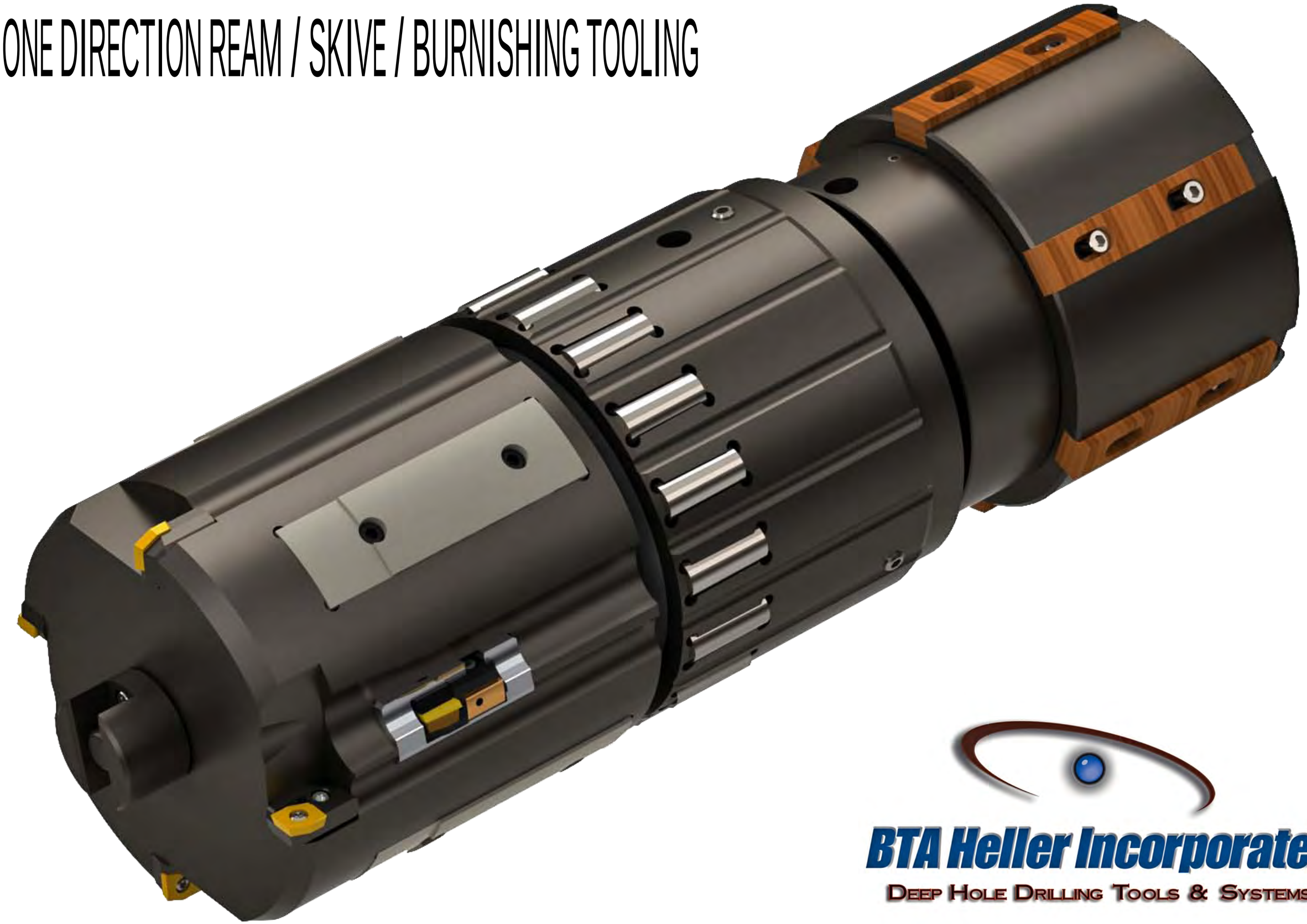
ONE DIRECTION REAM / SKIVE / BURNISHING TOOLING

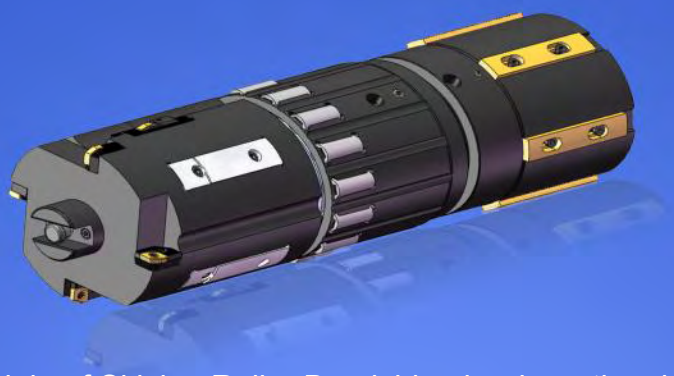


BTA Heller Incorporated

Deep Hole Drilling Tools & Systems

One Direction Reaming / Skiving / Burnishing Heads

The worlds fastest part finishing tool



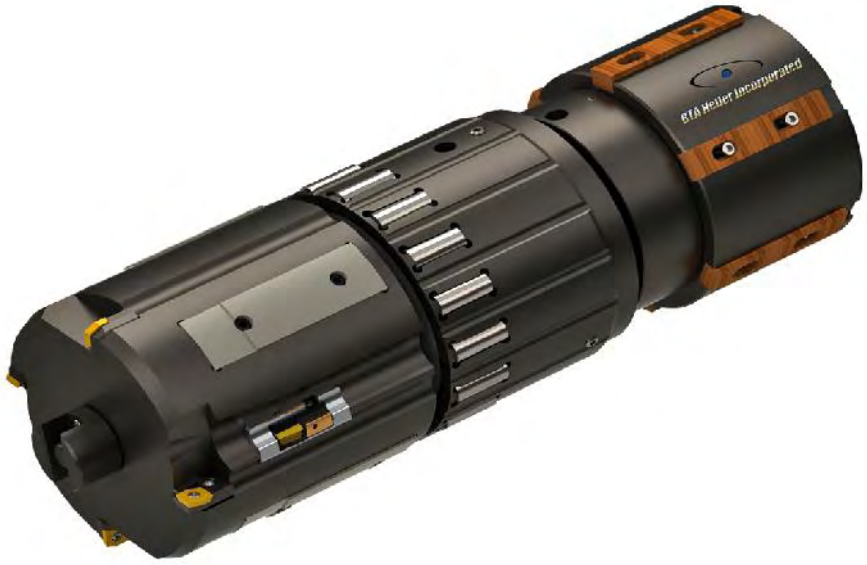
The basic principle of Skiving Roller Burnishing is where the skiving tool (a modified floating reamer) produces a geometrically true round bore, a prerequisite for successful roller burnishing. To date, this process has proven to be the fastest method of ID finishing of seamless or DOM tubing, with average rates of metal removal of 100 up to 150 inches per minute. Due to certain industry demand, the Skiving/Roller Burnishing tool assembly has become a combination Reaming/Skiving/Roller Burnishing tool assembly, capable of removing up to as much as .250” total stock removal in one operation.
BTA Heller Inc. offers a full range of individual or combined Skiving / Roller Burnishing tool assemblies starting at .500 up to 20.000” diameter and for cylinder lengths up to 33 feet long. Due to the productivity and accuracy demands, our Skiving Roller Burnishing tooling is mostly utilized on stand-alone deep hole drilling machines.

- I.D. Burnishing Tools ranging from .187” – 20.000” diameters.
- One Direction Skiving / Roller Burnishing Tools ranging from 1.480” – 20.000” diameters.
- Improved surface finish – as fine as 4 to 6 micro inch (Ra) on average.
- Improved size control – tolerances within .005 inch on average and much finer for special applications.
- Increased surface hardness – up to 5 to 10% or more.
- Improved fatigue life – as much as 300% or better.
- Enhanced corrosion resistance.
- Elimination of tool marks and minor surface imperfections.
- Replaces expensive secondary operations, such as grinding, honing, or lapping.
- Cleaner than honing or other abrasive operations.
- Faster production, at a lower cost, as compared to other ID finishing processes.
- This process has recently been accepted as an alternate method of ID finishing by other than the hydraulic cylinder industry.

COMPLETE SKIVING / BURNISHING TOOLS AND SYSTEMS.

BTA Heller Incorporated

Deep Hole Drilling Tools & Systems



One Direction Reaming / Skiving / Burnishing Tools

Tool type	Diameter range in Millimeters	BTA Boring bar Ø	Skiving knives		Roller head	
			Range	Cross-section	Range	Number of rollers
SKOD	38.00 – 49.99	33	Nominal Ø ± 0.05	20 x 14	-0.25	8
SKOD	50.00 – 64.99	43		18 x 18		
SKOD	65.00 – 84.99	56		24 x 24	-0.05/+0.3	12
SKOD	85.00 – 104.99	68				
SKOD	105.00 – 139.99	82				
SKOD	140.00 – 169.99	118				
SKOD	170.00 – 199.99	142			±0.05	16
SKOD	200.00 – 249.99	178		34 x 34		20
SKOD	250.00 – 300.00	214		40 x 40		

*** Larger Tool diameter sizes available on request.**

The basic principle of Skiving Roller Burnishing is where the skiving tool (a modified floating reamer) produces a geometrically true round bore, a prerequisite for successful roller burnishing. To date, this process has proven to be the fastest method of ID finishing of seamless or DOM tubing, with average rates of metal removal of 100 up to 150 inches per minute. Due to certain industry demand, the Skiving/Roller Burnishing tool assembly has become a combination Reaming/Skiving/Roller Burnishing tool assembly, capable of removing up to as much as .250" total stock removal in one

BTA Heller Incorporated

DEEP HOLE DRILLING TOOLS & SYSTEMS

Skive / Burnishing Feed & Speed data

Bore Dia.	SFPM	RPM	Feed Per/Rev. (IPR)	Feed Per/Min. (IPM)	Net Cutting HP	Coolant Volume (GPM)	Coolant Pressure (PSI)
1 .500"	600/700	1528/1783	.060-.080	122-143	2.5	38	125-150
2.000"	800/900	1528/1719	.070-.090	107-155	3	50	125-150
2.500	900/1100	1375/1680	.080-.100	110-168	4.5	63	120-150
3.000	900/1100	1146/1400	.080-.110	92-154	5.5	75	120-150
3.500	900/1100	982/1200	.080-.120	79-144	6.5	88	120-150
4.000	900/1100	860/1050	.080-.125	69-131	7.5	100	100-130
4.500	900/1100	764/934	.080-.125	61-117	8.5	113	90-120
5.000	900/1100	688/840	.085-.150	55-126	8.7	125	80-120
5.500	900/1100	625/764	.085-.150	53-115	9	138	75-110
6.000	900/1100	573/700	.090-.150	52-105	9.5	150	70-100
6.500	900/1100	529/646	.090-.150	48-97	9.7	163	70-100
7.000	900/1100	491/600	.100-.150	49-90	9.8	175	70-100
7.500	900/1100	458/560	.100-.150	46-84	10.2	188	70-100
8.000	900/1100	430/525	.100-.150	43-79	10.5	200	70-100
8.500	900/1100	404/494	.100-.150	40-74	10.9	213	60-100
9.000	900/1100	382/467	.100-.150	38-70	11.5	225	50-90
9.500	900/1100	362/442	.100-.150	36-66	12	238	50-90
10.000	900/1100	344/420	.100-.150	34-63	13	250	40-80
10.500	900/1100	327/400	.100-.150	33-60	13.2	263	40-80
11.000	900/1100	312/382	.100-.150	31-57	13.5	275	40-75
11.500	900/1100	300/365	.100-.150	30-55	14	288	40-70
12.000	900/1100	286/350	.100-.150	29-53	15	300	40-70

* For uncoated inserts run 400-600 SFPM

***When running 4130 or 4140 steel multiply SFPM x .6**

***When using our Skiving / Burnishing tools with the boring attachment multiply the (IPR) by .55**

BTA Heller Incorporated

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