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How to use the Sunnen Honing Guide

Use this Guide to choose the condition or application problem from this selection that most closely resembles the question(s) or problem(s) that you are experiencing and click your pointing device. You will be able to move or return to the previous section or another menu by clicking on the **BLUE** title of each section, Each page of the Guide can be turned forwards and backwards by clicking on the buttons located in the lower corners of the page.

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P/N JE90290

SUNNEN HONING GUIDE

Helpful Tips For Solving Bore Sizing And Finishing Problems

Choose the honing condition, information about Sunnen honing stones, information about approximate surface finishes, or honing oils and coolants from the Main Menu that most closely resembles the problem(s)/question(s) that you are experiencing/have questions about. Click your pointing device. By clicking on the **blue** title of each section, you will be able to return to the previous section or menu. Each page of the Guide can be turned forwards and backwards by clicking on the buttons located in the lower corners of each page. If you have Internet access, please visit Sunnen *on-line* by clicking on the official website address.

Main Menu

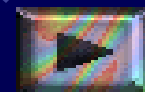
- Honing Condition Solutions
- Sunnen Stone Code
- Approximate Surface Finish
- Mandrel Recommendations
- Honing Oils and Coolants
- Stone Recommendations

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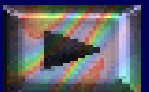
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P/N JE90290



Honing Condition Solutions

- ★ **Stone Not Cutting**
Glazed
- ★ **Stone Not Cutting**
Loaded
- ★ **Poor Stone Life**
- ★ **Bellmouth**
- ★ **Barrel**
- ★ **Taper in Open Bore**
- ★ **Taper in Blind Hole**
- ★ **Out-of-Round**
- ★ **Waviness**
- ★ **Rainbow**
- ★ **Finish Too Rough**
- ★ **Random Scratches**
- ★ **Slow Stock Removal**

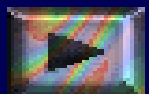




Stone Not Cutting – Stone Glazed*

Step 1	Sharpen A or J stone with MAN-700 diamond dresser; use LNB-700 Dressing stick on all other stones
Step 2	Increase cutting pressure
Step 3	Increase stroking speed
Step 4	Use softer stone (one with lower hardness number)
Step 5	Increase lubricity of honing fluid. Use recommended Sunnen Honing Oil/Coolant*

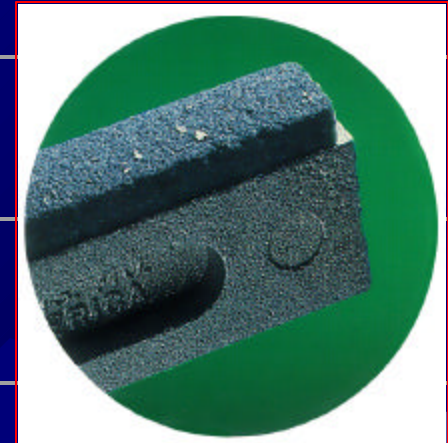
* Many honing problems, such as poor cutting action, poor stone life, and rough finish, are caused by the wrong honing oil, insufficient honing oil, dirty honing oil, or contaminated honing oil. Use only clean, full-strength Sunnen Industrial Honing Oil. Make sure that the honing oil is neither diluted nor “cut” with other oils. Keep solvents and cleaning fluids away from hone.



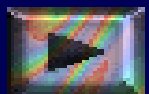


Stone Not Cutting – Stone Loaded*

Step 1	Clean stones with LBN-700 dressing stick
Step 2	Increase stroking speed
Step 3	Use softer stone (one with lower stone number)
Step 4	Use coarser stone (one with lower grit number)
Step 5	Increase lubricity of honing fluid. Use recommended Sunnen Honing Oil/Coolant*



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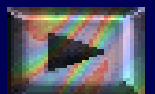




Slow Stock Removal*

Step 1	Increase spindle and stroke RPM
Step 2	Increase cutting pressure
Step 3	Use softer stone (one with lower stone hardness number)
Step 4	Use coarser grit stone (one with lower grit number)
Step 5	Increase lubricity of honing fluid. Use recommended Sunnen Honing Oil/Coolant*

* Many honing problems, such as poor cutting action, poor stone life, and rough finish, are caused by the wrong honing oil, insufficient honing oil, dirty honing oil, or contaminated honing oil. Use only clean, full-strength Sunnen Industrial Honing Oil. Make sure that the honing oil is neither diluted nor “cut” with other oils. Keep solvents and cleaning fluids away from hone.





Poor Stone Life*

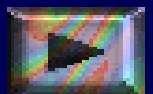
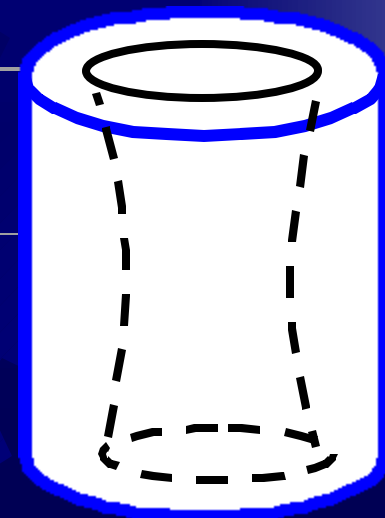
Step 1	Decrease cutting pressure
Step 2	Use faster spindle speed
Step 3	Use harder stone (one with higher hardness number)
Step 4	Use coarser grit stone (one with lower grit number)
Step 5	Increase lubricity of honing fluid. Use recommended Sunnen Honing Oil/Coolant*

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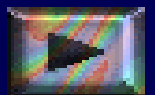
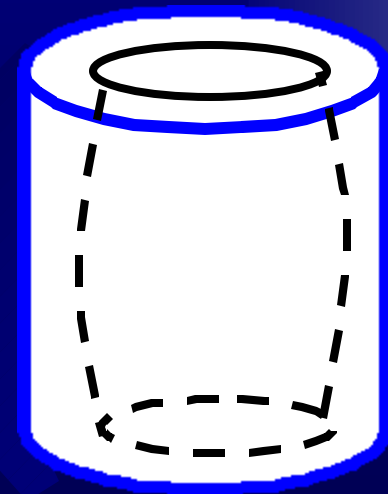
Bellmouth

Step 1	True stone and shoes with truing sleeve – if workpiece is short or unbalanced, shorten stroke length
Step 2	If bore is LONGER than 2/3 stone length: shorten stone only (or row of stones) slightly on both ends
Step 3	If bore is SHORTER than 2/3 stone length: shorten STONES and SHOES equally to 1-1/2 times bore length
Step 4	If bellmouth persists, shorten stones more but do not shorten shoes any further CAUTION: OVER-CORRECTION of bellmouth will lead to barrel condition
Step 5	Use softer stone (one with lower hardness number)



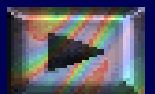
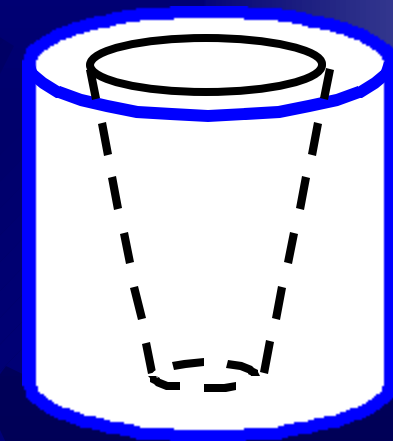
Barrel

Step 1	True stone and shoes with truing sleeve
Step 2	Use longer stone or shorten guide shoes on both ends CAUTION: OVER CORRECTION of barrel condition will lead to bellmouth
Step 3	Use mandrel with longer stone and shoe
Step 4	Use finer grit stone (one with higher grit number)



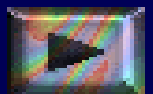
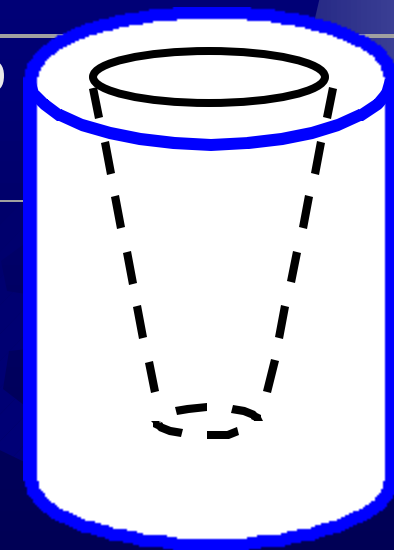
Taper In Open Bore

Step 1	True stone and shoes with truing sleeve
Step 2	Change stroke to tight end of the bore is stroked off the stone further
Step 3	Reverse the workpiece on the mandrel more often
Step 4	If power stroking, make sure spindle and stroker are in alignment



Taper In Blind Bore

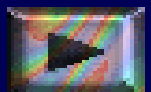
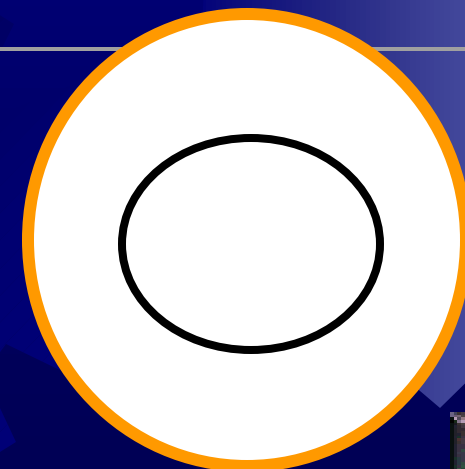
Step 1	Shorten stone and shoe to about 2/3 length of bore – shorten stone more if taper persists
Step 2	True stone and shoes frequently with truing sleeve – shorten stroke area near blind end of hole
Step 3	If hole has insufficient or no relief at bottom, use hard tip stone
Step 4	Provide sufficient relief at bottom of hole
Step 5	Provide adequate oil flow at bottom of hole to wash chips out





Out-Of-Round

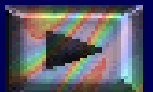
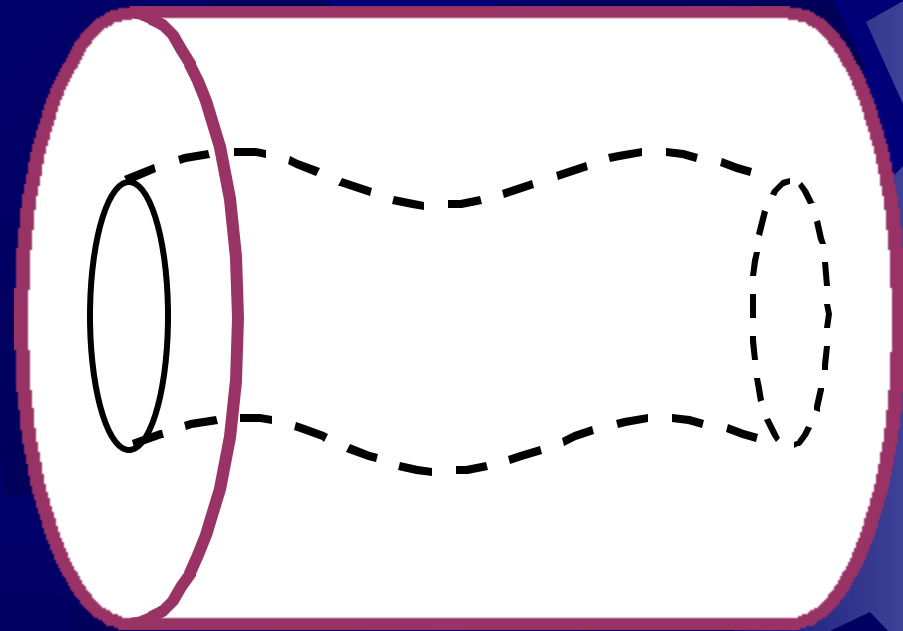
Step 1	Make sure honing tool is recommended size for diameter to be honed
Step 2	Thoroughly true stone and shoes to exact hole diameter
Step 3	If thin-wall part, decrease cutting pressure
Step 4	If stone stops cutting at decreased pressure, use stones with lower hardness number
Step 5	If power stroking, make sure spindle and stroker are in alignment



Waviness

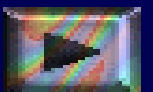
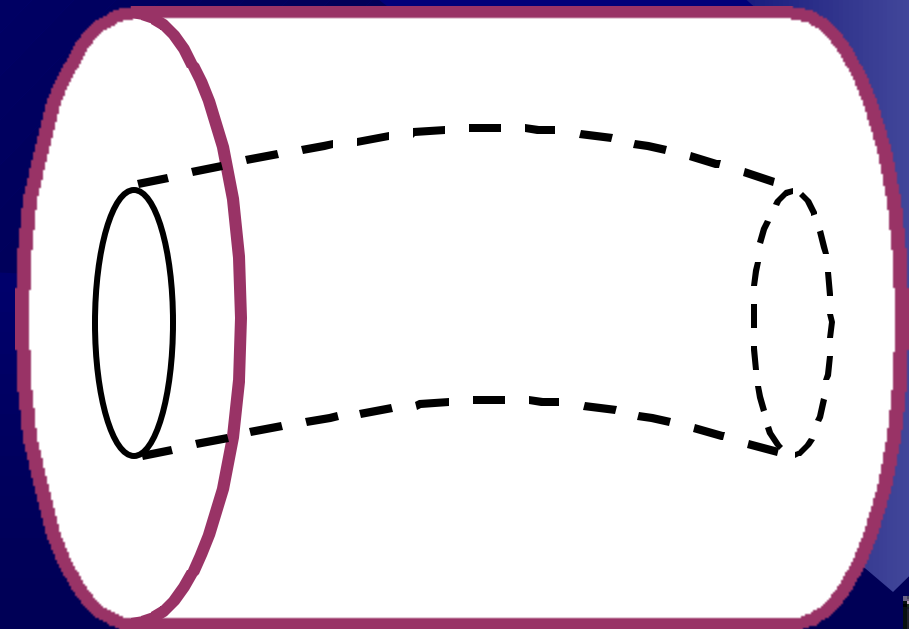
Step 1

Use honing tool with sufficient stone length to bridge waviness (or lands and ports in bore)



Rainbow

Step 1	Use L, BL, or multi-stone mandrel – stone length should be at least 1-1/2 times the length of the bore for best bow correction
Step 2	Use shorter stroke length (less overstroke)
Step 3	Use stone with lower hardness number to avoid part flexing





Finish Too Rough

Step 1	Decrease cutting pressure
Step 2	Use finer grit stone (one with higher grit number)
Step 3	Check oil to be sure you are using Sunnen Industrial Honing Oil*
Step 4	Thoroughly true shoes to exact bore diameter
Step 5	For extremely fine finishes in soft or exotic materials, use bronze mandrel or bronze shoes

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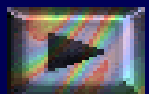





Random Scratches In bore*

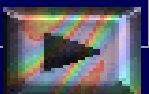
Step 1	Decrease cutting pressure
Step 2	Use finer grit stone (one with higher grit number)
Step 3	Use softer stone (one with lower hardness number)
Step 4	If hard steel mandrel is being used, change to soft steel mandrel – if soft mandrel or shoes are being used, change to bronze mandrel or shoes
Step 5	Increase lubricity of honing fluid. Use recommended Sunnen Honing Oil/Coolant*

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Sunnen Stone Code

<p>K8 – A 5 7</p> <p>↓ ↓ ↓ ↓</p> <p>Series Abrasive Grit Hardness</p>	<p>Abrasive Type</p> <p>A Aluminum Oxide</p> <p>C Silicon Carbide</p> <p>J Silicon Carbide</p> <p>DM Diamond</p> <p>DR Diamond</p> <p>DV Diamond</p> <p>NM CBN/Borazon®</p> <p>NR CBN/Borazon®</p> <p>NV CBN/Borazon®</p>	<p>Grit Size</p> <p>1 – 70</p> <p>2 – 80</p> <p>3 – 100</p> <p>4 – 150</p> <p>5 – 220</p> <p>6 – 280</p> <p>7 – 320</p> <p>8 – 400</p> <p>9 – 500</p> <p>0 – 600</p> <p>90 – 900</p> <p>00 – 1200</p>	<p>Hardness</p> <p>1- Soft</p> <p>3</p> <p>5</p> <p>7</p> <p>9</p> <p>11</p> <p>13</p> <p>15- Hard</p>
			



Approximate Surface Finish

Approximate Surface Finish in Microinches R_a /Micrometers R_a

Grit Size

Material	Abrasive Type	80	100	150	220	280	320	400	500	600	1200
Hard Steel	Aluminum Oxide/ Silicon Carbide	25/ 0,65	--	20/ 0,50	18/ 0,45	12/ 0,30	10/ 0,25	5/ 0,12	3/ 0,08	1/ 0,03	--
	CBN/Borazon®	--	55/ 1,40	45/ 1,15	40/ 1,00	28/ 0,70	--	20/ 0,40	--	7/ 0,18	2/ 0,05
Soft Steel	Aluminum Oxide/ Silicon Carbide	80/ 2,00	--	35/ 0,90	25/ 0,65	25/ 0,65	16/ 0,50	7/ 0,18	4/ 0,10	2/ 0,05	--
	CBN/Borazon®	---	65/ 1,60	--	70/ 1,75	--	--	25/ 0,65	--	16/ 0,40	5/ 0,12
Cast Iron	Silicon Carbide	100/ 2,50	--	30/ 0,75	20/ 0,50	12/ 0,30	10/ 0,25	6/ 0,15	5/ 0,12	3/ 0,08	--
	Diamond	--	--	--	80/ 2,00	--	--	50/ 1,27	--	20/ 0,50	12/ 0,30
Aluminum, Brass, Bronze	Silicon Carbide	170/ 4,30	--	80/ 2,00	55/ 1,40	33/ 0,85	27/ 0,70	16/ 0,40	12/ 0,30	2/ 0,05	--
Carbide	Diamond	--	--	30/ 0,75	20/ 0,50	--	--	7/ 0,18	--	3/ 0,08	1/ 0,3
Ceramic	Diamond	--	--	50/ 1,27	40/ 1,00	--	--	20/ 0,50	--	15/ 0,40	10/ 0,25
Glass	Diamond	--	--	95/ 2,40	70/ 1,80	--	--	30/ 0,75	--	15/ 0,40	8/ 0,20



Mandrel Recommendations

Bore Diameter - millimeters(inches)	Honing Unit	Spindle Speed (RPM Max)
1,52-2,03 (.060-.080)	D2	3000
2,03-2,54 (.080-.100)	D2	3000
2,54-3,05 (.100-.120)	K3, BL3	3000
3,05-3,81 (.120-.150)	K4, BL4	3000
3,81-4,70 (.150-.185)	K5, BL5	3000
4,70-6,22 (.185-.245)	K6, JK6, L6, BL6	3000
6,22-7,82 (.245-.308)	K8, JK8, LB8, BL8, Y8	3000
7,82-9,40 (.308-.370)	K10,, JK10, L10, BL10, Y10	2000
9,40-12,57 (.370-.495)	K-12, JK12, L12, BL12, Y12	1600 to 2000
12,57-15,72 (.495-.619)	K16, JK16, L16, BL16, Y16	1270
15,72-18,90 (.619-.744)	K20, JK20, L20, BL20, Y20	1000
18,90-25,40 (.744-1.000)	AK20, JAK20, AL20, BAL20, P28, R28	800
25,40-26,19 (1.000-1.031)	AK20, JAK20, AL20, BAL20, P28, R28	640
26,19-31,75 (1.031-1.250)	AK20, P28, R28	640
31,75-92,08 (1.250-3.625)	P28, R28	640 to 500
92,08-152,40 (3.625-6.000)	P28, R28	200
25,20-34,93 (1.031-1.250)	Y32	640 to 500
34,67-44,45 (1.365-1.750)	Y44	500 to 400
44,20-57,15 (1.740-2.250)	Y56	400 to 320
56,90-69,85 (2.240-2.750)	Y72	320 to 250
69,60-82,55 (2.740-3.250)	Y88	250
82,30-98,42 (3.240-3.875)	Y104	200
63,50-68,58 (2.500-2.700)	AN-600	250
68,58-104,14 (2.700-4.100)	AN-600	200
88,90-139,70 (3.500-5.500)	AN-600	200
63,50-83,82 (2.500-3.300)	AN-600	200
83,82-106,68 (3.300-4.200)	AN-600	200
101,60-142,24 (4.000-5.600)	AN-600	200



Stone Recommendations

For Deburring in Rough Holes

Bore Diameter - millimeters(inches)	Honing Unit	All Materials
1,52-2,03 (.060-.080)	D2	D6-A67
2,03-2,54 (.080-.100)	D2	D8-A67
2,54-3,05 (.100-.120)	K3, BL3	K3-A611, L3-A611
3,05-3,81 (.120-.150)	K4, BL4	K4-A611, L4-A611
3,81-4,70 (.150-.185)	K5, BL5	K5-A611, L5-A611
4,70-6,22 (.185-.245)	K6, JK6, L6, BL6	K6-A415, L6-A415
6,22-7,82 (.245-.308)	K8, JK8, LB8, BL8, Y8	K8-A413, L8-A413, Y8-A49
7,82-9,40 (.308-.370)	K10,, JK10, L10, BL10, Y10	K10-A413, L10-A413, Y10-A49
9,40-12,57 (.370-.495)	K-12, JK12, L12, BL12, Y12	K12-A413, L12-A413, Y12-A49
12,57-15,72 (.495-.619)	K16, JK16, L16, BL16, Y16	K16-A413, L16-A413, Y16-A49
15,72-18,90 (.619-.744)	K20, JK20, L20, BL20, Y20	K20-A413, L20-A413, P20-A49, Y20-A411
18,90-25,40 (.744-1.000)	AK20, JAK20, AL20, BAL20, P28, R28	K20-A413, L20-A413, P20-A413, Y20-A411
25,40-26,19 (1.000-1.031)	AK20, JAK20, AL20, BAL20, P28, R28	K20-A413, L20-A413, P28-A413, R28-A413
26,19-31,75 (1.031-1.250)	AK20, P28, R28	K20-A413, P28-A413, R28-A413
31,75-92,08 (1.250-3.625)	P28, R28	P28-A413, R28-A413
92,08-152,40 (3.625-6.000)	P28, R28	P28-A413, R28-A413
25,20-34,93 (1.031-1.250)	Y32	Y32-A49
34,67-44,45 (1.365-1.750)	Y44	Y44-A49
44,20-57,15 (1.740-2.250)	Y56	Y56-A49
56,90-69,85 (2.240-2.750)	Y72	Y72-A49
69,60-82,55 (2.740-3.250)	Y88	Y88-A49
82,30-98,42 (3.240-3.875)	Y104	Y104-A49
63,50-68,58 (2.500-2.700)	AN-600	G25-A47
68,58-104,14 (2.700-4.100)	AN-600	M27-A47
88,90-139,70 (3.500-5.500)	AN-600	N37-A47
63,50-83,82 (2.500-3.300)	AN-600	GY25-A47, GG25-A47
83,82-106,68 (3.300-4.200)	AN-600	MY33-A47, MM33-A47
101,60-142,24 (4.000-5.600)	AN-600	NY40-A47, NN40-A47



Stone Recommendations

For Soft Steel – Includes Cast and Stainless Steels (Use Bronze Mandrel or Shoes in Stainless Steels)

Bore Diameter - millimeters(inches)	Honing Unit	For Occasional Work	For Production Work
1,52-2,03 (.060-.080)	D2	D6-A67	D6-NM69
2,03-2,54 (.080-.100)	D2	D8-A67	D8-NM69
2,54-3,05 (.100-.120)	K3, BL3	K3-A67, L3-A67	K3-NM69, L3-NM69
3,05-3,81 (.120-.150)	K4, BL4	K4-A67, L4-A67	K4-NM69, L4-NM69
3,81-4,70 (.150-.185)	K5, BL5	K5-A67, L5-A67	K5-NM69, L5-NM69
4,70-6,22 (.185-.245)	K6, JK6, L6, BL6	K6-A57, L6-A57	K6-NM69, L6-NM69
6,22-7,82 (.245-.308)	K8, JK8, LB8, BL8, Y8	K8-A57, L8-A57, Y8-A57	K8-NM55, L8-NM55, *
7,82-9,40 (.308-.370)	K10, JK10, L10, BL10, Y10	K10-A57, L10-A57, Y10-A57	K10-NM55, L10-NM55, *
9,40-12,57 (.370-.495)	K-12, JK12, L12, BL12, Y12	K12-A57, L12-A57, Y12-A57	K12-NM55, L12-NM55, *
12,57-15,72 (.495-.619)	K16, JK16, L16, BL16, Y16	K16-A57, L16-A57, Y16-A57	K16-NM55, L16-NM55, *
15,72-18,90 (.619-.744)	K20, JK20, L20, BL20, Y20	K20-A57, L20-A57, P20-A57, Y20-A57	K20-NM55, L20-NM55, P20-NM55, *
18,90-25,40 (.744-1.000)	AK20, JAK20, AL20, BAL20, P28, R28	K20-A57, L20-A57, P20-A57, Y20-A57	K20-NM55, L20-NM55, P28-NM55, R28-NM55
25,40-26,19 (1.000-1.031)	AK20, JAK20, AL20, BAL20, P28, R28	K20-A57, L20-A57, P28-A57, R28-A57	K20-NM55, L20-NM55, P28-NM55, R28-NM55
26,19-31,75 (1.031-1.250)	AK20, P28, R28	K20-A57, P28-A57, R28-A57	K20-NM55, P28-NM55, R28-NM55
31,75-92,08 (1.250-3.625)	P28, R28	P28-A57, R28-A57	P28-NM55, R28-NM55
92,08-152,40 (3.625-6.000)	P28, R28	P28-A57, R28-A57	P28-NM55, R28-NM55
25,20-34,93 (1.031-1.250)	Y32	Y32-A57	*
34,67-44,45 (1.365-1.750)	Y44	Y44-A57	*
44,20-57,15 (1.740-2.250)	Y56	Y56-A57	*
56,90-69,85 (2.240-2.750)	Y72	Y72-A57	*
69,60-82,55 (2.740-3.250)	Y88	Y88-A57	*
82,30-98,42 (3.240-3.875)	Y104	Y104-A57	*
63,50-68,58 (2.500-2.700)	AN-600	GR25-A45	*
68,58-104,14 (2.700-4.100)	AN-600	M27-A45	*
88,90-139,70 (3.500-5.500)	AN-600	N37-A45	*
63,50-83,82 (2.500-3.300)	AN-600	GY25-A45, GG25-A45	*
83,82-106,68 (3.300-4.200)	AN-600	MY33-A45, MM33-A45	*
101,60-142,24 (4.000-5.600)	AN-600	NY40-A45, NN40-A45	*



Stone Recommendations

For Hardened Steel

Bore Diameter - millimeters(inches)	Try This Stone First	If The First Choice Does Not Cut, Use This Stone	For Production Work
1,52-2,03 (.060-.080) 2,03-2,54 (.080-.100)	D6-A65 D8-A65	D6-A63 D8-A63	D6-NM69 D8-NM69
2,54-3,05 (.100-.120)	K3-A65, L3-A65	K3-A63, L3-A63	K3-NM69, L3-NM69
3,05-3,81 (.120-.150)	K4-A65, L4-A65	K4-A63, L4-A63	K4-NM69, L4-NM69
3,81-4,70 (.150-.185)	K5-A65, L5-A65	K5-A63, L5-A63	K5-NM69, L5-NM69
4,70-6,22 (.185-.245)	K6-A55, L6-A55	K6-A63, L6-A63	K6-NM69, L6-NM69
6,22-7,82 (.245-.308)	K8-A55, L8-A55, Y8-A55	K8-A63, L8-A63, Y8-A63	K8-NM55, L8-NM55, *
7,82-9,40 (.308-.370)	K10-A55, L10-A55, Y10-A55	K10-A63, L10-A63, Y10-A63	K10-NM55, L10-NM55, *
9,40-12,57 (.370-.495)	K12-A55, L12-A55, Y12-A55	K12-A63, L12-A63, Y12-A63	K12-NM55, L12-NM55, *
12,57-15,72 (.495-.619)	K16-A55, L16-A55, Y16-A55	K16-A63, L16-A63, Y16-A63	K16-NM55, L16-NM55, *
15,72-18,90 (.619-.744)	K20-A55, L20-A55, P20-A55, Y20-A55	K20-A63, L20-A63, P20-A63, Y20-A63	K20-NM55, L20-NM55, P20-NM55, *
18,90-25,40 (.744-1.000)	K20-A55, L20-A55, P20-A55, Y20-A55	K20-A63, L20-A63, P20-A63, Y20-A63	K20-NM55, L20-NM55, P28-NM55, R28-NM55
25,40-26,19 (1.000-1.031)	K20-A55, L20-A55, P28-A55, R28-A55	K20-A63, L20-A63, P28-A63, R28-A63	K20-NM55, L20-NM55, P28-NM55, R28-NM55
26,19-31,75 (1.031-1.250)	K20-A55, P28-A55, R28-A55	K20-A63, P28-A63, R28-A63	K20-NM55, P28-NM55, R28-NM55
31,75-92,08 (1.250-3.625)	P28-A55, R28-A55	P28-A63, R28-A63	P28-NM55, R28-NM55
92,08-152,40 (3.625-6.000)	P28-A55, R28-A55	P28-A63, R28-A63	P28-NM55, R28-NM55
25,20-34,93 (1.031-1.250)	Y32-A55	Y32-A63	*
34,67-44,45 (1.365-1.750)	Y44-A55	Y44-A63	*
44,20-57,15 (1.740-2.250)	Y56-A55	Y56-A63	*
56,90-69,85 (2.240-2.750)	Y72-A55	Y72-A63	*
69,60-82,55 (2.740-3.250)	Y88-A55	Y88-A63	*
82,30-98,42 (3.240-3.875)	Y104-A55	Y104-A63	*
63,50-68,58 (2.500-2.700)	GR25-A45	GR25-A63	*
68,58-104,14 (2.700-4.100)	M27-A45	M27-A63	*
88,90-139,70 (3.500-5.500)	N37-A45	N37-A63	*
63,50-83,82 (2.500-3.300)	GY25-A45, GG25-A45	GY25-A63, GG25-A63	*
83,82-106,68 (3.300-4.200)	MY33-A45, MM33-A45	MY33-A63, MM33-A63	*
101,60-142,24 (4.000-5.600)	NY40-A45, NN40-A45	NY40-A63, NN40-A63	*



Stone Recommendations

For Soft Brass, Cast Iron, Bronze, Aluminum, Ceramic, and Carbide

Bore Diameter - millimeters(inches)	Soft Brass	Cast Iron, Bronze Aluminum	Ceramic & Carbide
1,52-2,03 (.060-.080) 2,03-2,54 (.080-.100)	D6-J63 D8-J63	D6-J67 D8-J67	D6-DM57 D8-DM57
2,54-3,05 (.100-.120)	K3-J63, L3-J63	K3-J67, L3-J67	K3-DM57, L3-DM57
3,05-3,81 (.120-.150)	K4-J63, L4-J63	K4-J67, L4-J67	K4-DM57, L4-DM57
3,81-4,70 (.150-.185)	K5-J63, L5-J63	K5-J57, L5-J57	K5-DM57, L5-DM57
4,70-6,22 (.185-.245)	K6-J63, L6-J63	K6-J57, L6-J57	K6-DM57, L6-DM57
6,22-7,82 (.245-.308)	K8-J63, L8-J63, Y8-J63	K8-J57, L8-J57, Y8-J57	K8-DM55, L8-DM55, **
7,82-9,40 (.308-.370)	K10-J63, L10-J63, Y10-J63	K10-J57, L10-J57, Y10-J57	K10-DM55, L10-DM55, **
9,40-12,57 (.370-.495)	K12-J63, L12-J63, Y12-J63	K12-J57, L12-J57, Y12-J57	K12-DM55, L12-DM55, **
12,57-15,72 (.495-.619)	K16-J63, L16-J63, Y16-J63	K16-J57, L16-J57, Y16-J57	K16-DM55, L16-DM55, **
15,72-18,90 (.619-.744)	K20-J63, L20-J63, P20-J63, Y20-J63	K20-J57, L20-J57, P20-J57, Y20-J57	K20-DM55, L20-DM55, P20-DM55, **
18,90-25,40 (.744-1.000)	K20-J63, L20-J63, P20-J63, Y20-J63	K20-J57, L20-J57, P20-J57, Y20-J57	K20-DM55, L20-DM55, P28-DM55, R28-DM55
25,40-26,19 (1.000-1.031)	K20-J63, L20-J63, P28-J63, R28-J63	K20-J57, L20-J57, P28-J57, R28-J57	K20-DM55, L20-DM55, P28-DM55, R28-DM55
26,19-31,75 (1.031-1.250)	K20-J63, P28-J63, R28-J63	K20-J57, P28-J57, R28-J57	K20-DM55, P28-DM55, R28-DM55
31,75-92,08 (1.250-3.625)	P28-J63, R28-J63	P28-J57, R28-J57	P28-DM55, R28-DM55
92,08-152,40 (3.625-6.000)	P28-J63, R28-J63	P28-J57, R28-J57	P28-DM55, R28-DM55
25,20-34,93 (1.031-1.250)	Y32-J63	Y32-J57	**
34,67-44,45 (1.365-1.750)	Y44-J63	Y44-J57	**
44,20-57,15 (1.740-2.250)	Y56-J63	Y56-J57	**
56,90-69,85 (2.240-2.750)	Y72-J63	Y72-J57	**
69,60-82,55 (2.740-3.250)	Y88-J63	Y88-J57	**
82,30-98,42 (3.240-3.875)	Y104-J63	Y104-J57	**
63,50-68,58 (2.500-2.700)	GR25-J63	GR25-J45	G25-DV57
68,58-104,14 (2.700-4.100)	M27-J63	M27-J45	M27-DV57
88,90-139,70 (3.500-5.500)	N37-J63	N37-J45	N37-DV57
63,50-83,82 (2.500-3.300)	GY25-J45, GG25-J45	GY25-J45, GG25-J45	**
83,82-106,68 (3.300-4.200)	MY33-J45, MM33-J45	MY33-J45, MM33-J45	**
101,60-142,24 (4.000-5.600)	NY40-J45, NN40-J45	NY40-J45, NN40-J45	**



Stone Recommendations

For Glass

Bore Diameter - millimeters(inches)	Glass	Spindle Speed (RPM Max)
1,52-2,03 (.060-.080)	D6-DM57	3000
2,03-2,54 (.080-.100)	D8-DM57	3000
2,54-3,05 (.100-.120)	K3-DM57, L3-DM57	3000
3,05-3,81 (.120-.150)	K4-DM57, L4-DM57	3000
3,81-4,70 (.150-.185)	K5-DM57, L5-DM57	3000
4,70-6,22 (.185-.245)	K6-DM57, L6-DM57	3000
6,22-7,82 (.245-.308)	K8-DM55, L8-DM55, **	3000
7,82-9,40 (.308-.370)	K10-DM55, L10-DM55, **	2000
9,40-12,57 (.370-.495)	K12-DM55, L12-DM55, **	1600 to 2000
12,57-15,72 (.495-.619)	K16-DM55, L16-DM55, **	1270
15,72-18,90 (.619-.744)	K20-DM55, L20-DM55, P20-DM55, **	1000
18,90-25,40 (.744-1.000)	K20-DM55, L20-DM55, P28-DM55, R28-DM55	800
25,40-26,19 (1.000-1.031)	K20-DM55, L20-DM55, P28-DM55, R28-DM55	640
26,19-31,75 (1.031-1.250)	K20-DM55, P28-DM55, R28-DM55	640
31,75-92,08 (1.250-3.625)	P28-DM55, R28-DM55	640 to 500
92,08-152,40 (3.625-6.000)	P28-DM55, R28-DM55	200
25,20-34,93 (1.031-1.250)	**	640 to 500
34,67-44,45 (1.365-1.750)	**	500 to 400
44,20-57,15 (1.740-2.250)	**	400 to 320
56,90-69,85 (2.240-2.750)	**	320 to 250
69,60-82,55 (2.740-3.250)	**	250
82,30-98,42 (3.240-3.875)	**	200
63,50-68,58 (2.500-2.700)	G25-DV57	250
68,58-104,14 (2.700-4.100)	M27-DV57	200
88,90-139,70 (3.500-5.500)	N37-DV57	200
63,50-83,82 (2.500-3.300)	**	200
83,82-106,68 (3.300-4.200)	**	200
101,60-142,24 (4.000-5.600)	**	200



Stone Recommendations

For Fine Finishing in Previously Honed Holes

Bore Diameter - millimeters(inches)	Hard Steel Soft Brass	Soft Steel, Bronze Aluminum, Cast Iron	Ceramic & Carbide
1,52-2,03 (.060-.080) 2,03-2,54 (.080-.100)	D6-J93 D8-J93	D6-J95 D8-J95	D6-DR07 D8-DR07
2,54-3,05 (.100-.120)	K3-J93, L3-J93	K3-J95, L3-J95	K3-DR07, L3-DR07
3,05-3,81 (.120-.150)	K4-J93, L4-J93	K4-J95, L4-J95	K4-DR07, L4-DR07
3,81-4,70 (.150-.185)	K5-J93, L5-J93	K5-J95, L5-J95	K5-DR07, L5-DR07
4,70-6,22 (.185-.245)	K6-J93, L6-J93	K6-J95, L6-J95	K6-DR07, L6-DR07
6,22-7,82 (.245-.308)	K8-J93, L8-J63, Y8-J93	K8-J95, L8-J65, Y8-J95	K8-DR05, L8-DR05, **
7,82-9,40 (.308-.370)	K10-J93, L10-J93, Y10-J93	K10-J95, L10-J95, Y10-J95	K10-DR05, L10-DR05, **
9,40-12,57 (.370-.495)	K12-J93, L12-J93, Y12-J93	K12-J95, L12-J95, Y12-J95	K12-DR05, L12-DR05, **
12,57-15,72 (.495-.619)	K16-J93, L16-J93, Y16-J93	K16-J95, L16-J95, Y16-J95	K16-DR05, L16-DR05, **
15,72-18,90 (.619-.744)	K20-J93, L20-J93, P20-J93, Y20-J93	K20-J95, L20-J95, P20-J95, Y20-J95	K20-DR05, L20-DR05, P20-DR05, **
18,90-25,40 (.744-1.000)	K20-J93, L20-J93, P20-J93, Y20-J93	K20-J95, L20-J95, P20-J95, Y20-J95	K20-DR05, L20-DR05, P20-DR05, **
25,40-26,19 (1.000-1.031)	K20-J93, L20-J93, P28-J93, R28-J93	K20-J95, L20-J95, P28-J95, R28-J95	K20-DR05, L20-DR05, P28-DR05, R28-DR05
26,19-31,75 (1.031-1.250)	K20-J93, P28-J93, R28-J93	K20-J95, P28-J95, R28-J95	K20-DR05, P28-DR05, R28-DR05
31,75-92,08 (1.250-3.625)	P28-J93, R28-J93	P28-J95, R28-J95	P28-DR05, R28-DR05
92,08-152,40 (3.625-6.000)	P28-J93, R28-J93	P28-J95, R28-J95	P28-DR05, R28-DR05
25,20-34,93 (1.031-1.250)	Y32-J93	Y32-J95	**
34,67-44,45 (1.365-1.750)	Y44-J93	Y44-J95	**
44,20-57,15 (1.740-2.250)	Y56-J93	Y56-J95	**
56,90-69,85 (2.240-2.750)	Y72-J93	Y72-J95	**
69,60-82,55 (2.740-3.250)	Y88-J93	Y88-J95	**
82,30-98,42 (3.240-3.875)	Y104-J93	Y104-J95	**
63,50-68,58 (2.500-2.700)	GR25-J85	GR25-J87	G25-DV87**
68,58-104,14 (2.700-4.100)	M27-J85	M27-J87	M27-DV87**
88,90-139,70 (3.500-5.500)	N37-J85	N37-J87	N37-DV87**
63,50-83,82 (2.500-3.300)	GY25-J85, GG25-J85	GY25-J85, GG25-J85	**
83,82-106,68 (3.300-4.200)	MY33-J85, MM33-J85	MY33-J85, MM33-J85	**
101,60-142,24 (4.000-5.600)	NY40-J85, NN40-J85	NY40-J85, NN40-J85	**



Stone Recommendations


For Fine Finishing in Previously Honed Holes, Continued

Bore Diameter - millimeters(inches)	Glass	Spindle Speed (RPM Max)
1,52-2,03 (.060-.080)	D6-DR07	3000
2,03-2,54 (.080-.100)	D8-DR07	3000
2,54-3,05 (.100-.120)	K3-DR07, L3-DR07	3000
3,05-3,81 (.120-.150)	K4-DR07, L4-DR07	3000
3,81-4,70 (.150-.185)	K5-DR07, L5-DR07	3000
4,70-6,22 (.185-.245)	K6-DR07, L6-DR07	3000
6,22-7,82 (.245-.308)	K8-DR05, L8-DR05, **	3000
7,82-9,40 (.308-.370)	K10-DR05, L10-DR05, **	2000
9,40-12,57 (.370-.495)	K12-DR05, L12-DR05, **	1600 to 2000
12,57-15,72 (.495-.619)	K16-DR05, L16-DR05, **	1270
15,72-18,90 (.619-.744)	K20-DR05, L20-DR05, P20-DR05, **	1000
18,90-25,40 (.744-1.000)	K20-DR05, L20-DR05, P20-DR05, **	800
25,40-26,19 (1.000-1.031)	K20-DR05, L20-DR05, P28-DR05, R28-DR05	640
26,19-31,75 (1.031-1.250)	K20-DR05, P28-DR05, R28-DR05	640
31,75-92,08 (1.250-3.625)	P28-DR05, R28-DR05	640 to 500
92,08-152,40 (3.625-6.000)	P28-DR05, R28-DR05	200
25,20-34,93 (1.031-1.250)	**	640 to 500
34,67-44,45 (1.365-1.750)	**	500 to 400
44,20-57,15 (1.740-2.250)	**	400 to 320
56,90-69,85 (2.240-2.750)	**	320 to 250
69,60-82,55 (2.740-3.250)	**	250
82,30-98,42 (3.240-3.875)	**	200
63,50-68,58 (2.500-2.700)	G25-DV87**	250
68,58-104,14 (2.700-4.100)	M27-DV87**	200
88,90-139,70 (3.500-5.500)	N37-DV87**	200
63,50-83,82 (2.500-3.300)	**	200
83,82-106,68 (3.300-4.200)	**	200
101,60-142,24 (4.000-5.600)	**	200



Honing Oils and Coolants

Selection/Information Charts

Process	Recommended Honing Oil 	MB-30	MAN-863	MAN-852	GK3X	SF	SCC-405	SCC-205	SCC-605
		KROSSGRINDING®	Yes	Yes	Yes	Yes	Yes(2)	Yes(1)	Yes(1)
	SINGLE STROKE HONING®	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
	Grinding	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
	Broaching	Yes	Yes	Yes	Yes	No	No	No	No
	Gun Drilling	Yes	Yes	Yes	Yes	No	No	No	No
	Milling	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Drilling	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Turning	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Superfinishing	No	No	No	No	Yes	No	No	No
	Use as Additive	Yes	Yes	Yes	Yes	No	N/A	N/A	N/A
	Use as Base	No	No	No	No	No	N/A	N/A	N/A
Material	Alnico	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Aluminum	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Beryllium	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Brass	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Bronze	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Carbide	Yes	Yes	Yes	Yes	(3)	Yes	Yes	Yes
	Carbon	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Cast Iron (soft)	Yes	Yes	Yes	Yes	Yes	No	No	Yes
	Cast Iron (hard)	Yes	Yes	Yes	Yes	Yes	No	No	Yes
	Ceramic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Cobalt	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Ferrite	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Glass	Yes	Yes	Yes	Yes	(3)	Yes	Yes	Yes
	Inconel	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Molybdenum	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Nickasil Plating	Yes	Yes	Yes	Yes	(3)	Yes	Yes	Yes
	Nylon	Yes	Yes	Yes	Yes	(3)	Yes	Yes	Yes
	Plexiglass	Yes	Yes	Yes	Yes	(3)	Yes	Yes	Yes
	Polycarbonate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Silver	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Steel (soft)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Steel (hard)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stellite	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Quartz	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Titanium	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Zirconium	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	



Honing Oils and Coolants

Selection/Information Charts, continued...

	MB-30	MAN-863	MAN-852	GK3X	SF	SCC-405	SCC-205	SCC-605
Hazardous OSHA	Yes	No	No	No	Yes	Yes	Yes	Yes
Hazardous DOT	No	No	No	No	No	No	No	No
Mineral Oil	Yes	No	No	No	Yes	Yes	No	No
Sulfur	Yes	Yes	No	No	No	No	No	No
Chlorine	No	No	No	No	No	No	No	No
Viscosity	125	125	150	125	46	Water	Water	Water
Pails 18,9 L (5 gal)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Drums 209,21 L (55 gal)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Returnable Totes 155 L (330 gal)	Yes	Yes	Yes	Yes	Yes	No	No	No
Disposable Totes	Yes	No	No	No	No	No	Yes	Yes
St. Louis, MO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Los Angeles, CA	Yes	No	Yes	No	No	No	No	No
Atlanta, GA	Yes	No	No	No	No	No	No	No
Detroit, MI	Yes	No	No	No	No	No	No	No
Boston, MA	Yes	No	No	No	No	No	No	No
Grand Island, NB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sunnen – United Kingdom	Yes	*	*	*	*	No	*	*
Sunnen AG - Switzerland	Yes	*	*	*	*	No	*	*
Sunnen Italia – Milan, Italy	Yes	*	*	*	*	No	*	*
Sunnen Shanghai – Shanghai, China	Yes	*	*	*	*	No	*	*

(1) Requires metalbond abrasive. (2) Depends on material. (3) Insufficient data available for recommendation.
 Estimated shipping weight: Pails – 182, KG (40 lbs.) Drums – 182KG (400 lbs.) Totes – 1180 KG (2600 lbs.)
 *Check with distributor for this honing fluids availability.





For more information about Sunnen honing solutions:

Sunnen Products Company, U.S.A. – (800) 6-SUNNEN or (314) 781-2100

Sunnen AG, Switzerland – ++41 71 648 16 16

Sunnen Products Limited, U. K. – ++44 1442 39 39 39

Shanghai Sunnen Mechanical Co. Ltd., China – 86-21-5-813-3322

Sunnen Italia, Italy – 39-02-383-417-44

