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(800) 544-9070 • (734) 261-7970 • Fax (734) 261-2028

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PLEASE CONTACT SIDLEY DIAMOND TOOL COMPANY FOR A PRINTED CATALOG.

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SIDLEY DIAMOND TOOL COMPANY

DIAMOND TOOLS



Experience Sidley Quality

MANUFACTURERS OF INDUSTRIAL DIAMOND & CBN PRODUCTS

American Made and Owned Since 1956

**32320 FORD ROAD GARDEN CITY, MI 48135
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History of Sidley

Founded in 1956 by George Sidley and located in Garden City, Michigan, it manufactures Industrial Diamond and CBN Tool products.

Its customer base includes: Automotive, Farm Implements, Aircraft, Bearing and

Aerospace Industries and Job Shops.

It is known for its Leading Innovations as well as Technical Field Support, Service Orientation, Reliable Dependability, Excellent Pricing and Delivery.

DIAMOND QUALITY CLASSIFICATION

- AA 3 to 4 Resettable Points
- A 2 to 3 Resettable Points
- B 1 to 2 Resettable Points
- C Throw Away, Non Resettable

- "AA" Series** —Finest Quality Industrial Diamond. Recommended where very close tolerances and high quality are necessary.
- "A" Series** —Fine Quality Industrial Diamond. Recommended for general grinding operations.
- "B" Series** —Medium Quality Industrial Diamond. Recommended for economical wheel dressing where an all-purpose tool is required.
- "C" Series** —Economy Quality Industrial Diamond. Non resettable (throw away).

Note: Call for our more detailed Diamond Classification sheet.

SIDLEY STANDARD DIAMOND DRESSING TOOLS



SINGLE POINT



STANDARD SHANK: 7/16" x 2" Lg.
Also available in any fraction or mm size upon request.

Ordering
Example -
SP-AA-25
7/16" x 2"



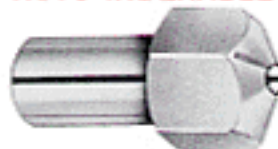
SINGLE POINT HEAD



STANDARD SHANK: 7/16" x 1" Lg.
DIA. HEAD: 5/8"



ROTO-INDEXABLE HEAD



SR = SIDLEY ROTO

STANDARD SHANK: 7/16" x 3/4" Lg.
HEX HEAD: 5/8"



ROTO-INDEXABLE HEAD



SMR = SIDLEY MINI ROTO

STANDARD SHANK:
1/4" x 3/4" Lg.
HEX HEAD: 7/16" or
3/8"

Single set and Roto-indexable hex head tools should be rigidly mounted at an angle of 10° to 15° with a line drawn through the center of the wheel, pointing in the direction of the wheel rotation. Point of contact should be slightly below the center of wheel as shown.

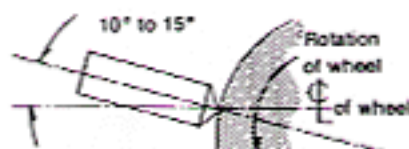
Approx. Ct. Wt.	Tool No.	Tool No.	Tool No.	Tool No.
.05	AA-05	A-05	B-05	C-05
.10	AA-10	A-10	B-10	C-10
.15	AA-15	A-15	B-15	C-15
.20	AA-20	A-20	B-20	C-20
.25	AA-25	A-25	B-25	C-25
.30	AA-30	A-30	B-30	C-30
.50	AA-50	A-50	B-50	C-50
.75	AA-75	A-75	B-75	C-75
*1.00-UP	AA-100	A-100	B-100	C-100

*1 carat and larger quoted on request.

Most single point diamond dressing tools are resettable or reworkable. Please call our Toll Free number with any questions 1-800-544-9070.

Resetting or relapping services available.

MOUNTING INSTRUCTIONS





SIDLEY RADIUS TOOLS Concave and Convex Dressing



CONCAVE RADIUS



SHANK: 3/8" x 3" Lg.



WHEEL
FACE

Ordering Example - CR-10

Tool No.	Radius Size To Form
CR-10	.010-.015
CR-15	.015-.020
CR-20	.020-.031
CR-31	.031-.062
CR-62	.062-.125
CR-125	.125-.250
CR-250	.250-.500
CR-500	.500+



HALF CIRCLE CONCAVE RADIUS



SHANK: 3/8" x 3" Lg.



WHEEL
FACE

Ordering Example - RT-1

Tool No.	Radius Size To Form
RT-1	.032-.062
RT-2	.063-.101
RT-3	.102-.187
RT-4	.188-.250
RT-5	.250-.500



CONVEX RADIUS



SHANK: 3/8" x 2" Lg.



WHEEL
FACE

Ordering Example - CV-2

Tool No.	Radius Size To Form
CV-2	.020-.125
CV-12	.125-.250
CV-25	.250-.500
CV-50	.500+

The above listed tools are the most commonly used, however, other special variations of radii, length of shank and included angles are available upon request.

STANDARD THREAD GRINDER TOOLS



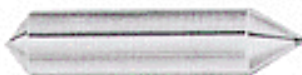
STANDARD SHANK:
1/4" x 1" Lg.

Jones & Lamson

Ordering Example - JLS

Tool No.	Type Diamond	Maximum Radius On Point
JLS	Natural Crystal	.010

Note: Non-Resettable



STANDARD SHANK:
3/8" x 1-5/8" Lg.

Excello

Ordering Example -
XLO-48-4105

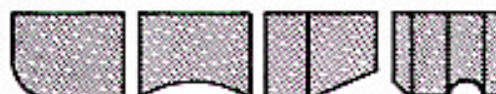
Excello Tool No.	Type Diamond	Maximum Radius On Point
48-4105	Natural Crystal	.010
*48-4128	Natural Crystal	.006

*Note: Quoted on request.

SIDLEY PHONO POINT TOOLS Concave and Convex Dressing



STANDARD SHANK:
1/8" x 1" Lg.



WHEEL
FACE



WHEEL
FACE



WHEEL
FACE



WHEEL
FACE

Ordering Example - PP-60°HD

USED TO DRESS TOOL ROOM WHEELS 7" DIAMETER & UNDER

Included Angle On Diamond
60°
75°
90°
60° H.D.
75° H.D.
90° H.D.

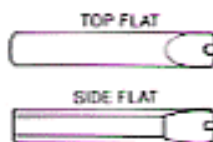
Note: H.D. = Heavy Duty
Non-Resettable

Shank tolerance standard for all tools +.000-.002 Ø. Overall length ±.010.

CHISEL POINT Profile Dressing



STANDARD SHANK:
7/16" x 2" Lg.



Ordering Example - CH-60° x .002 Radius 7/16" x 2"

Tool No.	Included Angle On Diamond	Radius Size
CH	60°	.002-.030
CH	75°	.002-.030
CH	90°	.002-.030

Note: Radius Tolerance = ± .001

CONE POINT Profile Dressing



STANDARD SHANK: 3/8" x 2" Lg.

Ordering Example - CP-60° x .002 Radius 3/8" x 2"

Tool No.	Included Angle On Diamond	Radius Size
CP	60°	.002-.030
CP	70°	.002-.030
CP	90°	.002-.030

FULL BALL RADIUS Profile Dressing



STANDARD SHANK: 3/8" x 2" Lg.

Ordering Example - FB-.010 Radius 3/8" x 2"

Full ball radius tools are designed to plunge dress a concave full 180° radius in a grinding wheel. Frequent turning of the tool will help maintain it over a long period of time.

Tool No.	Radius Size
FB	.010-.062

*Specify radius size when ordering.

DIAFORM Profile Dressing



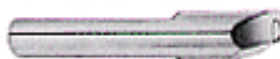
STANDARD SHANK:
3/8" x 1-3/4" Lg.

*Shanks also available in 1-3/8" and 2-1/4" at no additional cost.

Tool No.	Included Angle	Radius Size
DF	30°	.005-.030
DF	40°	.005-.030
DF	60°	.005-.030

Ordering Example - DF-40° x .005 Radius 3/8" x 1-3/4"

MOORE PANTOGRAPH Profile Dressing



Ordering Example - MO-30° x .005 Radius

Tool No.	Included Angle	Radius Size
MO	30°	.005-.030
MO	40°	.005-.030
MO	60°	.005-.030
MO	90°	.005-.030

HOGLUND Profile Dressers



Ordering Example - HG-42° x .005 Radius

Tool No.	Included Angle	Radius Size
HG	42°	.005-.030
HG	48°	.005-.030
HG	60°	.005-.030
HG	72°	.005-.030

Shank tolerance standard for all tools +.000-.002 Ø. Overall length ±.010.

J & L Profile Dressing



Ordering Example - J&L-1-50° x .005 Radius

Tool No.	Included Angle	Radius Size
J&L-1	50°	.005-.030*
J&L-2	40°	.005-.030*
J&L-3	30°	.005-.030*

SIDLEY BLADE DRESSERS Profile, Step and Radius Dressing



BTM-3-15°



BTM-3-0°

Any angle
please specify

Ordering Example - BTM-3-15°

*Manufactured to customer specifications

Style	Size Of Dia.	No. Of Dias.	Angle
BT	S,M,L	1,2,3,4,5	0° thru 15°
BT	S,M,L	1,2,3,4,5	0° thru 15°
BT	S,M,L	1,2,3,4,5	0° thru 15°

S = Small .03-.05 cts. ea.
M = Medium .06-.09 cts. ea.
L = Large .10-.15 cts. ea.

PROFILE BLADE INSERT DIAMOND DRESSER



PBH-3-M



11/16 Hexagon

RECTANGLE



PBR-2-M

CIRCLE



PBC-8-M



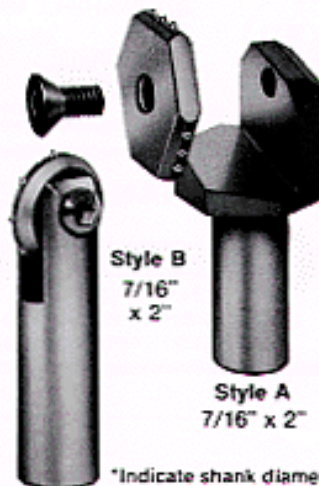
5/8 Rd.

Style	No. of Dias.	Size Of Dia.
PBH	2,3,4	S,M,L
PBR	2,3,4	S,M,L
PBC	6,8,10	S,M,L

S = Small .03-.05 cts. ea.
M = Medium .06-.09 cts. ea.
L = Large .10-.15 cts. ea.

Ordering Example - PBH-2 - Small

HOLDERS



Style B
7/16" x 2"

Style A
7/16" x 2"

*Indicate shank diameter

CLUSTER Straight Dressing



STANDARD SHANK:
7/16" x 1" Lg.
5/8" HEAD



MOUNTING INSTRUCTIONS



Ordering Example - SD-5

Tool No.	Number Of Layers	Number Of Diamonds
SD-5	1	5
SD-7	1	7
MD-15	3	15
MD-21	3	21

Cluster tools are suited for straight face dressing on centerless and cylindrical operations. For greatest efficiency, the tool should be mounted as shown. To improve tool life the tool should be indexed 10°-20° as required.

Shank tolerance standard for all tools +.000-.002 Ø. Overall length ±.010.

SIDLEY BLAST TOOLS For Large Grinding Wheels 20" x 6" wide and larger



STANDARD SHANK:
7/16" x 1" Lg.

Ordering Example: SB - 7/16" x 1" Lg.

BALL NOSE TOOLS For Heavy Dressing



STANDARD SHANK:
7/16" x 2" Lg.

Designed for dressing extremely hard coarse grinding wheels for cylindrical, centerless and surface grinders.

Ordering Example:
BN-1 - 7/16" x 2" Lg.

Tool No.	Wheel Size	Diamond Section
BN-1	14 x 2	1/4 Dia x 3/8 Dd*
BN-2	18 x 2	5/16 Dia. x 3/8 Dd*
BN-3	20 x 3	3/8 Dia. x 3/8 Dd*

*Diamond depth

HARDNESS TESTER For Rockwell Testers



Are used for checking the exact hardness of all metals for Rockwell Scale A, B and C.

*Quoted on request.

SPECIAL DIAMOND TOOLS BURNISHING, MARPOSS GAGE TOOLS, AND REISHAUER



*Quoted on request.



HAND DRESSER



STANDARD SHANK: 1/2" x 6" Lg.
Hand dressers are used to remove excessive abrasive material on grinding wheels.

DRESSING FIXTURE BLOCK

0° and 15°
Settings

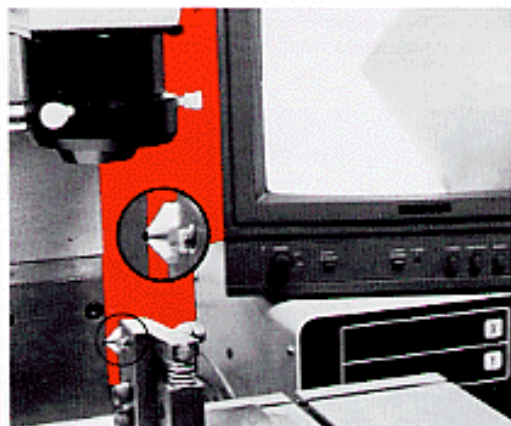


Specify hole size.

*Available upon request.

Shank tolerance standard for all tools +.000-.002 Ø. Overall length ±.010.

SIDLEY QUALITY PROGRAM

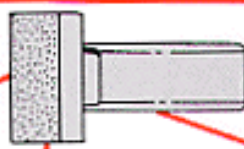


Our Quality Program is based on problem prevention instead of problem detection.

The Quality Program consists of the following: Documented Procedures, Internal Audits, Gage Calibration, FMEA's, SPC (Statistical Process Control) Charts, Internal Scrap/Rework System (Tag System), Machine Maintenance, Dock Audits, Tracking of Deliveries, and a System for Resolving Customer Problems by employee participation.

Through these methods, we are continuously improving our products. This Quality Program system is used to maintain Sidley Diamond Tool's enviable reputation for exceptional quality throughout the 1990's and beyond.

SIDLEY IMPREGNATED TOOLS



ORDERING EXAMPLE:
1A-6-A7

1A

The number assigned from 1 to 3, pertains to the overall dimension of the diamond section. The letter pertains to the shape of the diamond section. See Shapes below.

6

Diamond Size
No. 4 for 46 grit size wheels
No. 6 for 54 to 100 grit size wheels
No. 8 for 120 and finer grit size wheels
No. 12 for special applications.

A

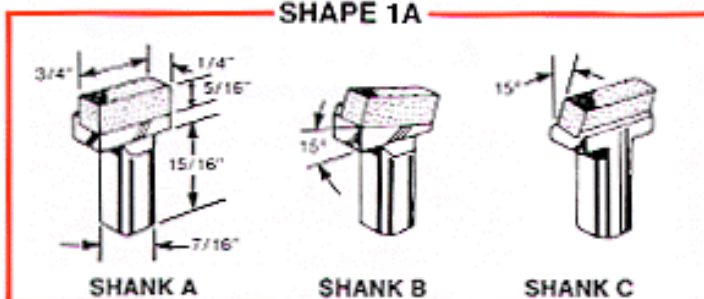
Shank Design
A-P
See Shank Designs at bottom of page.

7

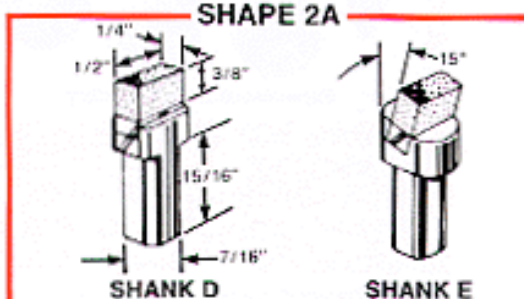
Shank Diameter
6 = 3/8"
7 = 7/16"
8 = 1/2"

SHANK DESIGNS

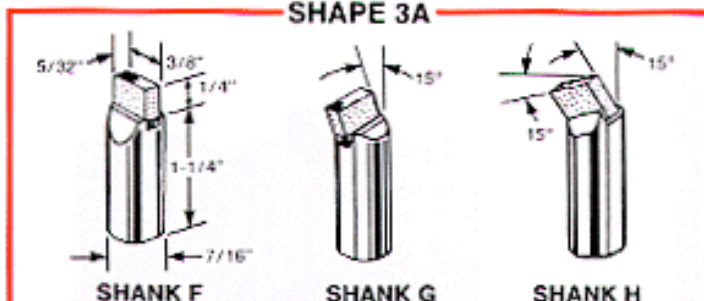
SHAPE 1A



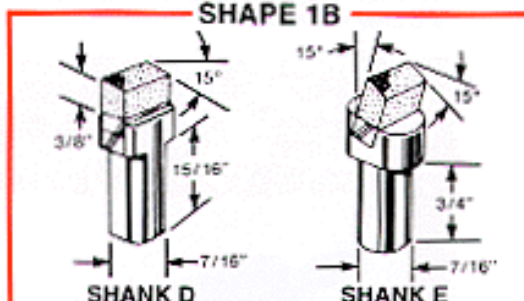
SHAPE 2A



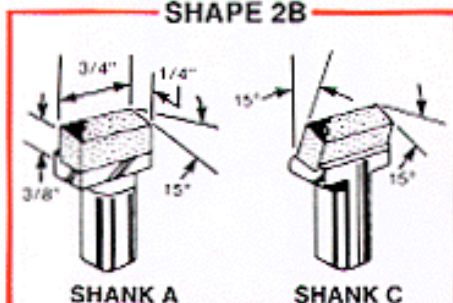
SHAPE 3A



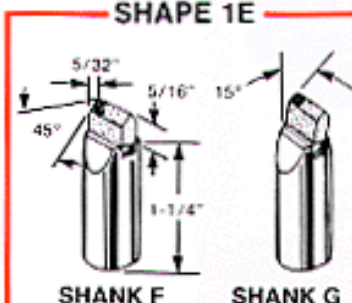
SHAPE 1B



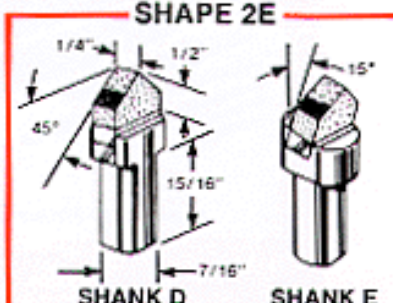
SHAPE 2B



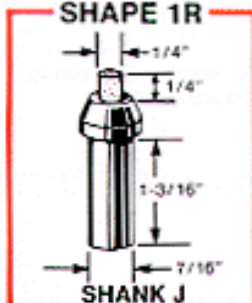
SHAPE 1E



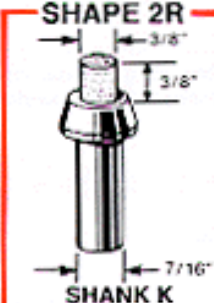
SHAPE 2E



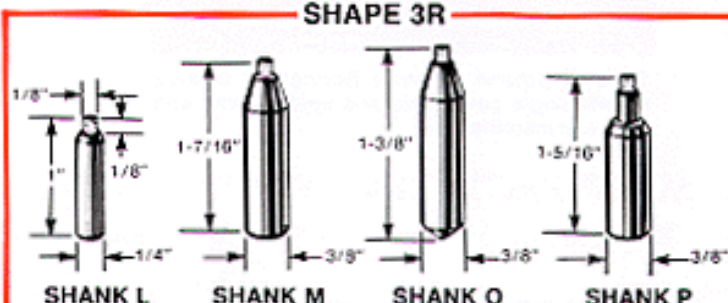
SHAPE 1R



SHAPE 2R



SHAPE 3R

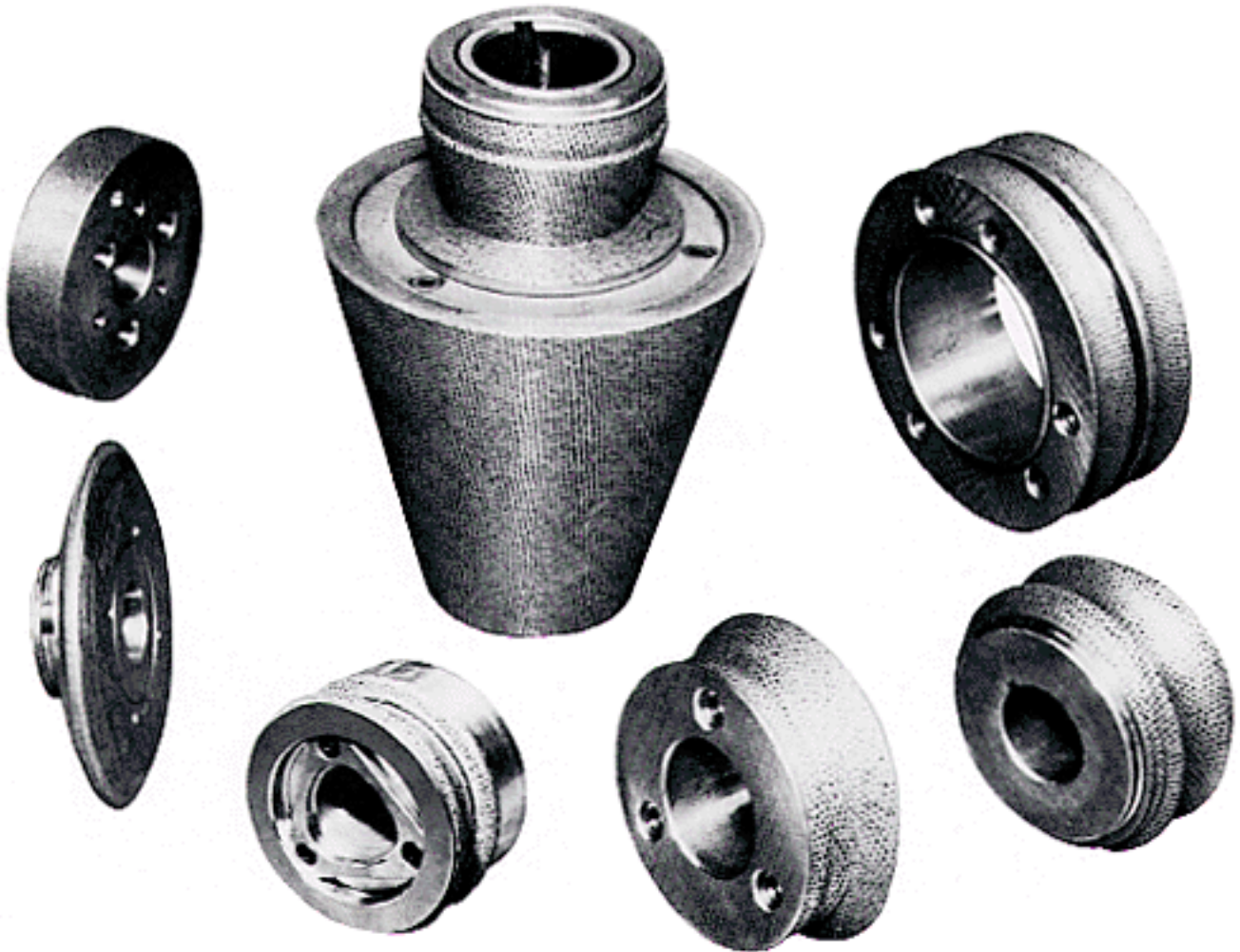


Shank tolerance standard for all tools +.000-.002 ϕ . Overall length $\pm .010$.



SIDLEY DIAMOND TOOL COMPANY

DIAMOND DRESSING ROLLS



Experience Sidley Quality

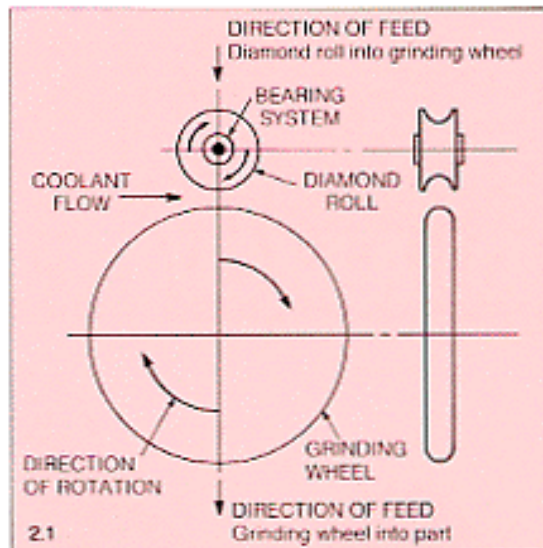
MANUFACTURERS OF INDUSTRIAL DIAMOND & CBN PRODUCTS

American Made and Owned Since 1956

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WHAT IS A DIAMOND DRESSING ROLL

A Sidley diamond dressing roll is a cylindrical tool with diamond particles embedded in the periphery. The diamond area is qualified to the required form and then is ready to use. In use, the roll is rotated and fed into the grinding wheel forming the abrasive grain of the wheel along with removal of embedded metal. The advantages of using this type of product versus single point tools or crush dressing is its speed (3 to 5 seconds to dress), a tool life of thousands of parts, and consistency of parts produced.

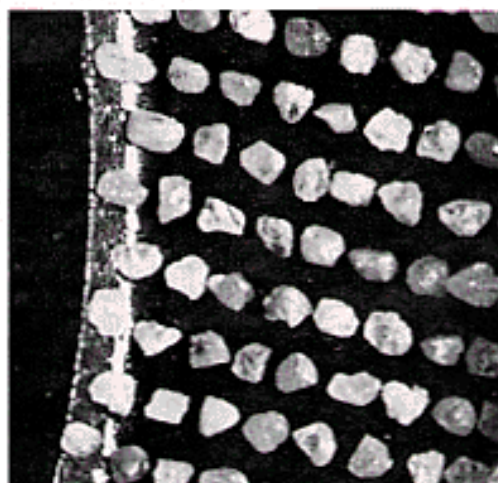


WHO USES DIAMOND DRESSING ROLLS?

Sidley diamond dressing rolls are now being used in a wide variety of industries such as • Aircraft/ Aerospace • Automotive • Farm and Off Road Equipment • Bearing • Tool & Die and other related industries. Sidley diamond dressing rolls are also being used to retrue CBN wheels.



2.2



2.3

STEPS IN THE PRODUCTION OF A SINTERED DIAMOND ROLL

After engineering, the first step in the manufacturing process is to produce a mold of the inverse profile. The internal area of the mold is then lined with diamonds by one of three methods of construction. It is then pressure packed with a super-tough matrix (base metal tungsten) and sintered. A cooling process

allows the matrix to tightly encapsulate the diamond. Then the mold is removed producing a diamond dresser with the diamonds on the periphery exterior. The next step is to bore and grind the dresser body, finally the profile of the roll is qualified through grinding to the customer's specifications.

FOUR BASIC STYLES OF DIAMOND ROLL CONSTRUCTION

Each type of diamond roll construction listed below has its own specific application. Generally as a rule, as the diamond size increases, so will the life of the roll; as the diamond size is reduced the finishing capabilities

are increased, but the life of the roll decreases. The type of roll to be purchased is determined by part piece finish and grinding wheel specifications.

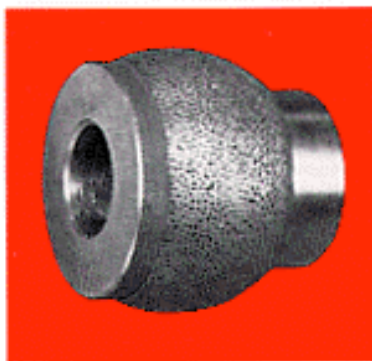
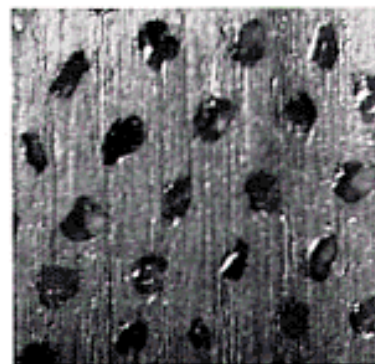


PATTERN HAND-SET

This is the most widely accepted type of roll in the industry. It is a single layer of diamonds that are individually placed (Fig. 2.2) in an interlocking uniform pattern. Having an engineered pattern ensures even diamond coverage throughout the periphery allowing for a more consistent finish on the ground product. The diamond size when using this method can vary from as large as 16 mesh (.039"), to as small as 35 mesh (.019"). Unless specified Sidley diamond rolls will use 18 to 20 mesh stones for this type of roll.

3.1

3.1(a)

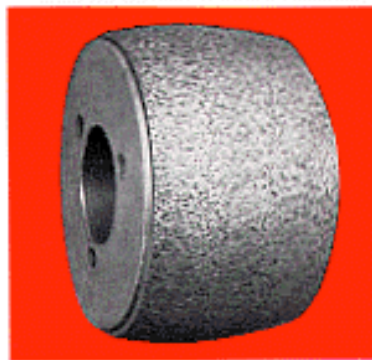
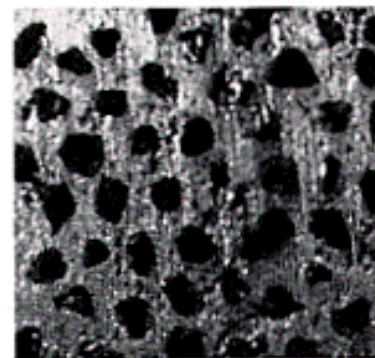


RANDOM HAND-SET

Used occasionally when production set-up is in a developmental stage. It is a single layer of diamonds placed at random in a non-uniform pattern. Manufactured in the same manner as pattern hand-set, smaller stones can be used, 45 mesh (.013") although an interlocking pattern cannot be guaranteed.

3.2

3.2(b)

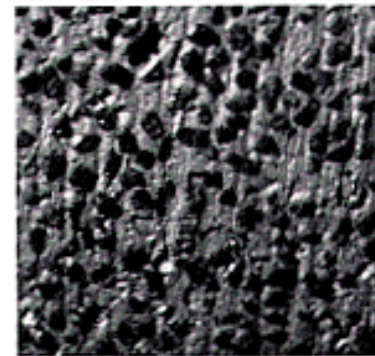


IMPREGNATED

Multiple layers of diamonds randomly dispersed in a non-uniform pattern. This type of roll can be requalified at least 4 times with a minimum depth of 1/16". The impregnated depth and concentration of diamond is adjustable to the customer's needs. Smaller diamonds, 80 mesh (.007") can be employed resulting in better finishes.

3.3

3.3(c)



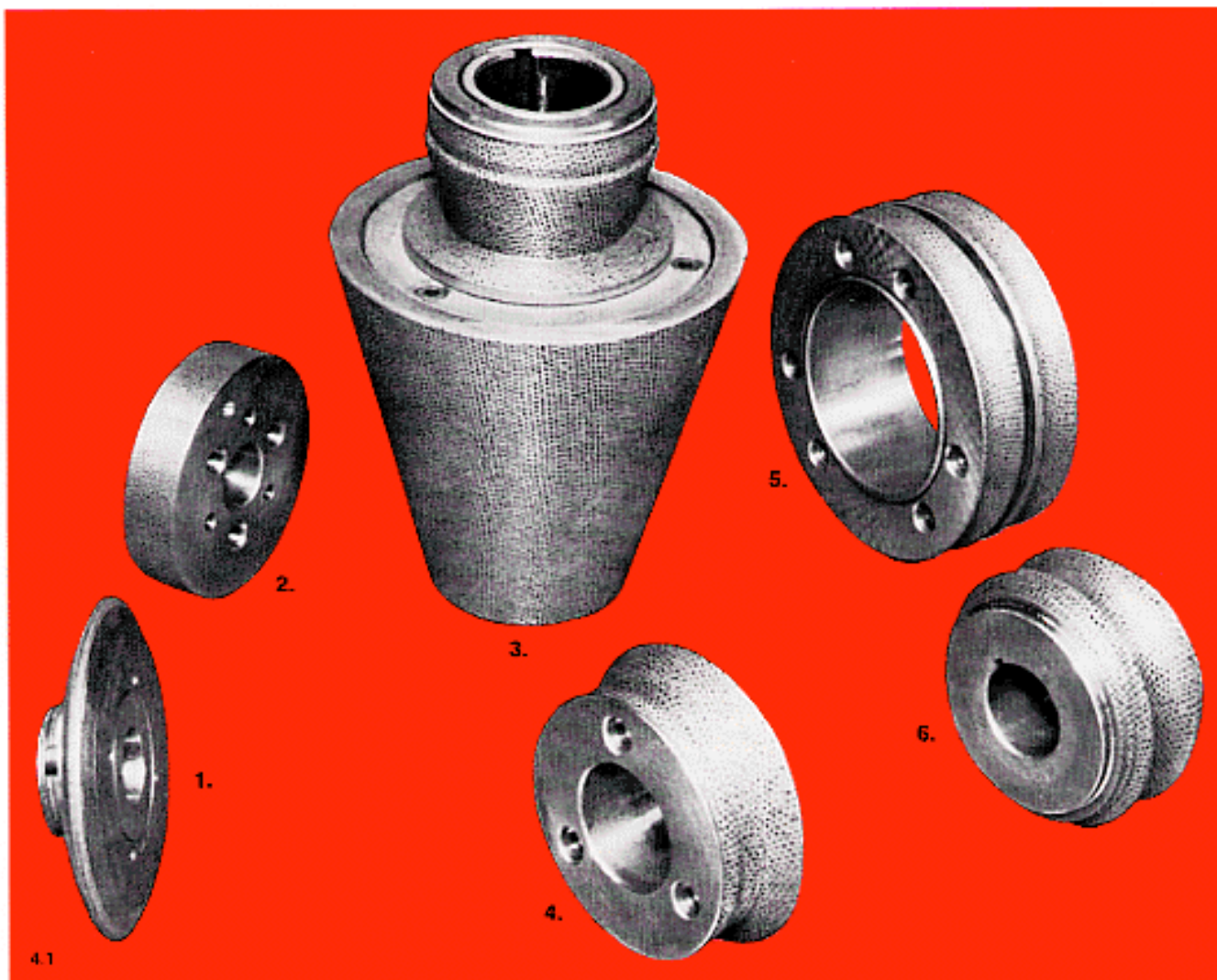
REVERSE PLATED

A single layer of diamonds can be manufactured either in a pattern or random dispersment. The matrix of a reverse plated roll is a nickel based alloy. The core of the roll is cast by use of a low temperature alloy and is not sintered. The high concentration of diamonds prevents the erosion of the matrix, increasing tool life in some cases. These rolls cannot be requalified and they need to be used on rigid equipment in top condition.

3.4

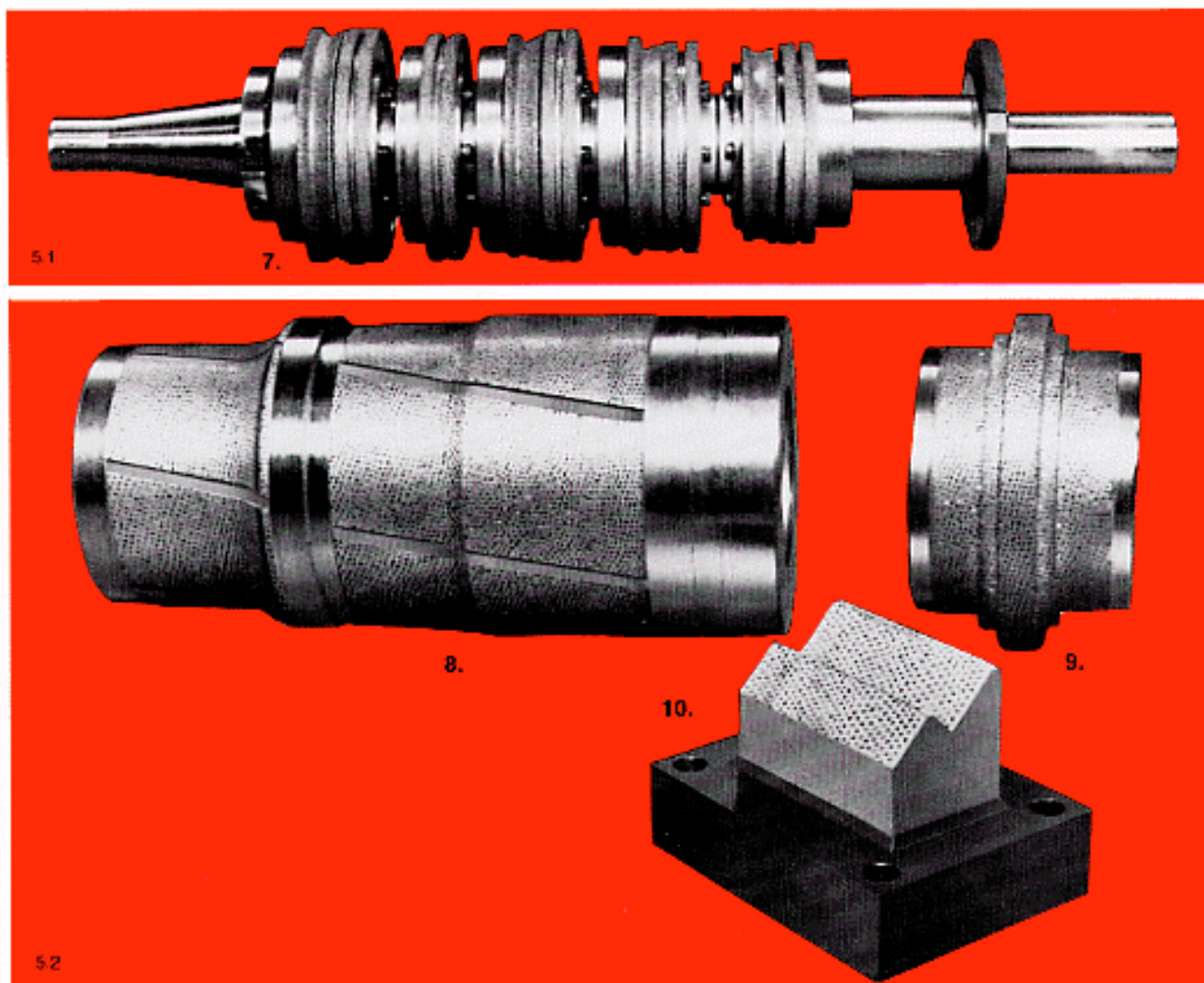
3.4(d)



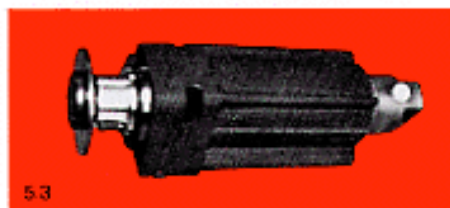


VARIOUS TYPES OF SIDLEY DIAMOND DRESSERS

1. **Profiling Roll** - This roll used in conjunction with CNC programmable dressers such as Hoglund, Pantograph or J & L. It traverses the grinding wheel generating the form.
2. **Straight Roll** - Used for traverse or plunge dressing of both O.D. and I.D. grinding operations and is manufactured in a variety of styles.
3. **Two Part Roll** - Used for plunge dressing on an angle-head grinder. The two part construction allows for individual replacement of either section. 50 millionths (.000050) of an inch per side step relation between large and small diameters is maintained.
4. **Intricate Profile Form** - Used for plunge dressing on various grinders. Contour accuracy on the profile is maintained to two ten thousandths (.0002) of an inch. This roll is used in the production of turbine blades.
5. **Adjustable Two Part Bearing Roll** - Used for plunge dressing on a cylindrical grinder. By using spacers, the distance between the races can be adjusted increasing the variety of parts produced by one set of rolls.
6. **Two In One** - This dresser is used for plunge dressing on a Cincinnati Micro-centric grinder, it combines two operations into one. It does both the ball track and seal grooves of an inner bearing race. Ball race curvature is within twenty five millionths (.000025) of an inch.



- 7. Grooving Roll -** Used in various industries for the production of precisely spaced grooves. Dimensional accuracy between grooves is within two ten thousandths (.0002) of an inch.
- 8. Step Roll -** Step relation tolerances of fifty millionths (.000050) of an inch are maintained with this type of roll. Recesses along the bias (swarf grooves) relieve pressures that develop during dressing and allows the coolant to flush abrasive grain and metal away from the dressing area.
- 9. Tang Roll -** This multiple roll construction (three pieces) allows for replacement of any one piece. A completely new roll would not be required if only one of the sections is worn out.
- 10. Form Block -** Diamond form blocks can be used with any reciprocating grinder without the added expense of a rotary drive unit which are required when using a diamond dressing roll.



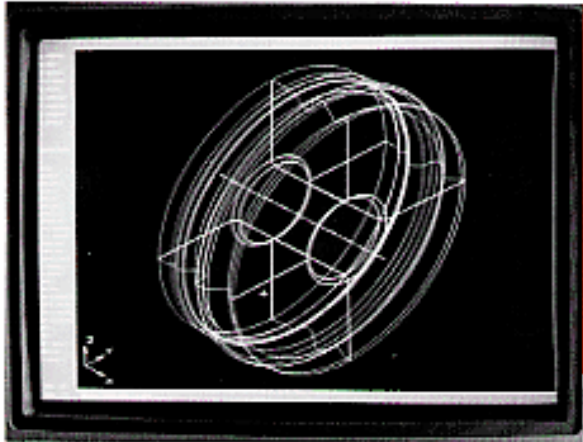
ROTARY DRIVE UNITS

Sidley Diamond Tool has dressing roll drive units available for all standard grinders and can design special units to adapt to special requirements. Our capabilities also extend to rebuilding existing dressing roll drive units. Rebuilding is often necessary to ensure optimum performance from diamond dressing rolls.

THE SIDLEY ENGINEERING DEPARTMENT

When Sidley Diamond Tool Company came into existence in 1956, we knew the needs of industries we supplied would be everchanging. Our engineers have kept that in mind over the years with progressive change and innovations.

Sidley is fully computerized with CAD and is compatible with most computers through IGS files. It has been this communication that has kept Sidley Diamond Tool Company a quality supplier to the industry.

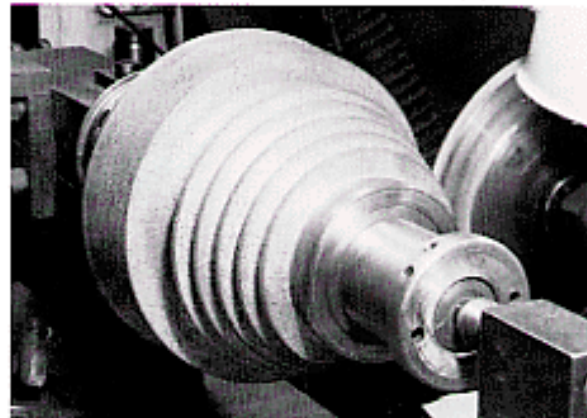


6.1

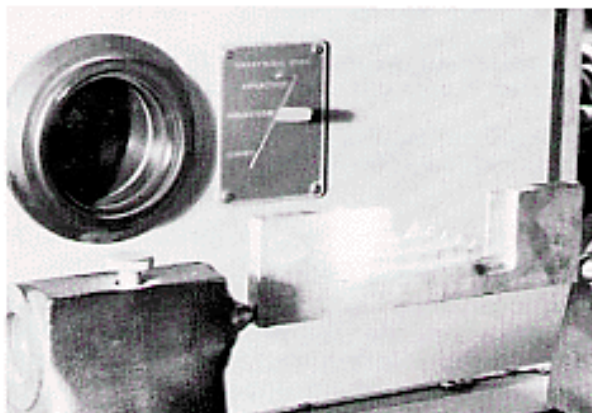


THE SIDLEY MANUFACTURING DEPARTMENT

In our manufacturing department, experienced machinists use the most up to date production inspection equipment to insure an accurate finished product. By using electronic gages and optical comparators that range to 100X magnifications, tolerances as low as one ten thousandths (.0001) of an inch can be achieved. By using strip chart recordings of up to 100,000X magnifications, tolerances as low as ten millionths (.000010") of an inch have been obtained. The Sidley Diamond Tool manufacturing department works in tandem with our engineers to ensure both high quality standards and customer satisfaction.



6.2



6.3



6.4

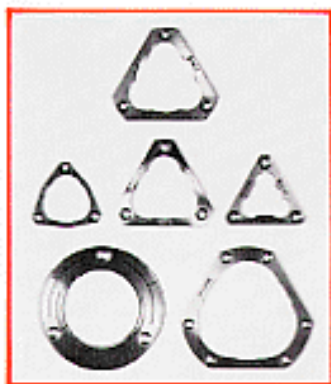
REQUALIFYING YOUR SIDLEY DIAMOND DRESSER

After being in production for a period of time a diamond dresser begins to wear (Fig. 7.1). This wear first becomes apparent through inadequate part finishes. The wear eventually becomes so advanced that the matrix of the roll erodes and the diamonds fall out. If allowed to advance to this stage the roll becomes unrepairable. However, the roll can usually be requalified if done when the finish first starts to decline. Sidley Diamond Tool requalifies rolls by first evaluating the roll to decide if or how it can be requalified. Then, we build up the matrix if necessary, and regrind the profile to re-establish the finish of the dresser. We also offer this service for rolls manufactured by other firms.



7.1

THE SIDLEY EASY MOUNT ADAPTOR*



7.2



7.3



7.4

The Sidley Easy Mount Adaptor (Fig. 7.2) addresses a long time problem in the use of diamond dressing rolls - the bore. Diamond dressing rolls for industry must be centered precisely on spindles; with the Easy Mount Adaptor mounted on a dressing roll tolerances of ten millionths (.000010") of an inch on parts, and previously unattainable finishes to 10 microinch and less have been achieved.

The Easy Mount Adaptor eliminates the need for costly shrink fitting and press fitting on spindles, by allowing the operator to easily mount and remove the diamond roll with approximately 25 lbs. of force. The Easy Mount Adaptor must be mounted on the dresser before the profile is ground; it can effectively be added on afterward, but the roll must be requalified (relapped).

*U.S. Patent No. 4,561,217

HOW TO ORDER A SIDLEY DIAMOND DRESSER . . .

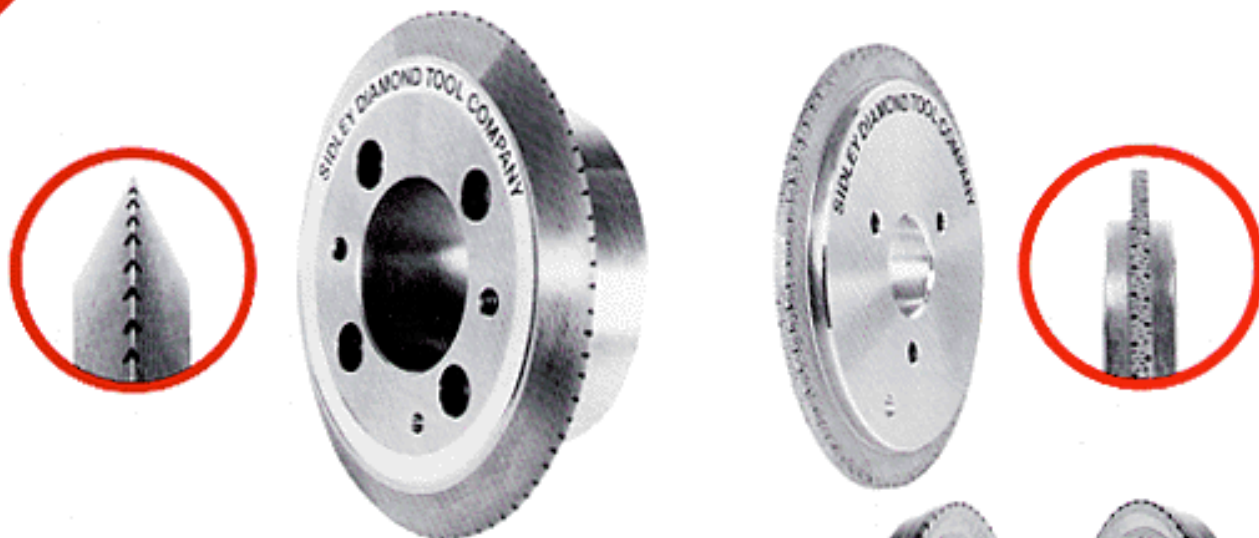
- Submit a part print with tolerances
- Give mounting information (type of drive unit, angle of contact)
- Finish requirements
- Grinding wheel specifications (type and size)



7.5

NEW

SIDLEY SUPER DRESS ROLLS



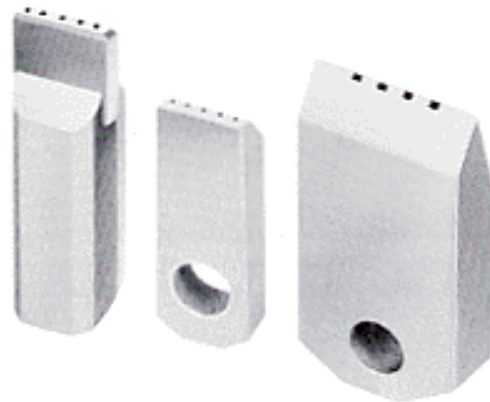
Sidley Diamond Tool Company introduces 'Sidley Super Dress' (SSD) products. Manufactured with a revolutionary and proprietary diamond material these products will simply outperform conventional diamond products. Sidley has had remarkable success with both SSD profiling rolls and dressing tools that can revolutionize dressing needs. They are available in many shapes and sizes for many applications.

SSD diamond roll profile dressers can experience greater life of up to 5X and many more reworks in comparison to conventional diamond rolls. We can manufacture these rolls with radii as small as .002" in virtually any style without modifying your current operating platform. Simply mount and enjoy the benefits.

SIDLEY SUPER DRESS TOOLS

Sidley diamond dressing tools manufactured with SSD can perform up to 5X longer than conventional diamond tools. These tools can be manufactured to physically duplicate your current tooling. We can virtually manufacture in any shank or configuration and there is no need to adjust your current operating parameters. Just use our SSD tools in place of your current tools and experience the many benefits.

Sidley Diamond Tool Company has been in business since 1956 and also manufactures all types of conventional diamond products. This tremendous experience gives us the unique opportunity to compare the SSD rolls and tools with our standard diamond products.

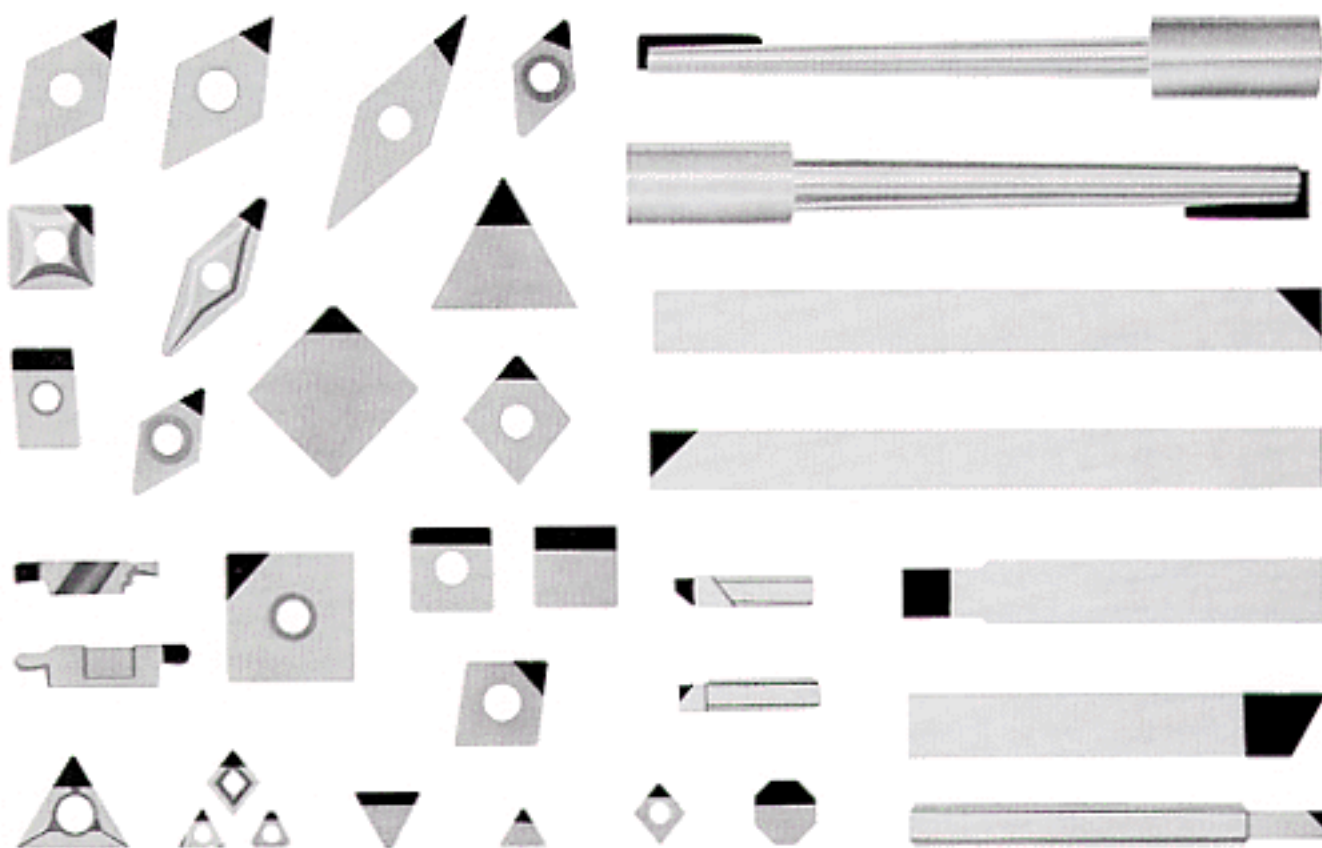


As with conventional diamond tools, SSD products are subject to over heating and physical abuse. Care should be taken when handling, mounting and using these products. An adequate supply of coolant is essential. SSD profile dressing rolls are recommended to be "Indicated-in" before using.



SIDLEY DIAMOND TOOL COMPANY

PCD & PCBN INSERTS and TOOLS



Experience Sidley Quality

MANUFACTURERS OF INDUSTRIAL DIAMOND & CBN PRODUCTS

American Made and Owned Since 1956

**32320 FORD ROAD GARDEN CITY, MI 48135
(800) 544-9070 • (734) 261-7970 • FAX (734) 261-2028**

SIDLEY PCD and PCBN PRODUCTS

Sidley Diamond Tool Company started manufacturing PCD (Polycrystalline Diamond) and PCBN (Polycrystalline Cubic Boron Nitride) in the early 1970's. These PCD and PCBN



GENERAL APPLICATION GUIDELINES FOR PCD

- Use PCD tools to machine non-ferrous metals and nonmetallic materials only.
- Make sure that the machine has adequate rigidity, and use rigid tool holders and fixtures.
- When PCD tools replace cemented tungsten carbide start with the same tool geometries.
- When replacing conventional diamond tools with PCD tools, increase the rake angles and use the same machining conditions.
- Whenever possible, machine wet with PCD tools.
- Establish a criterion for tool life and change tools as soon as that point is reached. Do not continue to run PCD tools after they have lost their sharp edges.
- To improve surface textures of machined surfaces, our PCD tools have polished rake faces as a standard.

These guidelines are based on experience gained in thousands of successful production applications of PCD tools.

PCD TOOLS

WORKPIECE MATERIAL	OPERATING CONDITIONS	
	SPEED (FT./MIN.)	FEED (IN./REV.)
Aluminum Alloys		
(4% - 8% Si)	3000-10000	.004-.025
(9% - 14% Si)	2000-8000	.004-.020
(16% - 18% Si)	1000-2300	.004-.015
Copper Alloys	2000-3300	.002-.008
Plastics/Composites	1000-3300	.004-.012
Sintered Tungsten Carbide	65-130	.006-.010
Manufactured Wood	3300-9800	.004-0.15

MARKET FOR NON-FERROUS/NON-METALLIC MATERIALS

MARKET SEGMENT	MAJOR PARTS	TYPICAL MATERIALS
Automotive, Small Engines and Related	Transmission Housings and Valve Bodies	380 Aluminum
	Manifolds	356, 319, 380 Aluminum
	Cylinder Heads	319 Aluminum
	Wheels	356 Aluminum
	Pistons	390 Aluminum
	Oil, Water, Power Steering and Fuel Pumps	380 Aluminum
	Brake Cylinders	380 Aluminum
	Carburetor	384, 413 Aluminum
	Engine Blocks	390 Aluminum
	Alternator, Starter, Air Conditioning Housing	380, 356 Aluminum
Woodworking	Construction Materials	Raw Wood Products
	Furniture	Wood Substitutes, Phenolic Laminates
Pumps, Valves	Housings, Moving Parts	Bronze, Brass
Home Appliances	Housings/Compressor Pistons	380/390 Aluminum
Aircraft/Aerospace	Cowling, Wing Tips, Ducts	Phenolics
	Floor Posts, Structural Components	Aluminum, Graphite Composites
	Trim Panels	Polyimides
Electrical Machinery	Commutator Shafts/Housings	Copper/Aluminum
Computer and Electronic	Moving Discs	Aluminum
	Mirrors/Lenses	Glass

products are offered by Sidley in hundreds of shapes and styles, and with its advanced manufacturing techniques along with experienced tool engineers, quality control, and customer service staff, Sidley provides an excellent combination for the cutting industry.



GUIDELINES FOR TURNING WITH TOOLS WITH PCBN INSERTS

The following general guidelines have been established as a result of production experience:

- Use a rigid machine that is fully capable of realizing the full productive potential of PCBN inserts.
- Don't use PCBN inserts for cutting easy-to-machine materials. They are designed to cut hardened steels, cast irons and tough superalloys.
- Keep tool overhang to a minimum.
- Use negative-rake tools whenever possible.
- Avoid side-cutting edge angles under 15 degrees.
- Use plenty of cutting fluid: Soluble oil is suitable.
- Chamfer the existing edge of the workpiece to minimize burr formation on high-temperature alloys.
- Stop the cut immediately if chatter is audible. Chatter indicates that the tool edge is dull or the setup isn't rigid enough.

Parameters for rough-turning selected materials with tools with PCBN inserts are given in the accompanying table. When taking finishing cuts, higher speeds and lower feeds than those given in the table are normally used.

APPLICATIONS PCBN

HARD CAST IRON	SOFT CAST IRON	SINTERED IRON	HARDENED STEELS	SUPERALLOYS
Pumps Impellers Shafts Rolls	Engine Blocks Brake Rotors Brake Drums Clutch Plates Transfer Housings	Valve Seats Cam Shafts Gears	Pinion Gears Side Gears Transmission Shafts Bearings	Turbine Disk Turbine Blade Turbine Shrouds Engine Shafts Turbine Vanes

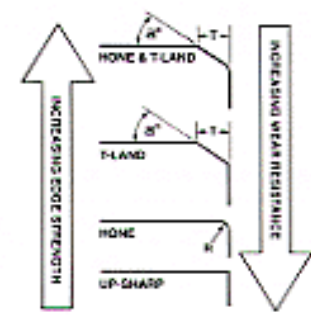
PCBN APPLICATION GUIDELINES

MATERIAL	OPERATION	SURFACE SPEED (Ft./Min)	FEED RATE (In./Rev.)	DEPTH OF CUT (In.)
Gray Cast Iron (180-270 BHN)	Turning	2000-4000	.006-.025	.005-.100
	Milling	2000-4000	.006-.012 (in./tooth)	.010-.100
Hard Cast Iron (>400 BHN)	Turning	250-500	.006-.025	.005-.100
	Milling	400-800	.006-.012 (in./tooth)	.010-.100
Hardened Steel (>45Rc)	Rough Turning	220-350	.006-.025	.030-.100
	Finish Turning	350-450	.004-.008	.004-.030
	Milling	400-800	.004-.010 (in./tooth)	.004-.075
Superalloys (>35Rc)	Turning	550-800	.004-.012	.004-.100
	Milling	700-1000	.004-.008 (in./tooth)	.004-.050
Sintered Iron	Turning	300-600	.004-.010	.004-.050
	Milling	400-800	.004-.008 (in./tooth)	.004-.050

SIDLEY ANSI INSERT CHART

A - Paralelogram 85° B - Paralelogram 82° C - Diamond (Rhombic) 80° D - Diamond (Rhombic) 55° E - Diamond (Rhombic) 75° H - Hexagon K - Paralelogram 55° L - Rectangle M - Diamond (Rhombic) 85° O - Octagon P - Pentagon R - Round S - Square T - Triangle V - Diamond (Rhombic) 35° W - Trigon 80°	<table><tr><td>Insert I.C.</td><td>Thickness</td></tr><tr><td>A = ± .0002</td><td>± .001</td></tr><tr><td>B = ± .0002</td><td>± .005</td></tr><tr><td>C = ± .0005</td><td>± .001</td></tr><tr><td>D = ± .0005</td><td>± .005</td></tr><tr><td>E = ± .001</td><td>± .001</td></tr><tr><td>*ΔF = ± .002 to ± .004</td><td>± .002</td></tr><tr><td>G = ± .001</td><td>± .005</td></tr><tr><td>*M = ± .002 to ± .010</td><td>± .005</td></tr><tr><td>*U = ± .005 to ± .012</td><td>± .005</td></tr></table>	Insert I.C.	Thickness	A = ± .0002	± .001	B = ± .0002	± .005	C = ± .0005	± .001	D = ± .0005	± .005	E = ± .001	± .001	*ΔF = ± .002 to ± .004	± .002	G = ± .001	± .005	*M = ± .002 to ± .010	± .005	*U = ± .005 to ± .012	± .005	<p>Number of 1/32nds on inserts less than 1/4" I.C.</p> <p>Number of 1/8ths on inserts 1/4" I.C. and over.</p> <p>Rectangle and parallelogram inserts require two digits: 1st digit - Number of 1/8ths in width 2nd digit - Number of 1/4ths in length</p>	<p>0 - Sharp corner (.005R) 4 - 1/16 radius 1 - 1/64 radius 6 - 3/32 radius 2 - 1/32 radius 8 - 1/8 radius 3 - 3/64 radius 12 - 3/16 radius</p> <p>A - Square insert with 45° chamfer D - Square insert with 30° chamfer - R.H. E - Square insert with 15° chamfer - R.H. Δ G - Square insert with 30° chamfer - L.H. Δ H - Square insert with 15° chamfer - L.H. K - Square insert with 15° double chamfer L - Square insert with 15° double chamfer N - Truncated triangle insert P - Flatted corner triangle - R.H. Δ R - Flatted corner triangle - L.H.</p>
Insert I.C.	Thickness																						
A = ± .0002	± .001																						
B = ± .0002	± .005																						
C = ± .0005	± .001																						
D = ± .0005	± .005																						
E = ± .001	± .001																						
*ΔF = ± .002 to ± .004	± .002																						
G = ± .001	± .005																						
*M = ± .002 to ± .010	± .005																						
*U = ± .005 to ± .012	± .005																						
SHAPE	TOLERANCE CLASS	SIZE (I.C.)	CUTTING POINT CONFIGURATION																				

T N M G - 4 3 2 C

RELIEF ANGLE N - 0° A - 3° B - 5° C - 7° P - 11° D - 15° E - 20° F - 25° G - 30° NP - 0° 10°	TYPE A - With hole B - With hole and one countersink C - With hole and two countersinks D - Smaller than 1/4" I.C. with hole E - Smaller than 1/4" I.C. clamp type F - Clamp type with chip groove on both top surfaces G - With hole and chip groove on both top surfaces H - With hole, one countersink and chip groove on one top surface J - With hole, two countersinks and chip groove on both top surfaces K - Smaller than 1/4" I.C. with hole, and chip groove on both top surfaces L - Smaller than 1/4" I.C. clamp type, and chip groove on both top surfaces M - With hole and chip groove on one top surface (except Pos./Neg. insert) Δ N - Clamp type with chip groove except ceramic - no chip groove P - With hole and 10° chip groove on both top surfaces (except Pos./Neg. inserts) R - Without hole, with chip groove on one top surface Δ U - Smaller than 1/4" I.C. clamp type, and with chip groove on one top surface	THICKNESS Number of 1/32nds on inserts less than 1/4" I.C. Number of 1/16ths on inserts 1/4" I.C. and over	EDGE AND SURFACE PREPARATION T-LAND T00515 = .005x 15° T00820 = .008x 20° T00830 = .008x 30° T01230 = .012x 30° HONES A = .0005 to less than .003 hone B = .003 to less than .005 hone C = .005 to less than .007 hone J = Polished Note: Other edge preparations are available upon request.  CUTTING DIRECTION (turns) R = Right hand L = Left hand
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*Exact tolerance is determined by the size of the insert.

SIDLEY ISO INSERT CHART

SHAPE					
RELIEF ANGLE					
If less than 10 use 0 in first place Example: 9.525 = 09					
LENGTH OF CUTTING EDGE					
CUTTING EDGE					
CUTTING DIRECTION					

T N M A 16 03 08 E R - LF

TOLERANCES (mm)							
m	s	d	m	s	d	m	d
Thickness				Thickness			
A	±0.005	±0.025	±0.025	J	±0.005	±0.025	±0.05 to ±0.15
F	±0.005	±0.025	±0.013	K	±0.013	±0.025	±0.05 to ±0.15
C	±0.013	±0.025	±0.025	L	±0.025	±0.025	±0.05 to ±0.15
H	±0.013	±0.025	±0.013	M	±0.08 to ±0.20	±0.13	±0.05 to ±0.15
E	±0.025	±0.025	±0.025	N	±0.08 to ±0.20	±0.025	±0.05 to ±0.15
G	±0.025	±0.13	±0.025	U	±0.13 to ±0.38	±0.13	±0.08 to ±0.25
) Exact tolerance is determined by size of insert							
above up to	H	P	K	T	C	R	D
	Class MN	Class U	Class J,K,L,M,N	Class U			
4.76 10.0	±0.08	±0.13	±0.05	±0.08	±0.11	±0.05	
12 15.0	±0.13	±0.20	±0.08	±0.13	±0.15	±0.08	
15.875 20.0	±0.15	±0.27	±0.010	±0.18	±0.18	±0.10	
25.00 25.0	±0.18	±0.38	±0.13	±0.25			
31.75 32.0	±0.20	±0.38	±0.15	±0.25			
TYPE		THICKNESS		CUTTING POINT RADIUS			
N		(mm)		00 Round Insert 00 Sharp Corner 02 0.2 mm (.008") 04 0.4 mm (.016") 08 0.8 mm (.0312") 12 1.2 mm (.048") 16 1.6 mm (.0625") 24 2.4 mm (.0937") 32 3.2 mm (.1250") 40 4.0 mm (.1562")			
R				FOR FLATTED MILLING INSERTS For secondary edge angle: A - 45° D - 60° E - 75° F - 85° P - 90°			
F				Wiper clearance angle: A - 3° B - 5° C - 7° D - 15° E - 20° F - 25° G - 30° N - 0° P - 11°			
A				SPECIAL FEATURES LF= Light Duty Finishing GF= General Finishing LM= Light duty Mid-range GM= General Purpose mid-range GR= General Roughing HS= High Speed P= Sides extra precision ground			
M				G= General Purpose pos./neg. L= Light Duty pos./neg. 1A= Chipbreaker form 2A= Chipbreaker form 1H= Chipsplitter 2H= Inserts 2K= Countersunk hole			
G							
W							
T							
O							
U							
X	Special Design						

Comparison cutting edge length "T" to "d"

		06	08	09	11	13	16	22	27	33	44
		03	04	05	06	07	09	12	15	19	25
		-	-	-	03	04	05	07	09	11	14
		-	-	-	04	05	06	09	11	13	18
		-	-	-	-	05	06	08	11	-	-
	80°	-	04	05	06	08	09	12	16	19	25
	55°	-	05	06	07	09	11	15	19	23	31
	35°	-	08	09	11	13	16	22	27	33	44
d		3.968 5/32"	4.762 3/16"	5.556 7/32"	6.35 1/4"	7.937 5/16"	9.525 3/8"	12.7 1/2"	15.875 5/8"	19.05 3/4"	25.4 1"



Single-Pass Honing Machines

- Automate The Bore Finishing Process
- Shorter Cycle Times
- Longer Tool Life
- Lower Costs
- Excellent Bore Geometry's and Tolerances



MANUFACTURERS OF INDUSTRIAL DIAMOND & CBN PRODUCTS

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(800) 544-9070 • (734) 261-7970 • FAX (734) 261-2028

Sidley's production honing system is unmatched in versatility and precision

Faster, easier and reliable, all with CNC repeatability

Sidley Diamond Tool Company and Belden Machine Corporation have combined expandable hone and CNC machine tool technologies to provide unmatched production accuracy's for the bore finishing process.

Sidley Diamond in the 1970's introduced the industries first expandable sleeved hones which excelled in producing maximum cylindricity (cylindricity \varnothing = roundness + straightness + taper). Since then Sidney has expanded and refined its product line to produce top quality hones for applications as small as 1/4" to 7" hole diameters and larger.

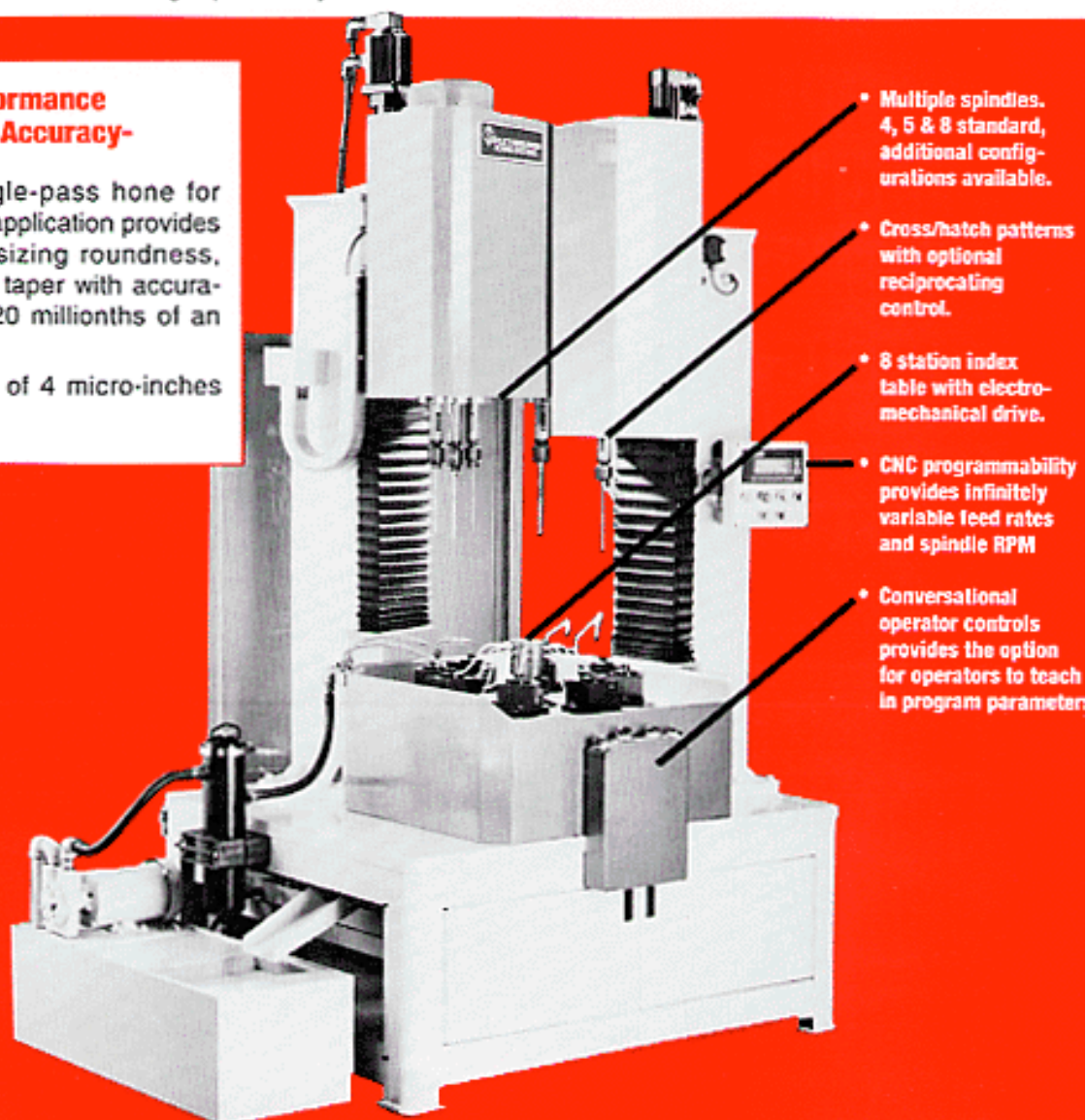
Belden Machine Corporation a technology leader in multiple spindle machine tools since the 1940's has developed and integrated a multiple spindle machine and CNC control for the honing process.

This combination of machine tool technology and honing expertise incorporates the best of both worlds . . . Premium tools combined with a precision machining system. Whether using diamond or CBN single pass hones Sidney Diamond/Belden Machine Corporation has the answer and ingenuity to produce the accurate results that you need with exacting repeatability.

High Performance Plus High Accuracy-

The proper single-pass hone for your bore sizing application provides the exact bore sizing roundness, straightness and taper with accuracy as close as 20 millionths of an inch.

Surface finishes of 4 micro-inches are obtainable.



- Multiple spindles. 4, 5 & 8 standard, additional configurations available.
- Cross/hatch patterns with optional reciprocating control.
- 8 station index table with electro-mechanical drive.
- CNC programmability provides infinitely variable feed rates and spindle RPM
- Conversational operator controls provides the option for operators to teach in program parameters

**Digital multi-axis CNC motion control system
providing precision, productivity, repeatability
and reliability that can be counted on.**

The advanced digital multi-axis Allen Bradley motion control system developed by Belden utilizes a full featured GMC position controller integrated with a modular, digital AC servo drive, variable frequency AC spindle drive, color operator interface and SLC 500 PLC technology. This control system allows the machine cycle to be defined by numeric set point entries or through operator controlled teach points. By allowing infinite variation of all cycle parameters, the machine cycle can be refined to optimize part bore geometry and reduce cycle time to maximize production rates.

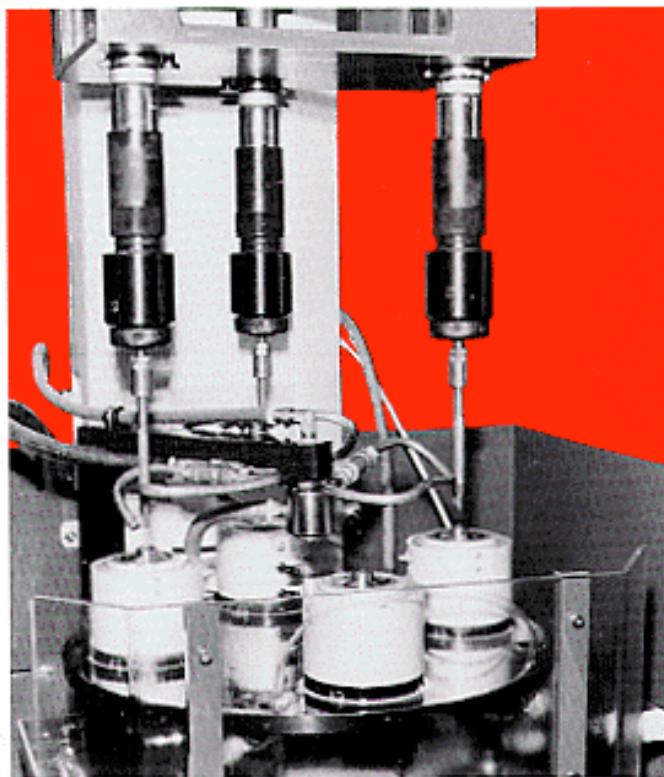
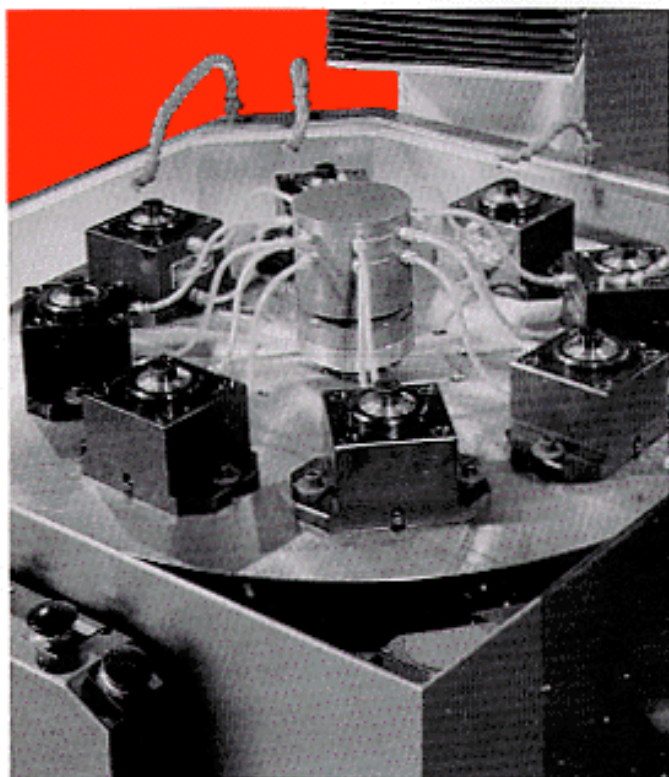
Sidley's diamond & CBN single-pass bore finishing tool technology combined with Belden's machine tool building and engineering expertise has created a robust product line of single-pass bore finishing systems. Machine systems range from single spindle stand-alone models up to 32 spindle fully automated transfer line production cells.

Each customer application is reviewed by Sidley applications engineers to define a bore finishing tool strategy and fixture concept. Once these are established a machine platform is selected and the bore finishing system is proposed to the customer along with requirements for performing critical pre-order process testing.

**Sidley
Single-Pass
Honing
Machines**



Sidley offers complete "Turn-Key" packages including conveyors, load/unload equipment, orientation and part handling unmanned systems.



Sidley Diamond hones produce round, straight, untapered holes in a single-pass

To find out how our expandable hones can improve your product and profits send us a part print specifying your production requirements.



Expandable soft cast iron sleeves of various diameters and lengths.

This 6 cylinder diesel crank case had its cam and crankshaft bores finished accurately in a single-pass.



Sidley hones are available from 1/4" to 7" diameter and larger.

A cast iron automatic transmission valve body cutaway shows a Sidney single-pass hone that ignores recesses and avoids the crowning of edges.



A small diameter Sidney hone finishes bores in a single-pass in this hardened steel vane pump rotor.



Sidley Hone Type and Application

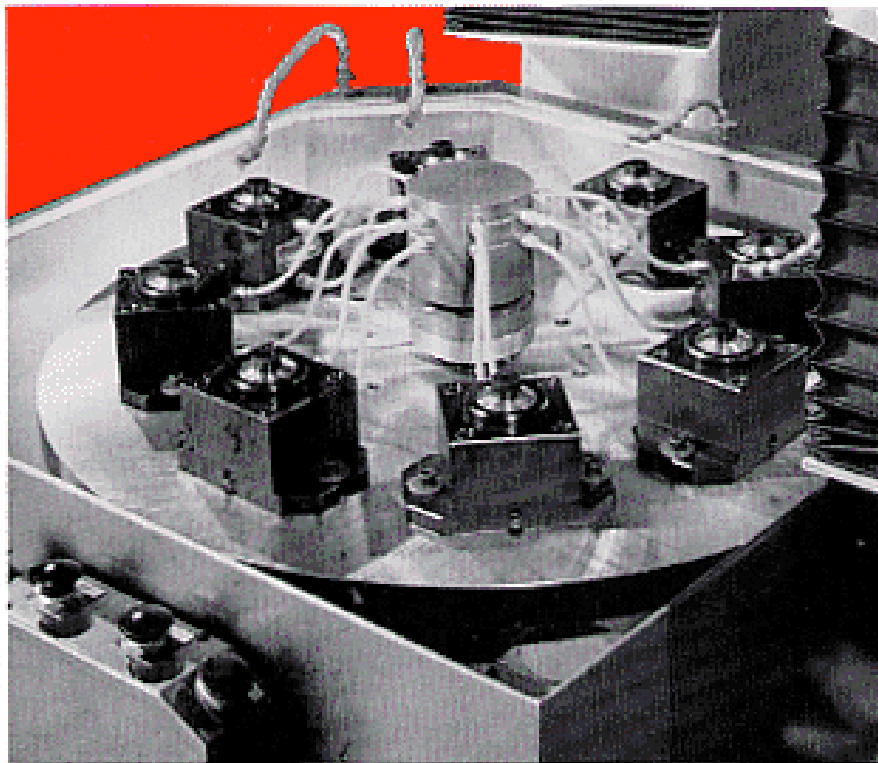
Refer to Sidney's hone catalog for tool information.

MATERIAL	DIAMETER \varnothing		STOCK REMOVAL		GRIT SIZE	R.P.M.	SURFACE FINISH		TOTAL CYLINDRICITY \varnothing		LIFE PER ADJUSTMENT	TOTAL LIFE
	INCH	MM	INCH	MM			MICRONINCH	MICROMETER	INCH	MM		
Hardened Steel	0.095"	2.41	.0005	.01	200/210	1000	25	.63	.0001	.0025	N.A.	2000-3000
Mild Steel	0.875"	22.2	.001	.025	180/200	300	20	.5	.0002	.005	5000	30000-40000
Cast Iron	3.628"	92.2	.0025	.06	60/80	100	63	1.6	.0003	.0076	1000	40000-50000
Cast Iron	1.000"	25.4	.0015	.04	100/120	250	32	.8	.0002	.005	5000	40000-50000
3rd Pass Cast Iron	1.000"	25.4	.0005	.01	325/400	250	10	.25	.00005	.0001	1500	10000-12000

Results based on 30 I.P.M. feed rate. Values for your application may vary.

Hone machine features-

- High speed honing spindles - up to 1800 RPM.
- Rapid traverse rates up to 350 IPM.
- Head feed design for easy automation interface.
- Precision feed rates controlled by closed loop servo system.
- Cross/hatch patterns with reciprocating capability.
- Electromechanical indexing drive with integral dial plate.
- Cam-driven indexing for smooth operation.
- Accurate part positioning on each cycle.
- Optional roll media or magnetic filtration unit down to 5 microns for uninterrupted production.
- User friendly control, menu-driven programming.
- Automatic diagnostics include programmable spindle load, cycle time log and parts counter.



Turn-Key fixture packages available.



SIDLEY DIAMOND TOOL COMPANY

DIAMOND ABRASIVE BORING BARS



Experience Sidley Quality

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DABB — TODAY'S ANSWER TO A PERFECT HOLE

Sidley Diamond Abrasive Boring Bars (DABB) are the proven state of the art way to assure maximum cylindricity (cylindricity ϕ = roundness + straightness + taper). The time consuming days of honing and lapping, along with their inherent problems of taper and bell mouthing are over. DABB tools produce straight, round, untapered holes in one down stroke in the bore without a skilled operator and without rejects. These results are achieved through the use of an expandable soft cast iron* sleeve permanently coated with diamond grit or cubic boron nitride (CBN) mounted over a tapered arbor. The diameter size can be adjusted by loosening a locknut on the arbor, turning a screw and tightening the locknut (non-locknut types also available), thereby altering the position of the expandable sleeve on the taper. The arbor can also contain passages for coolant flow to the spiral grooves in the sleeve or coolant can be added around the DABB through a guide bushing. The coolant cleanses the cutting sur-

faces extending tool life, and has long life itself since there are no loose abrasives to cause contamination.

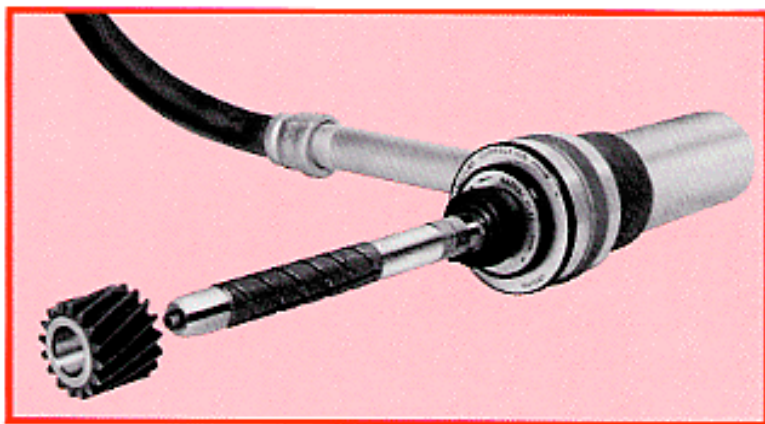
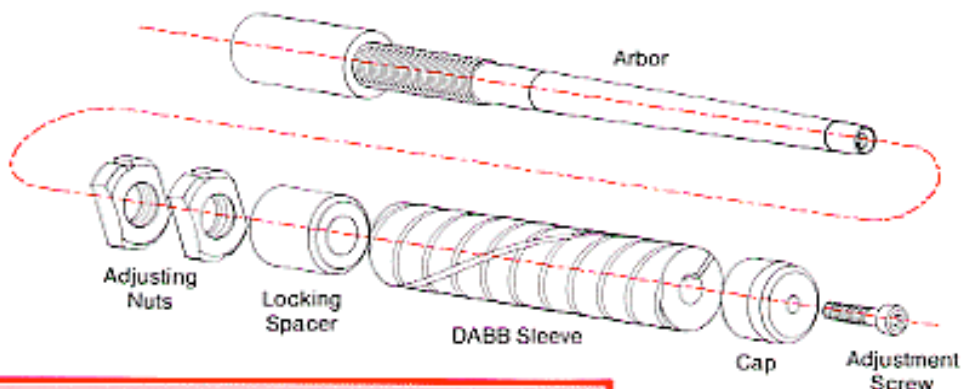
Although DABB tools cannot correct bore mislocation they can correct run out, taper and out of round. They do it with incredible speed since DABB's cut along their entire tapered length instead of reciprocating like a hone. The feed rates which exceed 30 IPM (762 mm PM) result in cycle times below 15 seconds.

The rigidity of DABB tools easily yields below .0002" (.005 mm) cylindricity in one pass with surface finish in the 32 microinch (0.8 micrometer) range. Improved cylindricity to .000050" (.001 mm) and surface finish better than 10 microinch (0.25 micrometer) can be obtained by first sizing a bore with coarser diamonds and high stock removal and then proceeding to an additional semi finish and finish pass with progressively finer diamonds. Most applications can be successfully processed with two passes.



*Sleeves can be reworked or replaced.
Individual components are available.

DABB's are available from
1/4" to 7" ϕ and larger.



DABB's can be equipped with coolant flow adaptors as shown. DABB Tools have round shanks as a standard, they are also available with special shanks to suit your machine.



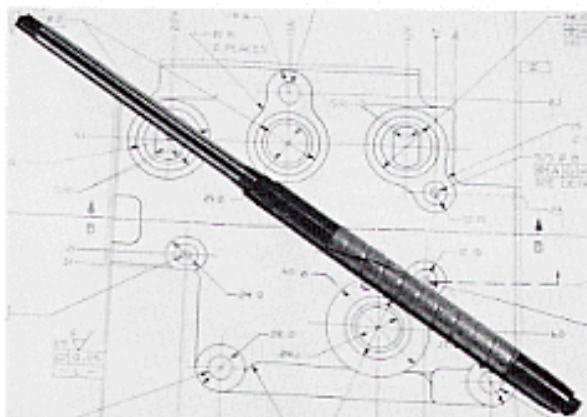
SIDLEY TOTAL RESPONSIBILITY

Sidley becomes your partner in providing the best DABB solution including adjustable diameter range, adjustment increment size, and estimates of speeds,

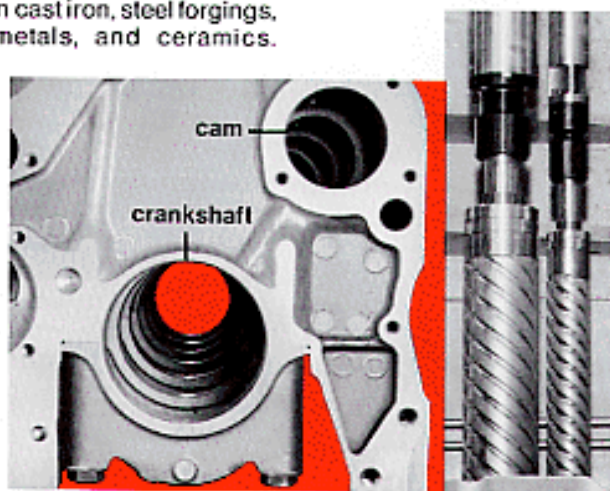
feeds, hole quality and tool life for your jobs. And after delivery Sidley service is available to develop even better quality and tool life at your work site.

TYPICAL DABB APPLICATIONS

DABB's are successfully used in cast iron, steel forgings, bearing steels, powdered metals, and ceramics.



To find out if a DABB will improve your product and profits send us a part print specifying your production requirements and intended production machine.



This 6 cylinder diesel crank case had its cam and crankshaft bores finished accurately in one pass.

A small diameter DABB finishes bores in one pass in this hardened steel vane pump rotor.



A cast iron automatic transmission valve body cutaway illustrates the DABB's ability to ignore recesses and avoid the crowning of edges.



TYPICAL RESULTS

DABB Type and Application

MATERIAL	DIAMETER \varnothing		STOCK REMOVAL		GRIT SIZE	R.P.M.	SURFACE FINISH		TOTAL CYLINDRICITY \varnothing		LIFE PER ADJUSTMENT	TOTAL LIFE
	INCH	MM	INCH	MM			MICROINCH	MICROMETER	INCH	MM		
Hardened Steel	0.095"	2.41	.0005	.01	200/210	1000	25	.63	.0001	.0025	N.A.	2000-3000
Mild Steel	0.875"	22.2	.001	.025	180/200	300	20	.5	.0002	.005	5000	30000-40000
Cast Iron	3.628"	92.2	.0025	.06	60/80	100	63	1.6	.0003	.0076	1000	40000-50000
Cast Iron	1.000"	25.4	.0015	.04	100/120	250	32	.8	.0002	.005	5000	40000-50000
3rd Pass Cast Iron	1.000"	25.4	.0005	.01	325/400	250	10	.25	.00005	.0001	1500	10000-12000

Results based on 30 I.P.M. feed rate. Values for your application may vary.