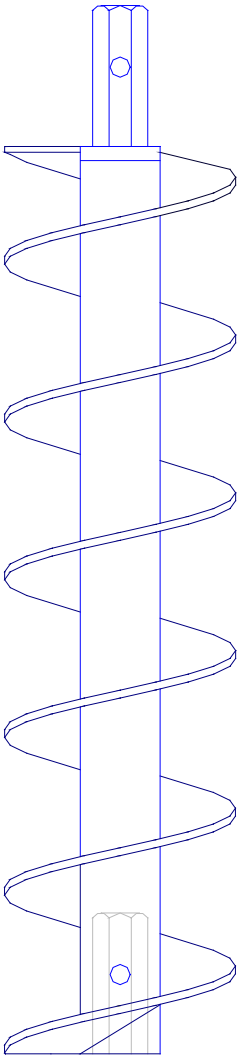


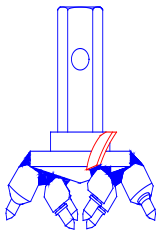
Solid Auger Section

Solid (construction) augers from Mills Machine are furnished with rugged steel flighting, heavy-duty steel center shaft and have a variety of cutting heads available. Used for utility, industrial, mining, and construction applications, they are available in standard diameters from 3 1/2 to 48 and larger sizes are available upon request. Standard solid augers have a hex shank (pin) up and a hex socket (box) down but can be made with any connection you desire. The normal length is five feet with other lengths readily available.

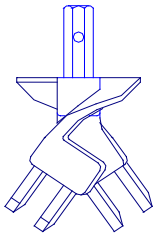
Several cutter head styles are available ranging from a fish tail or screw bit design for soft formations, forged steel finger type for soft to medium formations and a carbide tipped bullet cutter for medium to hard formations. Each type of cutter head is specially designed in a spiral shape or with flighting to efficiently convey the cuttings or spoils to the auger flighting.

Mills Machine Company excels in custom designed augers and cutter heads. We have presented several drawings on this page to show some of the versatility in our product design. Available are standard flow and jet auger designs (drill rod with flighting), cutting heads for standard duty or heavy duty for tough drilling applications. Custom diameters, variations of pitch, flighting and connections are some options available. Let our experienced sales people help you match your desired designs with our broad experience and custom manufacturing abilities.

Custom augers available on request.
Custom augers are non-returnable.



Bullet Cutter Head

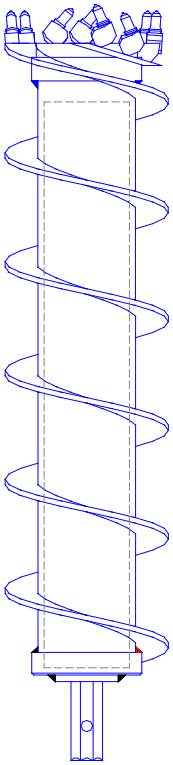


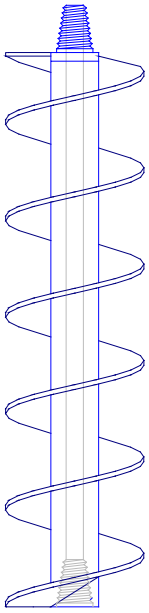
Finger Bit Cutter Head

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

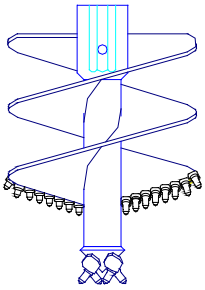
SOLID AUGERS

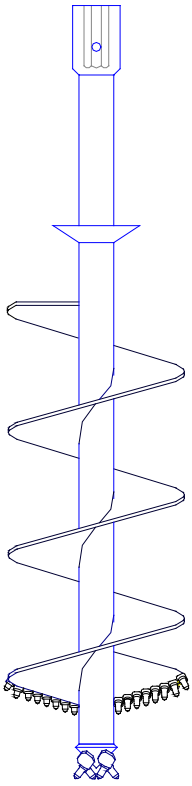
Post Remover: Easy, fast removal of highway or other posts. Fits over the top of the post and removes dirt and cement from around the post for fast post extraction.





Jet Auger: For passage of fluid through the auger to the cutter head for removal of cuttings and cooling.





Depending on cutters and length this can be a **"Post", "Rock", "Dirt" or "Tree" Auger.** We can furnish to any length, single or double helix, choice of cutters, choice of pilot bits, and choice of connection.

Core Barrel: Large Diameter with bullet cutters around the circumference.

Other variations of solid augers are available on a custom basis. We manufacture custom augers at standard prices and in lead times that are competitive. Custom augers are manufactured on a non-returnable basis. There are thousands of variations available and Mills Machine manufactures most all of them.

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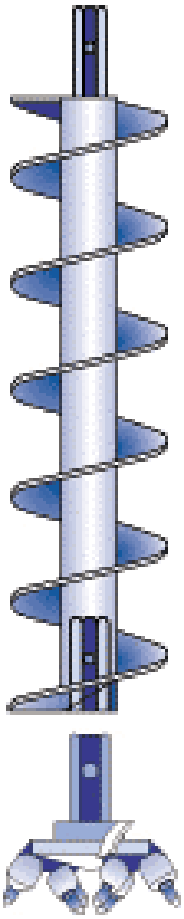
Solid augers have a hex shank (pin) up and a hex socket (box) down. The standard length is 5' with other length sections available. All Mills Machine built solid augers have **hard surface** coating on the outer flighting edge.



1 11/16 Dia. Center Tube with 1 1/8 Hex Shank

Part #	Description *	Hex	Pitch	Auger Diameter	Weight Lbs	Weight Kgs
SS35118	3 1/2 O.D. Hole Size	1 1/8	3	3 1/4	35	15.9
SS45118	4 1/2 O.D. Hole Size	1 1/8	3	4	39	17.7
SS50118	5 O.D. Hole Size	1 1/8	4	4 1/2	40	18.1
SS60118	6 O.D Hole Size	1 1/8	5	5 1/2	43	19.5

2 3/8 Dia. Center Tube with 1 5/8 Hex Shank

SS45158	4 1/2 O.D. Hole Size	1 5/8	3	4	48	21.8
SS50158	5 O.D. Hole Size	1 5/8	4	4 1/2	52	23.6
SS60158	6 O.D. Hole Size	1 5/8	5	5 1/2	53	24.0
SS70158	7 O.D. Hole Size	1 5/8	5	6	62	28.1
SS80158	8 O.D. Hole Size	1 5/8	7	7	63	28.6

2 7/8 Dia. Center Tube with 1 5/8 Hex Shank

SS90158	9 O.D. Hole Size	1 5/8	7	7 7/8	77	34.9
SS100158	10 O.D. Hole Size	1 5/8	8	8 7/8	87	39.5
SS120158	12 O.D. Hole Size	1 5/8	9	10	102	46.3
SS120200	12 0.D. Hole Size	2	9	10	110	50.0

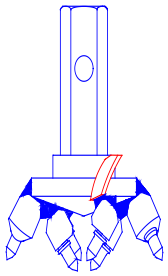
*** Solid Auger diameters are designated by the hole diameter cut by the solid auger cutter head. The actual diameter of the auger is smaller so the auger flighting conveys the cuttings and the cutter head does the work. See Auger Diameter column above for actual diameter of the auger.**

Solid Auger Cutter Heads

The outside diameter of the Auger Cutter Head determines the auger hole size.

Bullet Bit, Solid Auger Cutter

Part #	Description	Hex	No. of Cutters	Weight Lbs	Weight Kgs
SABB312118	3 1/2 O.D. Mini-Bullet Cutter Head	1 1/8	4-CCM4		
SABB400118	4 O.D. Mini-Bullet Bullet Cutter Head	1 1/8	4-CCM4		
SABB412118	4 1/2 O.D. C-23 Bullet Cutter Head	1 1/8	4-C23		
SABB600158	6 O.D. C-23 Bullet Cutter Head	1 5/8	6-C23		
SABB700158	7 O.D. C-23 Bullet Cutter Head	1 5/8	8-C23		
SABB800158	8 O.D. C-23 Bullet Cutter Head	1 5/8	8-C23		
SABB1000158	10 O.D. C-23 Bullet Cutter Head	1 5/8	10-C23		
SABB1200158	12 O.D. C-23 Bullet Cutter Head	1 5/8	10-C23		

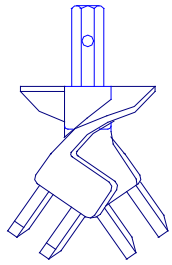


Bullet Bit Cutter Head

Finger Bit, Solid Auger Cutter Head

The finger bit cuts a 1/2 larger diameter hole, on the5 and larger sizes, than the corresponding bullet bit or fish tail bit.

SAFB312118	3 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	2.5	1.2
SAFB412118	4 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	10	4.5
SAFB512118	5 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	11	5.0
SAFB612118	6 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	15	6.8
SAFB412158	4 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	48	21.8
SAFB512158	5 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	52	23.6
SAFB612158	6 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	53	24.0
SAFB712168	7 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	62	28.1
SAFB812158	8 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	63	28.6
SAFB912158	9 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	77	34.9
SAFB1012158	10 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	87	39.5
SAFB1212158	12 1/2 O.D. Tungsten Carbide Finger Bit	1 5/8	102	46.3



Finger Bit Cutter Head

Fish Tail Screw Bit, Solid Auger Cutter Head

Screw Bit, Head Only, all are Hard Faced		Weight Lbs	Weight Kgs
SASBH312HFM	3 1/2 O.D. Fish Tail Screw Head Medium		
SASBH412HFM	4 1/2 O.D. Fish Tail Screw Head Medium		
SASBH500HFL	5 O.D. Fish Tail Screw Bit Head Large		
SASBH600HFL	6 O.D. Fish Tail Screw Bit Head Large		
SASBH700HFL	7 O.D. Fish Tail Screw Bit Head Large		
SASBH800HFL	8 O.D. Fish Tail Screw Bit Head Large		
SASBH900HFL	9 O.D. Fish Tail Screw Bit Head Large		
SASBH100HFL	10 O.D. Fish Tail Screw Bit Head Large		

Screw Bit Head

Shank for Screw Bit, use as listed above.

SASHSHK118M	1 1/8 Medium Shank		
SASBSHK118L	1 1/8 Large Shank		
SASBSHK158M	1 5/8 Medium Shank		
SASBSHK158L	1 5/8 Large Shank		

Screw Bit Shank

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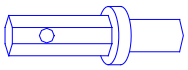
Hex Components



Hex Repair Shanks

Part #	Description	Weight Lbs	Weight Kgs
RS-1687	1 1/8 Hex Repair Pin Shank for 1 11/16 Tube		
RS-2375	1 5/8 Hex Repair Pin Shank for 2 3/8 Tube		
RS-2875	1 5/8 Hex Repair Pin Shank for 2 7/8 Tube		

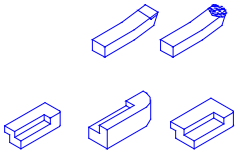
Hex Repair Sockets

RK-1687	1 1/8 Hex Box Repair Socket for 1 11/16 Tube		
RK-2375	1 5/8 Hex Box Repair Socket for 2 3/8 Tube		
RK-2875	1 5/8 Hex Box Repair Socket for 2 7/8 Tube		

Hex Drive Pins

DP-1687	Drive Pin for 1 11/16 Tube		
DP-2375	Drive Pin for 2 3/8 Tube		
DP-2875	Drive Pin for 2 7/8 Tube		

Finger Bit Components



FBH1	Mini Finger Bit, Hard Surfaced		
FBH2	Standard Finger Bit, Hard Surfaced		
FBC3	Standard Finger Bit, Carbide Coated		
W33	Finger Bit Wedge		
W34	Finger Bit Wedge		
W37	Finger Bit Wedge		

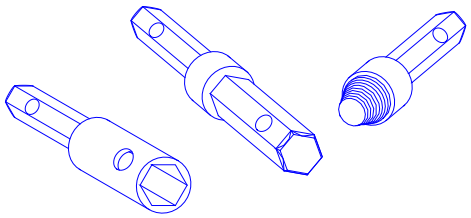
Hex Extension Rods

158EXT	Adjustable 1 5/8 Hex Male Shank to Female Socket, 24 to 36		

Solid Hex Extensions are available in any length.

Hex Adapters

Mills Machine has a complete line of Hex adapters available. Sizes range from combinations of 1 1/8 hex to 2 1/4 hex shank and socked with 3 and 4 hex available. They include:



Hex Male Shank to Hex Male Shank
Hex Male Shank to Hex Female Socket
Hex Female Socket to Hex Female Socket.
Hex Connection to Standard Pin or Box of your choice

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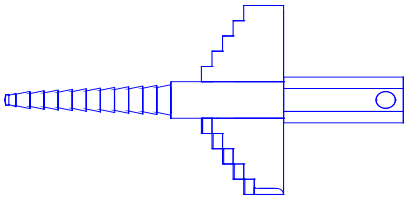
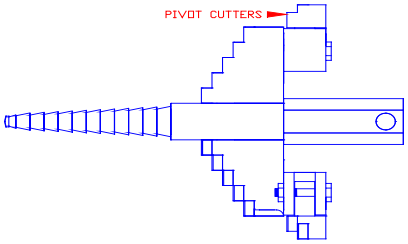
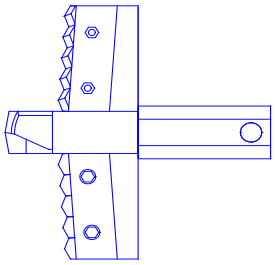
Horizontal Drilling Bits

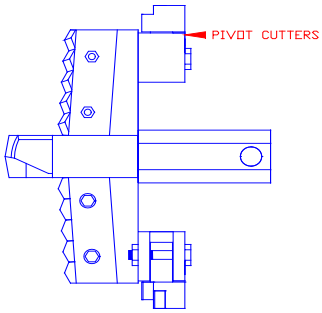
Mills Machine's horizontal drilling bits are designed to cut a variety of formations. The different cutter configurations include Step, Apex (Chevron) or Claw (Bullet) type configurations to drill from dirt to hard rock formations. Two popular styles are available in Free Bore and Casing Push with retractable wings (pivot cutters) to set casing as you drill.



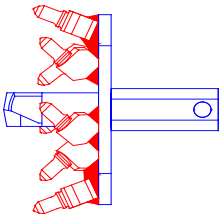


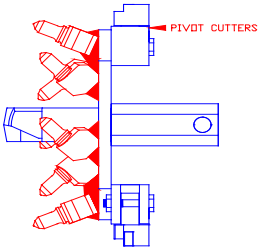
Step Construction – HDD. This type of bit is designed to cut soft to medium-soft formations. It features a carbide step type design and a carbide tipped spiral pilot neck. The swept back tapered design keeps the bit centered in the hole. This type of bit should be used in dirt, clay, sand rock, and light sandstone formations. The HDD is known for its fast penetration due to its stair step blades, which produce small cuttings that are easily removed from the hole.





Apex (Chevron) Construction – RQT. This type of bit is designed for soft to medium formations. It features bolt on blades with apex carbide inserts giving it a serrated look. The self-centering heavy duty pilot bit is also, carbide tipped and screws out for easy replacement. The shape of the blade and carbide inserts offers an aggressive but durable cutting action with the added bonus of field replaceable cutters.





Claw (bullet) Construction – HDR. This type of bit is designed for medium to hard formations. The HDR features our popular carbide tipped bullet cutters that rotate in their holders providing a self-sharpening action. These inexpensive carbide cutters are field replaceable and are rated at up to 10,000 PSI rock. This aggressive bit can be used to cut hard compacted clay, sand rock, shale and soft limestone formations. The HDR is known for its rapid penetration rate and durability.

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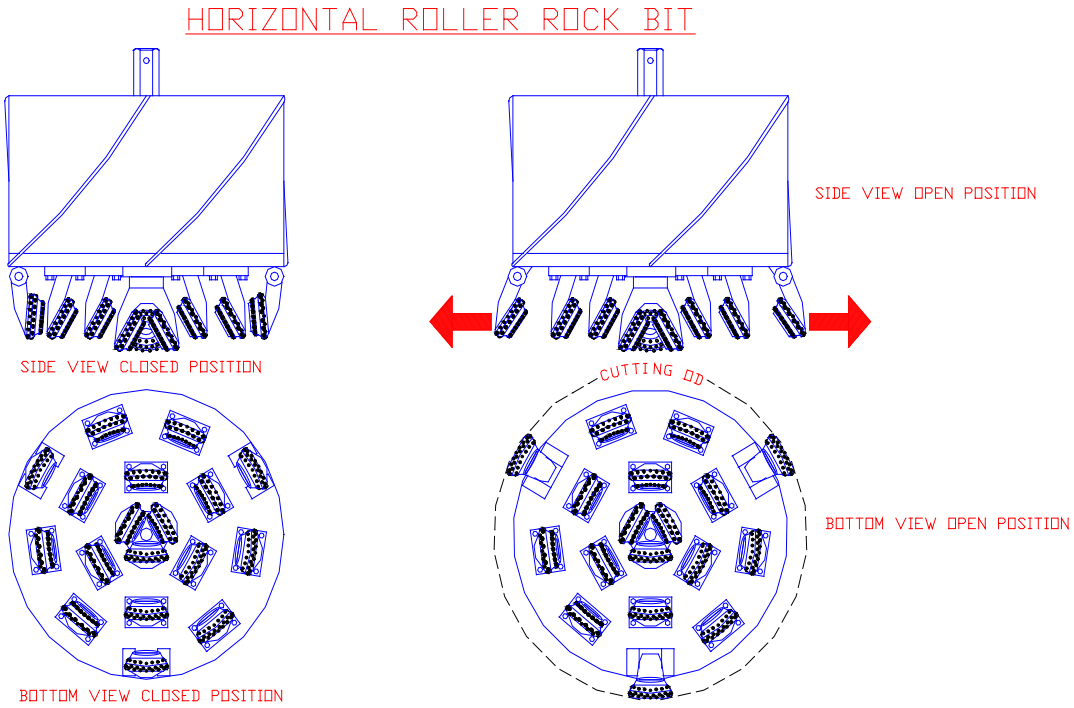
Horizontal Roller Rock Head (HRR)

Mills Machine has been custom manufacturing horizontal **hard rock** drilling bits for over 20 years. We make two types of HRR bits a **Free Bore** and **Casing Push** type. Both of these designs feature steel tooth or tungsten carbide button roller cone bit segments with sealed bearings. We offer new or economical reconditioned roller cones manufactured by major oil field bit companies.

Free Bore bits have fabricated fixed cutters that can be cut off and replaced extending the body life. **Casing Push** bits feature gage cutters that open out when rotated to the right (clockwise) to cut a larger hole than the outside diameter of the casing or pipe. If warranted the bit can be rotated to the left (counter clockwise) to close the cutters and the bit can be retracted leaving the casing in the hole. This is not possible with a free bore bit. Also, both types of bits can be manufactured with bolt on field replaceable cutters. **Free Bore bits can be manufactured in any size** and the **casing push type currently starts at 18** and larger. We are working on smaller casing push designs so, please ask if smaller sizes are available.



The casing push design features the **Mills Cam Lok** technology which enables the hinged roller gage cutter to positively lock in place and just as positively close back into the body for retraction from the hole. Normally two small water lines are tacked to the top of the casing to provide water or drilling fluids to keep the roller cones cool and to flush the small rock cuttings out of the hole. The common drive for these type of bits are solid flight augers, but we also offer rotary threaded drill rod or jet augers (drill rod with flighting). These bits offer an economical solution to your hard rock boring needs. Call for more information about our custom designed bits for your special application.

We can also manufacture these bits in **drag (blade) type**, for boring soft to medium formations. Drag type feature bolt-on field replaceable carbide tipped teeth. **Bullet type** construction falls into a category between drag type and roller type head. Suitable for soft to medium hard formations this versatile, fast cutting head is capable of drilling up to 10,000 psi rock.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Application Questionnaire
Horizontal Road Boring Bits

Company _____ **Phone**_____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact**_____

Sketch:

****Quantity:** _____ ****Closed Diameter** _____

****Open Diameter** _____

****Casing ID** _____ ****Casing OD or Wall Thickness** _____

Cutters ****Bearing:** **Conventional ☐ Sealed ☐**

****Steel Tooth Cones ☐ New ☐ Retip ☐**

Formation: Soft ☐ Med. Soft ☐, Medium ☐,

Med. Hard ☐, Hard ☐

OR **TCI Button Bit Cones ☐New ☐ Rerun ☐

Formation: 1☐, 2☐, 3☐, 4☐, 5☐, 6☐, 7☐, 8☐, 9☐

****Top Connection Hex Size:** _____

or Thread Size _____**Pin ☐ Box ☐**

**** Must fill out these items. Fill out more if possible or custom product requested.**

Barrel Length _____

Top Neck Dimensions: OD_____ID_____ Length_____

Knurled ☐

Breakout

Flats: Two Sided ☐ Four Sided ☐

Special _____

Flat Length_____ Location _____

Dimensions: Flat to Flat_____ OR Depth per Side_____

Location_____

Float Valve: Bore Only ☐ Install: Customer Furnished ☐ Mills Furnished ☐

Brand _____ Model & Size _____

Special Requirements: _____

_____

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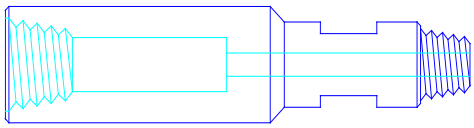
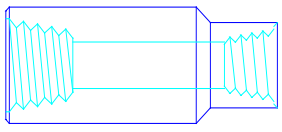
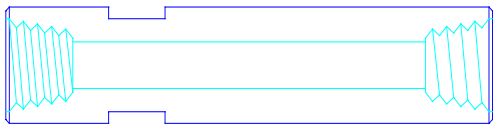
Mills Machine Rotary Substitute Adapters (Subs) are made from 4142 heat-treated alloy steel. They are made to any length, outside diameter, inside diameter or thread combination. We do inventory the most common subs in stock. We carry a large inventory of steel stock and are able to custom manufacture any sub to meet your specific requirements at competitive prices and with a quick turn around.

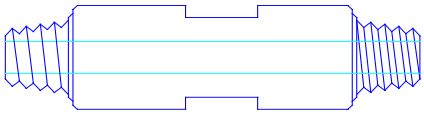
Subs can be made with a breakout configuration for any rig. Unless otherwise specified our standard flat is 2" long and 3/8 deep per side. We manufacture single flats, double depth flats, extra long flats, beveled flats, or flats to meet your specific needs. Breakout lugs are also available. Flats or lugs normally add to the length of the sub.

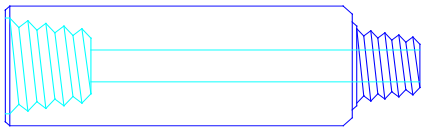
The outside and inside diameter of the sub should match up to the drill rod that you are using. We should always be aware of the largest O.D. and at the smallest I.D in your drill string.

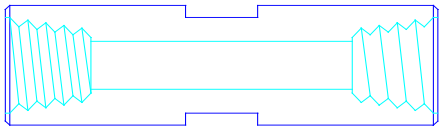












When going from a large connection to a smaller connection, a bottleneck may be furnished to reduce the weight of the sub and make it easier to breakout. The bottleneck is normally cut on a 45° angle and may add length to the sub.

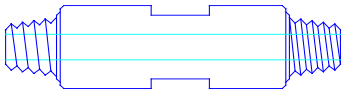
Any box thread can be bored out to accept a float (check) valve. The valve will add length to the sub depending on the length of the valve. The valves are sized to the box thread and can be seen in the last section of this catalog (Misc. Drilling Accessories). The bored out sub can be furnished with a float valve installed. We also stock float valve repair parts, prices on request.

Please use the application questionnaire for Subs at the back of this section.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

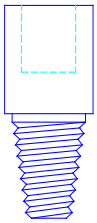
Sub Variations

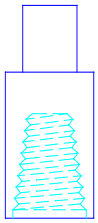
Mills Machine will furnish you any variation of the sub needed to complete your drill string or job requirements. Some of the variations that we normally find are the breakout flats, special flats, breakout lugs, extra length, bottle necks, knurling and float valves. These are listed in the following price sheets. Some of the other sub configurations are:



Kelly Subs or Kelly Adapters or Kelly Saver.
This terminology refers to a sub used between the Kelly or top head drive and the drill pipe. It is usually a pin to pin sub that takes the wear abuse to protect the drill pipe and the drive connection. **Mills can furnish the subs along with the fluted, hex or square Kelly Bar drive itself.**

Weld-on or Thread-on Tool Joint Subs.
These subs are designed with one end to shrink fit or screw on the end of your drill tube and then be welded. The opposite end is the pin or box of your choice.





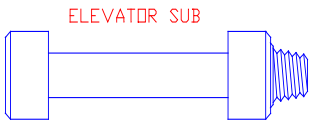
Pin or Box to Blank Subs. Similar in use to the above subs, these have a blank face either solid or with an ID on the end opposite the pin or box.

Shock Subs. These are specialized subs designed to absorb the shock vibrations created by a down-hole hammer and prevent damage to the drill string and the top head drive.

Floating or Cushion Subs. These subs absorb shock vibrations transmitted up through the drill string built to protect the pipe, the construction is simpler with more vertical movement in the sub.

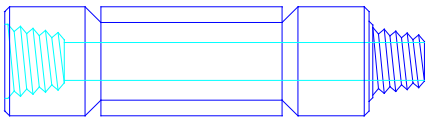
Special ID. We will furnish subs bored to a special ID, either smaller or larger than standard or for special cases with no ID bore.

Jet Subs. These subs are designed with the water flow to jet out the sides of the sub to assist cleaning the perforated pipe or screen.



Elevator Lift Subs. These narrow-necked subs provide a lifting area for use with standard pipe elevators. They are commonly used with internal flush (IF) pipe.

Break Out Lugs. Lugs are sometimes used instead of flats to give extra purchase for disconnecting subs.



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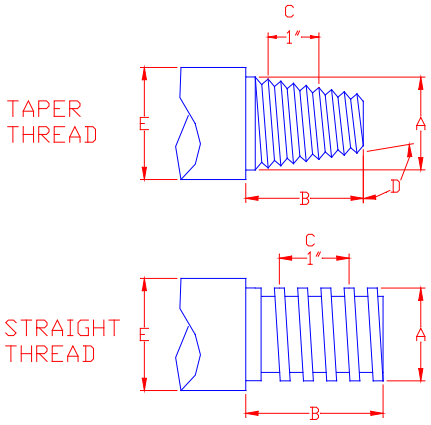
Often we come across undefined tool joints. The thread identification is normally stamped on the tool joint. If that stamp is worn or is not present you need specific information to determine the tool joint identification. The way to define the pin tool joint (The box tool joint is hard to measure and measurement has often lead to errors) is to measure:

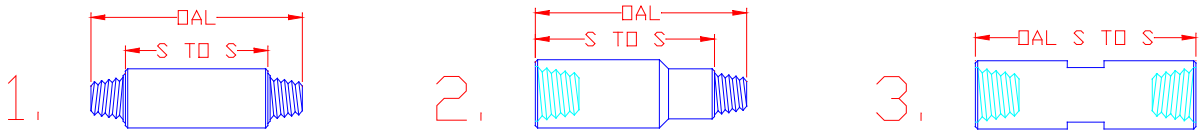
A. The diameter of the base of the pin where it meets the sub body (shoulder).
B. The thread length. Measured from shoulder to the end of the tool joint.
C. The number of threads per inch - put the 0 mark of a ruler on the center of the first thread, don't count that thread, then count the threads to the one inch mark (see sketch).
D. The thread form (taper, square, acme, special, etc.)
E. The material OD - this may differ within threads, but is a cross check.



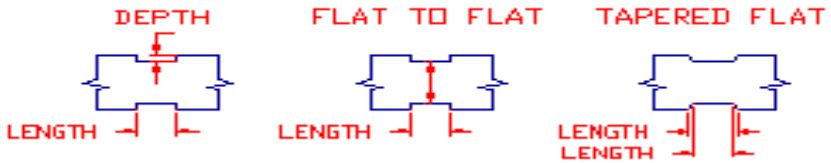
Your free thread ruler is at the beginning of this catalog. It will assist you in determining the thread. If you need additional copies, please contact your sales representative.

If there are problems measuring the part, send it to our engineers who can match the tool joint with one of over 600 thread gages we have in stock or in the API reference books.

Subs have two length measurements. The first is the over-all-length (OAL), this is the length from the tip to tip of the sub - the longest dimension of the sub. The second is the shoulder-to-shoulder or working length (S to S), the working dimension of the sub in the drill string. It is measured from the shoulder face of the pin to the shoulder face of a pin on pin to pin subs (1.). On a pin to box sub it is measured from the shoulder face of the pin end to the end of the box end (2). On a box to box sub the OAL and S to S are the same (3).



Flats depths on subs may be measured in two different ways. The first, and most common, is by the depth of the flat from the diameter of the sub (1), how much material is removed. The second method of measurement is to measure the distance between the flat surface to flat surface (2), or the opening of the pipe-handling tool. If the flat has a taper, please give us the length at the top and again at the bottom of the flat (see sketch).



Mills Machine stocks the thread gages for over **600 different tool joint** connections for use in the water well, construction, mining, utility, horizontal and environmental drilling industries. The threads are manufactured to meet the specifications of the American Petroleum Industry or the Diamond Core Drilling Manufacturers Association.

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Stock Subs

Subs (Rotary Adapters or Substitutes)

The Subs listed below are what we consider to be stock standard sizes and the working length will accept standard break out flats.

All of our subs are manufactured from 4142 heat treated alloy steel on computerized lathes enabling us to offer better pricing and availability.

Many other sizes are available in a multitude of configurations from the over 600 thread gages we have in stock. For quantities of ten or more please call us for special pricing.

Part Number	Box to Box	Dimensions O.D x I. D.	Working Length
PSBBMJR238R	MJR to 2 3/8 Regular	2 3/4 – 3 1/8 BN x 1 1/2	10”
PSBBMJR278R	MJR to 2 7/8 Regular	2 3/4 – 3 3/4 BN x 1 1/2	10”
PSBBMJR312R	MJR to 3 1/2 Regular	2 3/4 – 4 1/2 BN x 1 1/2	10”
PSBBMJR412R	MJR to 4 1/2 Regular	2 3/4 – 5 1/2 BN x 1 1/2	12”
PSBBMR238R	MR to 2 3/8 Regular	3 1/4 x 1 1/2	10”
PSBBMR278R	MR to 2 7/8 Regular	3 1/4 – 3 3/4 BN x 2”	10”
PSBBMR312R	MR to 3 1/2 Regular	3 1/4 – 4 1/2 BN x 2”	10”
PSBBMR412R	MR to 4 1/2 Regular	3 1/4 – 5 1/2 BN x 2”	12”
PSBB238IF238R	2 3/8 IF to 2 3/8 Reg	3 1/2 x 1 1/2	10”
PSBB238IF278R	2 3/8 IF to 2 7/8 Reg	3 1/2 – 3 3/4 BN x 2”	10”
PSBB238IF312R	2 3/8 IF to 3 1/2 Reg	3 1/2 – 4 1/2 BN x 2”	10”
PSBB238IF412R	2 3/8 IF to 4 1/2 Reg	3 1/2 – 5 1/2 BN x 2”	10”
PSBB278IF312R	2 7/8 IF to 3 1/2 Reg	4 1/2 x 2”	10”
PSBB278IF412R	2 7/8 IF to 4 1/2 Reg	4 1/2 – 5 1/2 BN x 2”	10”
	Pin to Box		
PSBB312R412R	3 1/2 Reg to 4 1/2 Reg	4 1/2 – 5 1/2 BN x 1 1/2	9”

BN – Bottleneck for Break-out Flats

We also stock smaller quantities of 2 3/8 & 2 7/8 FEDP and Mayhew FH Box-Regular Box, MR & 2 3/8 IF Pin-Pin and 4 1/2 Reg Pin to 6 5/8 Reg Box.

Custom threads and other configurations (breakout flats, float valve bore, etc.) are available from over 600 thread gages in Stock!

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The thread dimensions shown in the following chart are those that may be used to determine a thread type in the field. For specific details of the threads, please contact Mills Machine Co., Inc. or refer to the DCDMA Standards book.

Tool Joint Name and Nominal Size	Material		Pin Dimensions			Box Dimensions		Taper	Thread	
	O. D.	Make to Dia.	Pin Length	Pin ID	Pin Dia. At Base	Box Length	Box Max ID		Thread /Inch	Thread Form

Section 1 - Popular Sizes

API REGULAR (Reg.)

2 3/8 REG	3 1/8		3”	1”	2.625	3 1/4	1 3/4	3	5	TAPER
2 7/8 REG	3 3/4		3 1/2	1 1/4	2.990	3 3/4	2”	3	5	TAPER
3 1/2 REG	4 1/4	4 1/2	3 3/4	1 1/2	3.490	4”	2 7/16	3	5	TAPER
4 1/2 REG	5 1/2		4 1/4	2 1/4	4.600	4 1/2	3 1/4	3	5	TAPER
5 1/2 REG	6 3/4		4 3/4	2 3/4	5.515	5”	3 3/8	3	4	TAPER
6 5/8 REG	7 3/4	8”	5”	3 1/2	5.975	5 1/4	4 3/4	2	4	TAPER
7 5/8 REG	8 7/8	9”	5 1/4	3 1/2	6.975	5 1/2	5 1/4	3	4	TAPER
8 5/8 REG	10”		5 3/8	4”	7.951	6 1/4	6 5/8	3	4	TAPER

API INTERNAL FLUSH (IF)

2” IF	2 3/8		2 1/4	1 1/8	1.975	2 3/4	1 1/2	2	4	TAPER
2 3/8 IF	3 1/2		3”	1 5/8	2.860	3 1/4	2 1/8	2	4	TAPER
2 5/8 IF LH	3 3/4		3 1/4	1 3/4	3.128	3 5/8	2 1/4	2	4	TAPER
2 7/8 IF	4 1/8	4 1/2	3 1/2	2 1/8	3.385	3 3/4	2 1/2	2	4	TAPER
3 1/2 IF	4 3/4		4”	2 11/16	4.000	4 1/4	3 1/4	2	4	TAPER
4” IF (4 1/2 XH)	6”		4 1/2	3 1/4	4.828	4 3/4	3 1/2	2	4	TAPER
4 1/2 IF (5 XH)	6 1/8		4 1/2	3 3/4	5.250	4 3/4	4”	2	4	TAPER
5 1/2 IF	7 3/8		5”	4 13/16	6.390	5 1/2	5 1/16	2	4	TAPER
6 5/8 IF	9”		5”	3 3/4	7.459	5 5/8	6 1/4	2	4	TAPER

API FULL HOLE (FH)

2 7/8 FH	4 1/4	4 1/2	3 1/2	2 1/8		3 7/8	2 1/8	3	5	TAPER
3 1/2 FH	4 5/8		3 3/4	2 7/16	3.990	4”	2 7/8	3	5	TAPER
4” FH	5 1/4		4 1/2	2 13/16	4.270	4 3/4	3 1/4	2	4	TAPER
4 1/2 FH	5 3/4		4”	3”	4.782	4 1/4	3 1/4	3	5	TAPER
5 1/2 FH	7”		5”	4”	5.828	5 1/2	4 1/4	2	4	TAPER
6 5/8 FH	8”		5”	5”	6.740	5 1/2	5 1/2	2	4	TAPER

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Tool Joint Thread Chart

Tool Joint Name and Nominal Size	Material		Pin Dimensions			Box Dimensions		Taper	Thread	
	O. D.	Make to Dia.	Pin Length	Pin ID	Pin Dia. At Base	Box Length	Box Max ID		Thread /Inch	Thread Form
MAYHEW										
JUNIOR (MJ)	2 3/4		2 1/4	1 1/4	2.320	2 1/2	1 11/16	2	4	TAPER
REGULAR (MR)	3 1/4		3”	1 1/2	2.555	3 1/4	2”	1 1/2	4	TAPER
FULLHOLE (MFH)	3 3/4		3 3/8	2”	3.045	3 5/8	2 3/8	1 1/2	4	TAPER
FAILING EXPLORATION										
2 3/8 FEDP	3 1/8		2 3/4	1 3/8	2.480	3”	1 3/4	2	4	TAPER
2 7/8 FEDP	3 3/4		3 1/4	1 7/8	3.100	3 1/2	2 1/4	2	4	TAPER
SQUARE THREAD & DCDMA THREADS										
3 THREAD N ROD	2 3/8		2 3/4	1”	1.860	3”	1 5/8		3	SQUARE
4 THREAD N ROD	2 3/8		2 3/4	1”	1.865	3”	1 5/8		4	SQUARE
A ROD	1 5/8		1 7/8	9/16	1.260	2 1/8	1 1/16		3	SQUARE
AW ROD	1 3/4		1 7/8	5/8	1.365	2 1/8	1 1/4		3	SQUARE
AWJ (AWML)	1 3/4		1 3/4	5/8	1.425	1 7/8	1”	2	5	TAPER
E ROD	1.305		1 3/4	7/16	0.996	2”	7/8		3	SQUARE
B W	2 3/8		2 1/4	3/4	1.680	2 5/8	1 3/8		3	SQUARE
BQ	2 3/16		4 3/4	1 13/16		2”	1 13/16	1/2	3	TAPER
HW	3 1/2		3 1/4	2 1/4		3 1/2	2 13/16		3	SQUARE
EW	1 3/8		1 9/16	7/16	1.050	1 3/4	7/8		3	SQUARE
NW	2 5/8		2 3/4	1 3/8	2.210	3”	2”		3	SQUARE
NWJ (NWML)	2 5/8		2 3/8	1 1/4	2.240	2 3/4	1 1/2	2	4	TAPER

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Section 2 - Other Sizes

API X-HOLE (XH)

Tool Joint Name and Nominal Size	Material O. D.	Material Make to Dia.	Pin Dimensions Pin Length	Pin ID	Pin Dia. At Base	Box Dimensions Box Length	Box Max ID	Taper	Thread /Inch	Thread Form
3 1/2 XH	4 7/8		3 1/2	2 7/16	3.800	3 7/8	2 7/8	2	4	TAPER
4 1/2 XH Same as 4 IF. Use those dimensions.										
5" XH Same as 4 1/2 IF. Use those dimensions.										

HACKER

JUNIOR	3 1/8		2 1/4	1 7/8	2.685	2 3/4	2 1/8	1 3/4	5	TAPER
SENIOR	3 1/2		2 1/2	1 3/4	2.895	2 3/4	2 1/4	1 1/2	4	TAPER
4" HACKER	5 7/8		3 5/8	3 3/4	5.215	4"	4 3/8	1 1/2	4	TAPER
6 5/8 HACKER	7 1/2		3 1/16	6"	6.935	3 1/2	6 1/4	1 1/2	4	TAPER
8 5/8 HACKER	10 1/2		4 1/2	7 1/2	9.460	5"	8"	2	4	TAPER

BECO

3 1/2 BECO	4 3/4	3 3/4	1 1/2	3.970	4 1/4	2 1/4	3	2	TAPER
4 1/2 BECO	5 3/4 or 6 1/2	4 1/4	2 1/4	5.000	5"	3 1/4	3	2	TAPER
5 1/4 BECO	7"	5 3/4	2 13/16	5.750	5 1/2	3 3/4	3	2	TAPER
6" BECO	7 5/8 or 8 3/4	6 1/2	3"	6.500	5 1/2+	4 1/2	3	2	TAPER
8" BECO	10 3/4 or 12 3/4	4 7/8	5"	8.500	5 1/2+	6 1/4	3	2	TAPER

CA-21 (DEEP ROCK)

CA 21	2 1/4		1 1/4	1 1/8	1.765	1 1/2	1 1/2	1 1/2	6	TAPER

E U E

Nominal Size	API Size										
3/4	1.050	1.560		1 1/8	1.315	0.825	1 3/8		3/4	10	TAPER
1	1.315	1.900		1 1/4	1.469	1.049	1 1/2		3/4	10	TAPER
1 1/4	1.660	2.200		1 3/8	1.825	1.380	1 3/4	1 1/2	3/4	10	TAPER
1 1/2	1.900	2.500		1 7/16	2.093	1.610	1 7/8	1 3/4	3/4	10	TAPER
2 "	2 3/8	3.063		1 15/16	2.625	1.995	2 3/8	2 1/4	3/4	8	TAPER
2 1/2	2 7/8	3.668		2 1/8	3.113	2.441	2 1/2	2 1/2	3/4	8	TAPER
3"	3 1/2	4.500		2 3/8	3.795	2.992	2 3/4	3 5/16	3/4	8	TAPER
3 1/2	4"	5.000		2 1/2	4.250	3.476	2 7/8		3/4	8	TAPER
4"	4 1/2	5.563		2 5/8	4.790	3.958	3"		3/4	8	TAPER

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Tool Joint Thread Chart

Tool Joint Name and Nominal Size	Material O. D.	Material Make to Dia.	Pin Dimensions Pin Length	Pin Dimensions Pin ID	Pin Dimensions Pin Dia. At Base	Box Dimensions Box Length	Box Dimensions Box Max ID	Taper	Thread /Inch	Thread Form
HACKER FAILING										
6 5/8 HF	8”		3 1/2	6”	7.310	4 1/2	6 1/2	1.5	4	TAPER
***Also, known as 7” Hacker**										
MOBILE										
2 5/8 MOBILE	2 5/8		2 1/2	1 1/4	2.240	2 7/8	1 3/4	2	5	TAPER
NATIONAL PIPE THREAD										
1” NPT	1 3/4		1”	1”	1.325	1 1/4	1 1/8	3/4	11 1/2	TAPER
1” NPT LH	1 3/4		1”	1”	1.325	1 1/4	1 1/8	3/4	11 1/2	TAPER
1 1/4 NPT	2”		1”	1 1/4	1.660	1 1/4	1 3/8	3/4	11 1/2	TAPER
1 1/2 NPT	2 1/4		1 1/8	1 1/2	1.950	1 3/8	1 5/8	3/4	11 1/2	TAPER
2” NPT	2 3/4		1 1/8	2”	2.385	1 5/8	2 1/8	3/4	11 1/2	TAPER
2” NPT LH	2 3/4		1 1/8	2”	2.385	1 5/8	2 1/8	3/4	11 1/2	TAPER
2 1/2 NPT	3 1/4		1 9/16	2 1/2	2.875	1 3/4	2 5/8	3/4	8	TAPER
3” NPT	4”		1 5/8	3”	3.500	1 7/8	3 1/8	3/4	8	TAPER
3” NPT LH	4”		1 5/8	3”	3.500	1 7/8	3 1/8	3/4	8	TAPER
3 1/2 NPT	4 5/8		1 11/16	3 1/2	4.000	2 1/16	3 5/8	3/4	8	TAPER
3 1/2 NPT LH	4 5/8		1 11/16	3 1/2	4.000	2 1/16	3 5/8	3/4	8	TAPER
4” NPT	5 1/4		1 3/4	4”	4.510	2 1/4	4 1/8	3/4	8	TAPER
4” NPT LH	5 1/4		1 3/4	4”	4.510	2 1/4	4 1/8	3/4	8	TAPER
4 1/4 NPT				4 1/4	4.250			3/4	8	TAPER
5” NPT	6 5/16		2”	5”	5.563	2 1/2	5 1/4	3/4	8	TAPER
6” NPT	7 3/8		2”	6”	6.625	2 1/2	6 1/4	3/4	8	TAPER
P K RED DEVIL										
P K Red Devil	2 7/8		3 7/8	1 3/8	2.300	4 1/4	1 7/8	3/4	8	TAPER
ROCKMASTER										
ROCKMASTER	2 3/4		3”	1 1/8	2.030	3 1/4	1 3/4		3	ACME
WINTER WEISS										
2 3/8 WW MOD.	3 1/4		3”	1 1/2	2.535	3 1/4	2”	1.5	4	TAPER
2 7/8 WW MOD.	3 7/16		3”	1 1/2	2.535	3 1/4	2”	1.5	4	TAPER

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SUB Application Questionnaire

SUB — Rotary Substitute Adapter

Company _____ **Phone** _____
Address _____ **Fax** _____
_____ **E-mail** _____
City, State Zip _____
Contact_____

Sketch:

Quantity:**_____
Top Connection:** _____ **Pin** ☐ **Box** ☐
Bottom Connection:**_____ **Pin** ☐ **Box** ☐

****Must fill out these items. Fill out more if possible or custom product requested.**

*Length: Shoulder to Shoulder*_____
OR Overall _____
Top Neck Dimensions: *OD*_____*ID*_____
Knurled ☐ *Length*_____
Bottom Neck Dimensions: *OD*_____*ID*_____
Knurled ☐ *Length*_____

Breakout Flats: *Two Sided* ☐ *Four Sided* ☐
Special _____
*Flat Length*_____
Dimensions: *Flat to Flat*_____
*OR Depth per Side*_____
*Location*_____
Lugs: *Drill Pipe* *OD* _____
Hour Glass: ☐ *Location* _____*Dimensions* _____

Float Valve: *Bore Only* ☐ *Install:* *Customer Furnished* ☐
Mills Furnished ☐
Brand _____ *Model & Size* _____

Special Requirements: _____
_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Rock Bits

Mills stocks a wide variety and size of rock bit (also known as a roller cone roller bit). The **steel or milled tooth** design features forged steel teeth with cast carbide inserts. The shape of the tooth varies with hardness of the formation being cut. The **tungsten carbide insert (TCI) button** bits use cemented carbide, again designed for the specific formation. The bearings are conventional (roller bearing) or the sealed journal bearing (SJB).

Rock bits have a specific pin tool joint depending on the size of the bit as follows:

Up to 2 15/16 Dia.	4 Thd, Rod
From 3 7/8 to 4 1/2 Dia.	2 3/8 API Reg.
From 4 3/4 to 5 1/8 Dia.	2 7/8 API Reg.
From 5 5/8 to 7 3/8 Dia.	3 1/2 API Reg.
From 7 5/8 to 9 Dia.	4 1/2 API Reg.
From 9 1/2 to 12 1/4 Dia.	6 5/8 API Reg.
From 13 3/4 to 26 Dia.	6 5/8, 7 5/8 or 8 5/8 API Reg.

Steel Tooth Bits:
Steel tooth bits are available as new, limited service, good retip or water well quality as follows:

New - These bits have never been used to drill a hole.

Limited Service - These bits are in like new condition and at a casual glance would pass for a new bit.

Steel Tooth Bit

Good Retip - These bits have totally been reconditioned. The dull teeth have been rebuilt back to working condition with crushed tungsten carbide. The bearings have been greased and in some extreme cases on the Regular roller bits, oversize bearings are installed to tighten up the cones. These bits are suitable for reentry into the shallow drilling market and possess about 50% of the life of a new bit.

Water Well Quality - This is the lowest quality bit available and only limited footage can be expected. Wear check will show relatively loose bearings and weak seals. The teeth have been rebuilt back to gage and the bit will look like a good quality retip.

TCI Button Bit

TCI Button Bits:
The **TCI button bits** are available as new, limited service, good rerun and water well quality as follows:

New - These bits have obviously never been used to drill a hole.

Limited Service - These bits would pass for new at a casual glance. However, they do have a few hours wear that is indicated by slight gage wear. Most of these bits have only been used to complete a hole and thus have limited wear.

Good Rerun - This type of bit normally has 50% life left in it and has been reconditioned to a point of reentry to the shallow well drilling market. Wear is indicated by slight gage wear, slightly weak seals, and slightly worn buttons.

Water Well Quality - This is the lowest quality bit available for even the shallow drilling market as shown by the lower price. The wear indicators for this bit are: weak seals, additional gage wear, possible pump wash, and dull buttons. These bits will offer only limited footage and are usually bought when competitive price is a factor.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
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General and IADC Codes
Proper **application** of roller cone bits is mainly **dependent on the formation and hardness** of the material being drilled. It is important that this information be given for the selection of the proper bit for the job.

Rock bits are classified by a three space IADC code. These classifications of letters and numbers spell out the type of teeth, the formation hardness and the bit construction. A short description follows:

1-X-X Steel tooth, soft formation having low compressive strength and high drillability.
2-X-X Steel tooth, medium to medium hard formation with high compressive strength.
3-X-X Steel tooth, hard semi-abrasive formations.
5-X-X Button bit, soft to medium formations with low compressive strength.
6-X-X Button bit, medium hard formations of high compressive strength.
7-X-X Button bit, hard, semi-abrasive and abrasive formations.

The second position designates formation hardness sub-classification from softest to hardest within each series.

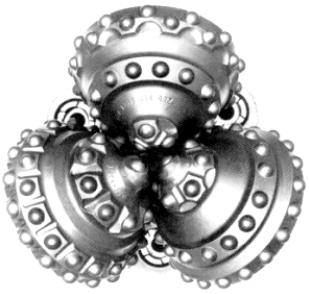
X-1-X
X-2-X
X-3-X
X-4-X

The third position designates the common construction features.

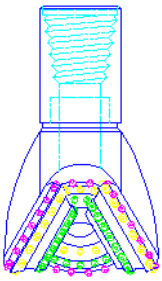
X-X-1 Standard 3 cone rock bit
X-X-2 T type gage row teeth.
X-X-3 Tungsten carbide inserts in face.
X-X-4 Sealed roller bearings.
X-X-5 Sealed bearings with inserts in gage face.
X-X-6 Sealed friction bearings.
X-X-7 Sealed friction bearings and inserts in gage face.

Call for pricing on the **readily available new**, **retip or rerun bits**. We will find the limited service and water well quality bits for you as required.

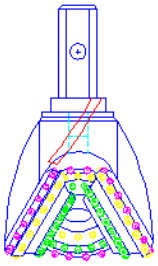
There is no guarantee concerning the footage these bits will drill. The quality of the used bits is determined by our years of experience using sight and feel.



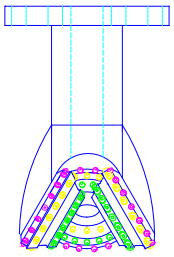
Mills Machine can also modify rock bits to special requirements such as box up, reverse circulation or hex mount as you may require. Our objective is to serve the needs of the drilling industry. How can we help you?



Box Tool Joint



Hex Pin Tool Joint

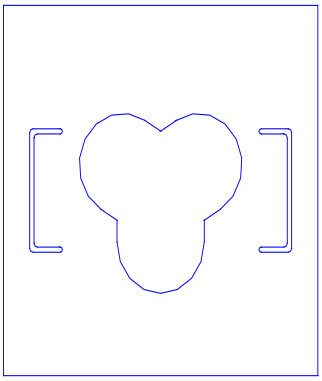


Reverse Circulation Flange Mount

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Rock Bit Breakout Plates

Rock bit breakout plates are designed to hold the bit in place while using the rig to remove the bit from the bottom of the drill string. They can be manufactured to the specific dimensions of your drill rig table or opening. The heavy duty steel plate has two handles for ease of use. This handy tool can is also offered with a triangular catch basket to prevent the bit from falling through the bottom.



Size	NO Basket Dimensions In Inches	Weight Lbs	Kgs	WITH Basket Dimensions In inches	Weight Lbs	Kgs
6 3/4	10 x 10	18	8.1	10 x 10 x 4	21	9.5
7 7/8	13 x 13	24	10.9	13 x 13 x 4	27	12.2
8 3/4	14 x 14	27	12.2	14 x 14 x 4	30	13.6
9 7/8	15 x 15	30	13.6	15 x 15 x 4	33	15.0
12 1/4	18 x 18	38	17.2	18 x 18 x 5	46	20.9
15”	21 x 21	56	25.4	21 x 21 x 6	64	29.0
17 1/2	24 x 24	66	29.9	24 x 24 x 6	74	33.5
22”	28 x 28	80	36.3	28 x 28 x 6	90	40.8

For sizes in between the above ranges use the size of the larger breakout plate. Please furnish the dimensions of your rig table (square and depth). We can build the plate specifically for your table. *Custom Breakout Plates are non-returnable.*

***Breakout plates for down hole hammers bits** are also available.

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MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

Application Questionnaire

Rock Bit **Rock Bit**

Company _____ **Phone** _____
Address _____ **Fax** _____
_____ **E-mail**

_____
City, State Zip _____
Contact_____

Quantity:** _____ **Size**_____

Pin Size:**_____

Bearing: Conventional ☐ Sealed ☐**

Steel Tooth: New☐ Retip ☐** *IADC Code*_____
Formation: Soft ☐, Med. Soft ☐, Medium ☐,
Med. Hard ☐, Hard ☐

OR

TCI Button Bit: New ☐ Rerun ☐** *IADC Code*_____
Formation: 1 ☐, 2 ☐, 3 ☐, 4 ☐, 5 ☐,
6 ☐, 7 ☐, 8 ☐, 9 ☐

****Must fill out these items. Fill out more if possible or custom product requested.**

Jet Size: Standard ☐ Special _____*Center Out ☐*

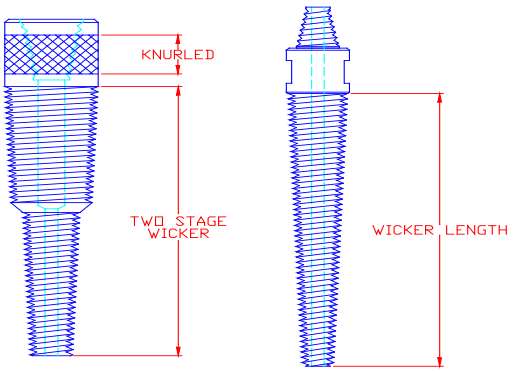
Circulation: Air: ☐ CFM _____*PSI* _____
Fluid: ☐ GPM _____*PSI* _____

Special Requirements: _____
_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

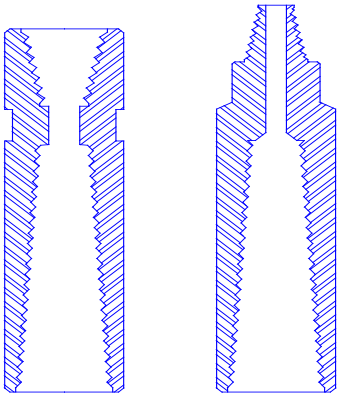
Fishing Tools

Taper Taps: Mills Machine stocks a variety of **casehardened, heat-treated taper taps designed to thread into the ID of the object (fish) lost down the hole**. These tools are stocked with standard tool joints to meet your specific requirement. Our experience has taught us that when a taper tap is required it's needed immediately. We are prepared to meet your emergency requirements. We also, stock a variety of subs to adapt our taper taps to your drill string.



Our standard stock sizes are designed to pick up most standard small to large drill rod sizes. We also offer a quick turnaround for **custom manufactured tools to meet your specific requirements** with options consisting of breakout flats, right-hand or left-hand wickers, any thread, special lengths, oversize guides, mill guides or wall hooks.

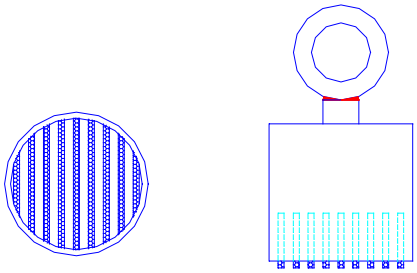
Information of taper taps is on page 5-13 and an application questionnaire on taper taps is at the back of this section.



Overshots: Overshots (rotary die collar) are manufactured like taper taps except they are **made to go over the OD of the object lost down hole** (pages 5-14)**.** Like taper taps, overshots are **stocked in a variety of sizes** and connections so we are able to **ship immediately.** Overshots and taper taps share the same options.

Information of overshots is on page 5-14 and an application questionnaire is at the back of this section.

Fishing Magnets: When taper taps and overshots cannot be used fishing magnets may be the answer to getting your fish out of the hole. Several sizes are carried in stock for your emergency needs. We need to know the ID of the pipe or open hole and the approximate weight of the object. Magnets can lift a specific weight only if there is full contact with the magnet surface. Round or dirty objects reduce the pulling capacity of the magnet. **Circulating magnets that flush the cuttings out of the way are quoted upon request.**



Sizes of fishing magnets are listed on catalog page 5-15 of this section.

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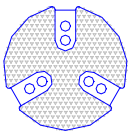
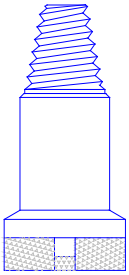
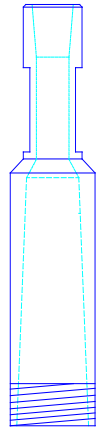




Junk Mills: Our junk mills, described in detail on catalog page 5-16, are **designed to eliminate steel objects that cannot be fished** by milling them up with a special carbide coated face.



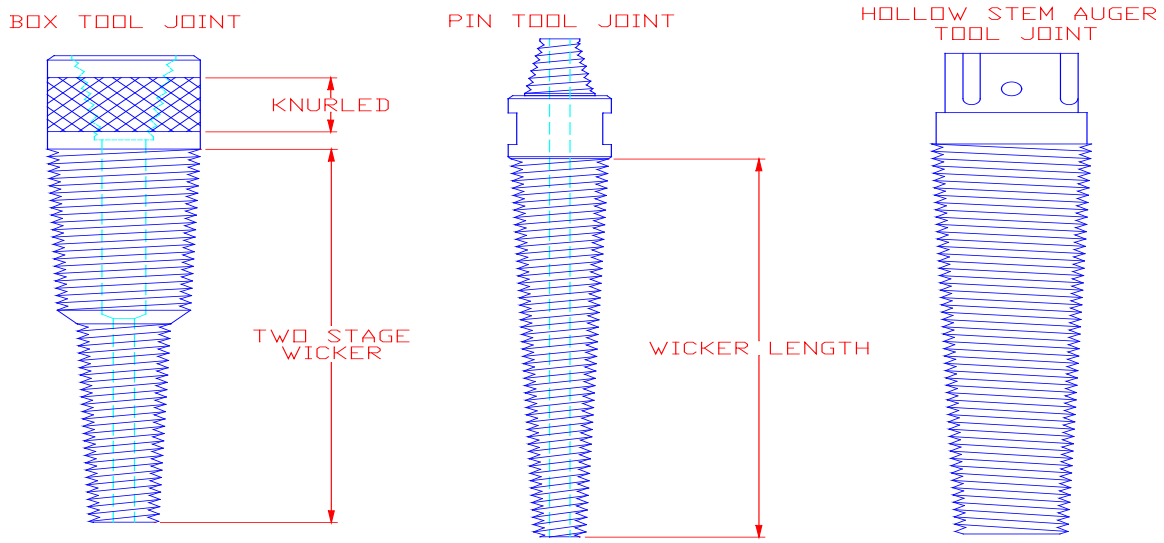
OVERSHOT W/ WALL HOOK

We also offer a variety of other fishing tools and accessories that range from simple to complex **fishing tools** and their accessories. The releasing and circulating overshot is the strongest external catch fishing tool designed to let go of the fish if it becomes stuck in the hole. When the pipe is imbedded into the sidewall of the hole, a wall hook may be used to catch and guide it into the overshot. If the hole is larger than the fish an oversize guide may be required to center the overshot or taper tap in the hole. Multi-step fishing tools can catch different sizes.

Internal releasing spears are available and work just like the releasing overshot designed to release the fish if it becomes stuck in the hole. These spears are sized to the specific pipe being used and normally require a little longer lead-time.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Taper Taps



Mills stocks a variety of **casehardened, heat-treated** taper taps with standard tool joints to meet your specific requirement. Heat-treating toughens the taper tap making it difficult to damage and easier for you to use. When it takes a special sub to match your tool joint with the taper tap we have in inventory, we can make that sub immediately.

We **stock** several different sizes with standard connections. We also manufacture to your **special requirements** with options of breakout flats, right-hand or left-hand wickers, any thread, special length, oversize guides, mill guide or wall hooks.

Also carried in stock are **Internal Auger Fishing** Tools (A taper tap with left-hand wicker for retrieving hollow stem augers).

Due to the variety of auger tool joints, we stock the heat-treated tap without tool joints and add the tool joint when your order is received.

The carbonized threads on taper taps are extremely hard and brittle. Be extra careful to avoid impact. In use slowly lower the tool down the hole until the fish is engaged. Then slowly rotate the tool while applying some down pressure. Mark the drill rod to tell how far into the fish you have penetrated.

Taper taps can be reworked by annealing, re-threading the tap and then heat treating the re-threaded area. We will quote you pricing as necessary.

Please use the application questionnaire for Taper Taps at the back of this section.

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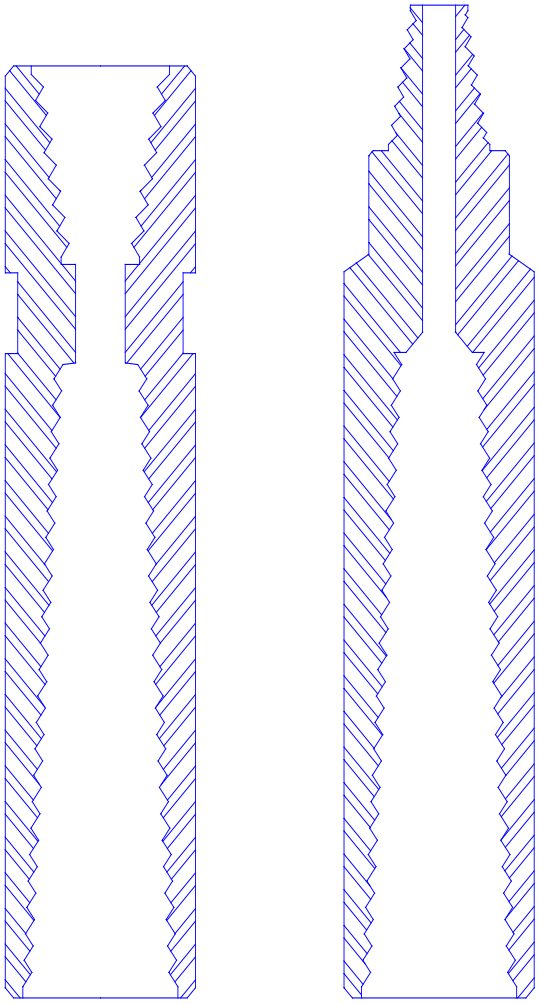
Die Collar Overshot

The Mills Machine Overshot is a **rugged, external catch, fishing** tool that is economical and simple to use. Overshots are manufactured like taper taps except they go over the OD of the fish. Like taper taps, overshots are **stocked** in a variety of sizes and standard connections so we are able to get something to you rapidly.



To build an overshot from scratch takes four to six days due to the heat treat process necessary to harden the teeth. It is speedier to build a sub to fit a stocked overshot and match your needs than to build the entire product.

We can build the overshot with oversize guides to more easily catch the fish or with a wall hook to snag behind a fish leaning against the drill hole wall.

Your Mills sales representative will work with you to get the fastest solution to your problem at the lowest cost.

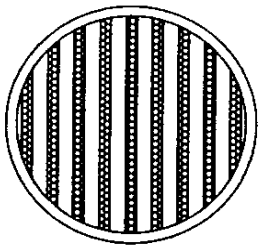
The carbonized threads on overshots are extremely hard and brittle. Be extra careful to avoid impact. In use, slowly lower the tool down the hole until the fish is engaged. Then slowly rotate the tool while applying some down pressure. Mark the drill rod to tell how far into the fish you have penetrated

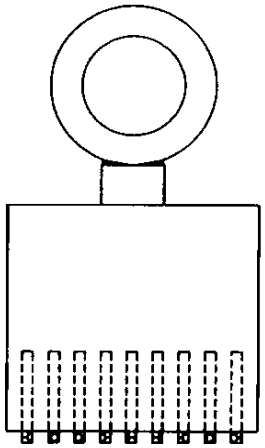
Overshots can be reworked by annealing, re-threading the overshot and then re-heat treating the re-threaded area. We will quote you pricing as necessary.

Please use the application questionnaire for overshots at the back of this section.

Fishing Magnets

This **Magnetic Fishing Tool** is an Alnico permanent magnet (never needs recharging) that can be lowered into the hole and magnetically latch onto the fish. We recommend this tool for retrieving small objects only! To achieve maximum lift requires a flat clean surface, which is rarely found down the hole.





Magnet sizes that we normally keep in stock are listed below but other sizes are available upon request.

3 1/2 Diameter	150 # lift*
4 1/2 Diameter	350 # lift*
5 1/2 Diameter	600 # lift*
6 1/2 Diameter	800 # lift*

The magnet is lowered into the hole with wire cable or rope. The inside diameter of the eyebolt is 1 1/4.

*** A guaranteed lift capacity is not feasible except on a flat, clean magnetic surface at least 1/4 thick.**

The magnet is shipped with a flat steel plate on the magnetic surface. This protection plate must be removed for use and returned to the magnet for storage.

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If you cannot fish it out or if you run into concrete and rebar, it is time for the Junk

Mill. Mills Machine manufactures these rugged mills from 4142 heat treated steel and a **composite matrix of large chunks of cutting grade or milling grade, crushed tungsten carbide** rod 1 1/2 to 2" thick on the face.

With this mill you can eliminate anything in your way - rock, drill pipe, casing, tool joints, reamers, and rock bits. To order please specify:

Size O.D. _____

Object to be Milled_____

_____

Footage to be Milled_____

Tool Joint _____

Flats or Knurl _____

Face Structure: Flat, concave, convex, tapered or pilot reamer face.

_____

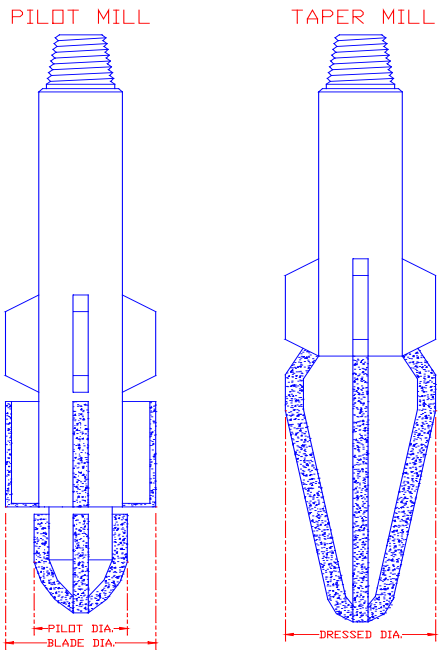
Circulation _____

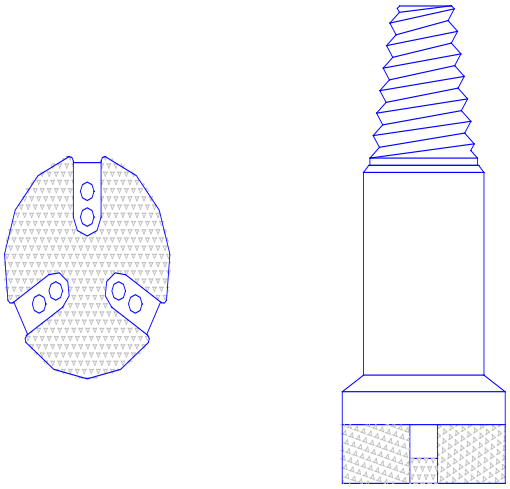
Stabilizer ribs _____

Fishing neck dimensions_____

Hole size or if inside casing, casing size_____

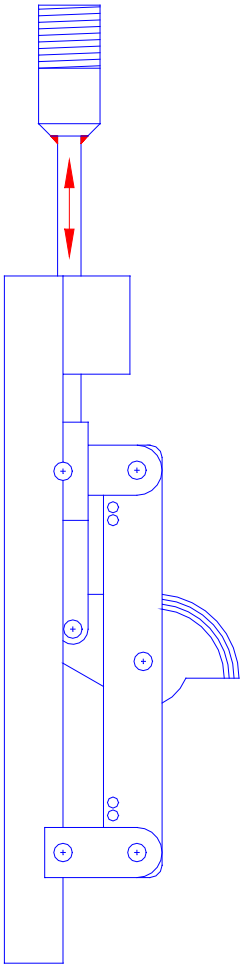
These mills can be reworked several times to lengthen their life. **Please call for rework prices.** If its down hole and you need to get rid of it, the Junk Mill is the tool to use.





"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Casing Perforators



The casing perforator (known as a Mills Knife) is used to perforate pipe or casing by punching vertical slots through the casing wall. This tool is designed to cut through steel casing with a maximum wall thickness of .300 and requires a two-line rig. The main wire line is for holding the tool in the hole and plumbing black pipe is used to lower the knife into the hole and trip the perforator blade. The secondary line is a wire line or bailer line to support the knife while the pulling rods are lifted.

As the knife is lowered into the hole the pulling rods are added by joint until the desired depth is reached. A location mark is made on the pipe to show the position of the punched hole. The rod is pulled up with a 3000 to 4000 pound force to extend the knife blade and pierce the pipe. The blade penetration of the steel is felt as a slight jerk through the rod. Lowering the rod releases the knife. The pipe is then rotated the desired degrees if a series of holes is required at that depth.

It is recommended that you practice near the surface to see and feel the operation of the knife before going down hole. Pulling too hard or pulling after penetration can split the pipe. After the perforations are made at the lowest level the drilling rod is raised to the next desired level. This prevents fowling of the wireline.

The top connection is a 2 inch NPT pin. The standard perforator is for 6 inch I. D. casing with no more than .300 wall thickness. Backing Shoes are available that expand the 6" perforating knife to 8" or 10". The 12" perforator can handle a .375 wall and also has backing shoes to expand out to 14 or 16 inches. Other sizes can be quoted upon request.

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Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

Application Questionnaire

Taper Tap Taper Tap

Date _____

Company _____ **Phone** _____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact** _____

Sketch:

Quantity **:_____

**Object to be Retrieved ****_____

Object ID &** *OD* _____

Top Connection **:_____**Pin** ☐ **Box** ☐

****Must fill out these items. Fill out more if possible or custom product requested.**

Depth to fish _____*Weight of fish* _____

*Length: Shoulder to Shoulder*_____

OR Overall _____

Top Neck: *OD* _____*ID* _____*Length* _____

Knurl ☐

Breakout Flats:

Two Sided ☐ *Four Sided* ☐

Flat Length _____*Location*_____

Dimensions: *Flat to Flat*_____

OR Depth per Side _____

Wicker: Large OD _____

Small OD _____

*Length*_____

RH (Standard) ☐ *OR LH* ☐

*Special: Oversize Guide*_____

*Wall Hook*_____

Other _____

_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Application Questionnaire

Die Collar Overshot

Die Collar Overshot

Date _____

Company _____ **Phone** _____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact** _____

Sketch:

Quantity **:_____

Object to be Retrieved** _____

Object *ID &* **OD**** _____

Top Connection **: _____**Pin** ☐ **Box** ☐

**** Must fill out these items. Fill out more if possible or custom product requested.**

Depth to fish _____ *Weight of fish* _____

*Length: Shoulder to Shoulder*_____

OR Overall _____

Top Neck: OD _____ *ID* _____ *Length* _____

Knurl ☐

Breakout Flats:

Two Sided ☐ *Four Sided* ☐

Flat Length _____ *Location*_____

*Dimensions: Flat to Flat*_____

OR Depth per Side _____

Wicker: Large OD _____

Small OD _____

*Length*_____

RH (Standard) ☐ *OR LH* ☐

Special: Oversize Guide _____

Wall Hook _____

Other _____

_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Check our Web site:
www.MillsMachine.com

MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

Stabilizers

Mills Machine custom manufactured stabilizers are used to keep the drill rod centered in the hole. They are available in a wide range of construction with all wear surfaces coated with carbide hard facing.

All stabilizers are made with heavy walled steel pipe. Stabilizers larger than 8 1/2 OD are normally made with an inner as well as an outer pipe for rigidity and strength. There is full, direct flow circulation provided. We will discuss the specific design with you before accepting your order.

All stabilizers are made with 4142 heat-treated, steel tool joints. All ribs are fully welded on both sides and have hard facing. Optional replaceable cast carbide ribs are available to increase the gage life.

Mills offers **five standard styles of stabilizers**.

The first type is the **Smooth Stabilizer** that is normally a couple of inches smaller than the borehole ID and can have an inner and outer barrel.

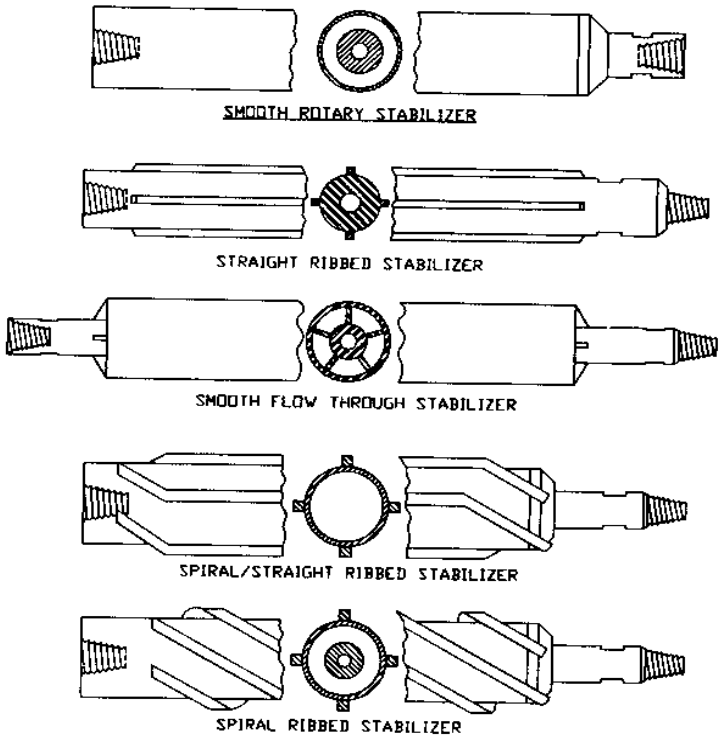
The **Flow Through** is another variation for larger diameters that allow the cuttings to flow between the inner and outer barrel.

Straight Ribbed Stabilizers can have three or more ribs (4 ribs is the most common) depending on the application. The ribs are welded to the steel tubing and are hard faced down the entire length to extend the gage life.

A variation on the straight rib design is the **Spiral Ribbed** stabilizer. The hard faced ribs are hand spiraled around the steel body to give 360 degree wall contact and assist in cutting removal.

The combination **Spiral-Straight Ribbed** stabilizer shown below gives the wall contact of the spiral stabilizer while reducing the cost of the spiraling process.

Finally, there is the **Overhammer Stabilizer** shown in more detail on the following page.



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

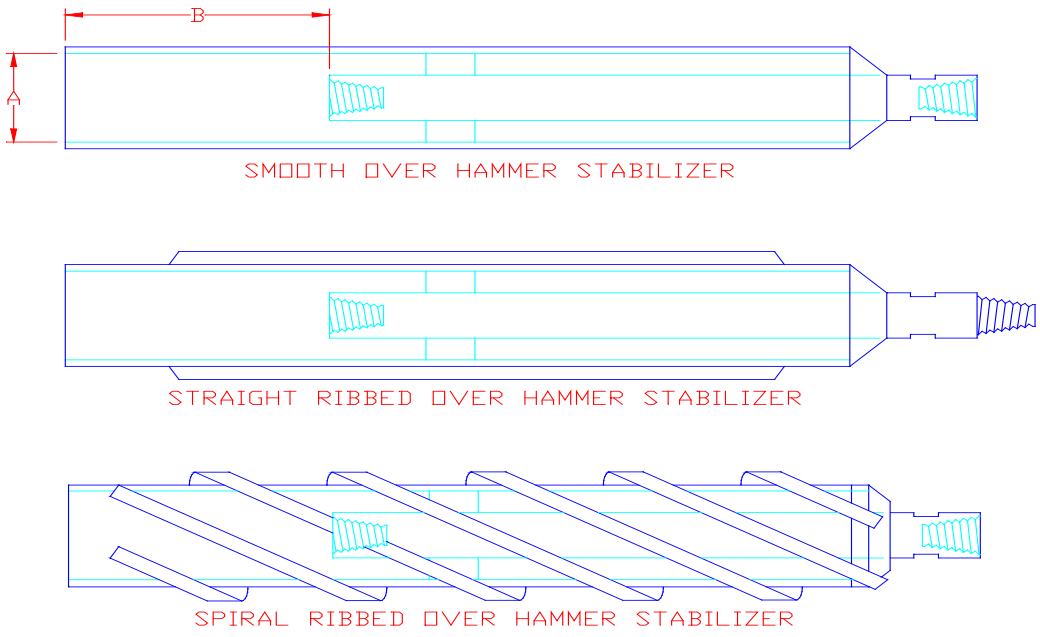
Over-Hammer Stabilizers

The Mills Machine over-hammer stabilizer is built with the rugged construction that is standard for our units and with the ability to take the punishment of direct connection to the down hole hammer. The stabilizer is designed for the specific hammer that it is coupled with.

Although more often of smooth design it can be built with straight or spiral ribs. The top connection matches the drill pipe while the bottom is designed to overlap and protect the hammer.

We can design the top neck to your specific requirements. A float valve can be inserted into the bottom box connection if required.

It is essential that the over-hammer stabilizer application questionnaire at back of this section be filled out for the proper design of the stabilizer.



In building a stabilizer we will build the stabilizer ID, dimension A above, to fit the case diameter. The case housing length, dimension B above, is the length of the stabilizer case over the hammer. These dimensions must be specified.

Application Questionnaire

Stabilizers Stabilizers

Company _____ **Phone** _____
Address _____ **Fax** _____
_____ **E-mail** _____
City, State Zip _____ **Contact** _____
Sketch:

Quantity **: _____**Length: Shoulder to Shoulder** _____
OR Overall _____
Hole Size **:_____
Top Connection **: _____ **Pin** ☐ **Box** ☐
Bottom Connection **:_____ **Pin** ☐ **Box** ☐

Stabilizer Type **: Straight Ribbed ☐ **Spiral Ribbed** ☐
Smooth ☐
Ribs **: Quantity _____**Finished OD**_____

****Must fill out these items. Fill out more if possible or custom product requested.**

*Carbide Specs*_____
Barrel: Outer OD _____ *Outer ID* _____
Inner OD _____ *Inner ID* _____

*Top Neck Dimensions: OD*_____*ID*_____
Knurled ☐ *Length*_____
*Bottom Neck Dimensions: OD*_____*ID*_____
Knurled ☐ *Length*_____

Flats: Two Sided ☐ *Four Sided* ☐
Special _____
Flat Length _____*Location* _____
*Dimensions: Flat to Flat*_____
*OR Depth per Side*_____
Lugs: Drill Pipe OD _____ *Hour Glass*_____
Location _____*Dimensions* _____

Float Valve: Bore Only ☐ *Install: Customer Furnished* ☐
Mills Furnished ☐
Brand _____ *Model & Size* _____
Special Requirements: _____
_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Application Questionnaire
Overhammer Stabilizers

Overhammer Stabilizers

Company _____ **Phone** _____

Address _____ **Fax** _____

_____ **E-mail**

_____

City, State Zip _____

Contact_____

Quantity **: ____ **Length: Shoulder to Shoulder**_____ **Sketch:**

OR Overall _____

Top Connection **:_____ **Pin** ☐ **Box** ☐

Bottom Connection **:_____ **Pin** ☐ **Box** ☐

Stabilizer Type **: Straight Ribbed ☐ **Spiral Ribbed** ☐

Smooth ☐

Ribs **: Quantity _____**Finished OD**_____

Hammer **: Brand _____

Case OD _____

Body Length_____

Case Housing Length_____

See Dimension B on opposite page.

Removable Barrel Design Yes ☐ **No** ☐

****Must fill out these items. Fill out more if possible or custom product requested.**

*Carbide Specs*_____

Barrel: Outer OD _____ *Outer ID* _____

Inner OD _____ *Inner ID* _____

*Top Neck Dimensions: OD*_____*ID*_____

Knurled ☐ *Length*_____

Flats: Two Sided ☐ *Four Sided* ☐

Special _____

Flat Length _____*Location* _____

*Dimensions: Flat to Flat*_____

*OR Depth per Side*_____

Lugs: Drill Pipe OD _____*Hour Glass*_____

Location _____ *Dimensions* _____

Float Valve: Bore Only ☐ *Install: Customer Furnished* ☐

Mills Furnished ☐

Brand _____ *Model & Size* _____

Special Requirements: _____

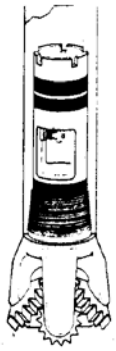
_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Check our Web site:
www.MillsMachine.com

MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

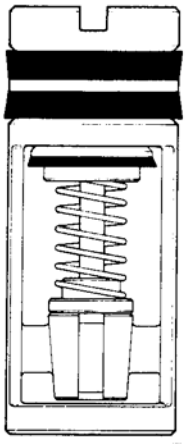
Mills Machine Co. stocks a wide variety of float valves at very competitive prices to sell separately or to install in our subs and stabilizers. We also stock the metal or rubber repair kits. Please contact us if you are not sure which type of float valve to use.

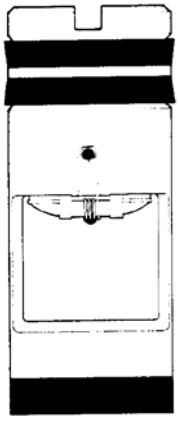


Baker Poppet Style	Baker Flapper Style	Demco Poppet Style	Box Tool Joint Size		Valve Diameter	Valve Length
1R, Model F			2 3/8	API Regular	1 21/32	5 7/8
1F-2R, Model F		27R	2 7/8	API Regular	1 29/32	6 1/4
			2 7/8	API Full Hole		
			2 7/8	API Internal Flush		
2F-3R, Model F	2F-3R, Model G	35R	3 1/2	API Regular	2 13/32	6 1/2
			2 7/8	API Full Hole		
			2 7/8	API Internal Flush		
3 F, Model F	3 F, Model G		3 1/2	API Full Hole	2 13/16	10”
3 1/2, Model F			3 1/2	API Internal Flush	3 1/8	10”
4R, Model F	4R, Model G	45R	4 1/2	API Regular	3 15/32	8 5/16
4F, Model F	4F, Model G		4 1/2	API Full Hole	3 21/32	12”
			4”	API Internal Flush		
5R, Model F	5R, Model G		5 1/2	API Regular	3 7/8	9 3/4
5F-6R, Model F	5F-6R, Model G	65R	6 5/8	API Regular	4 25/32	11 3/4
6F, Model F			8 5/8	API Regular	5 11/16	14 5/8

Baker is the Registered trademark of Supply Products Division, Baker Oil Tool Co.
Demco is the Registered trademark of Retsco, Inc.

The Poppet (plunger) Style Valve provides positive and instantaneous shut-off against high or low pressure, assuring continuous flow of the fluid during drilling. It prevents flow-back when adding joints and keeps cuttings out of the drill pipe, preventing plugging while making connections.





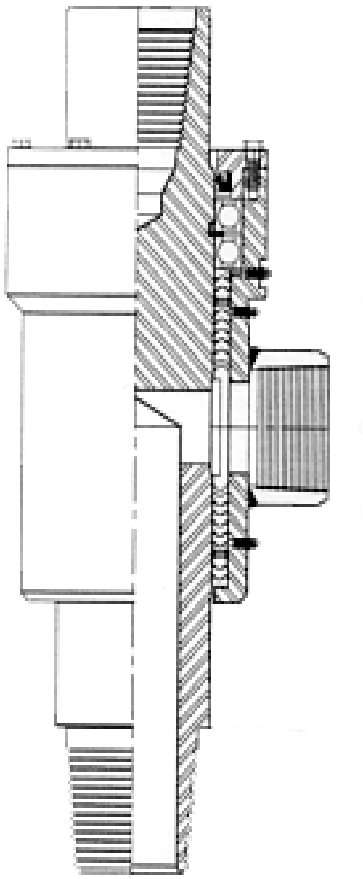
The Flapper Style Valve incorporates a specially designed flapper which opens quickly and fully to provide a completely unrestricted bore through the hole. When circulation stops the flapper closes instantly to prevent cuttings from entering the drill string and plugging the bit. The flapper style compliments primary blowout prevention equipment.

“PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES”

Drilling Accessories

Water Swivels

Available are the top mounted swivels or the side inlet swivels. The top mounted swivel comes with a U-bolt bail for conventional drilling or with studs when used as a rotating head. The lower NPT connection can be right or left hand, depending on the drill rig, while the top connection is the standard right hand thread, straight up or with a goose neck.



The side feed swivels is used with hydraulic, top-head drive rigs to insure the prevention of contamination of the hydraulic fluid. They are also used with auger rigs to convert them to circulating, rotary drilling rigs. The bottom connection will be matched to your specific requirements while the side connection is a standard NPT thread. The top is a 1 5/8 or 2" hex pin.

Please specify the bottom connection, water connection and, for side feed, the tops drive connection. These connections will determine the water course diameter.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

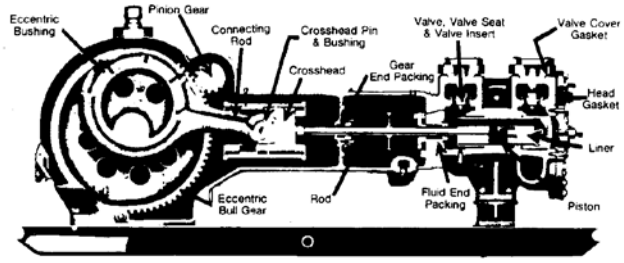
Mud Pump Parts

Mills Machine Co., Inc. is your source for parts for the following mud pumps:

Gardner-Denver	Fluid end and gear end parts
Wheatly	Fluid end parts
Armstrong	Fluid end parts
Failing	Fluid end parts
Gaso	Fluid end parts
Harrisburg	Fluid end parts
L-K Industries	Fluid end parts
Worthington	Fluid end parts

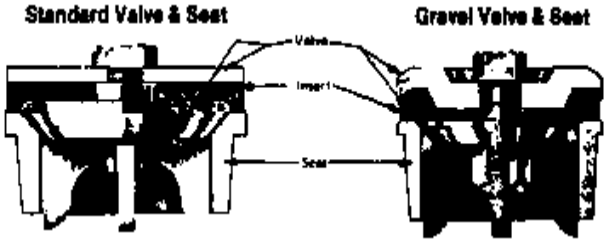
These are just a few of the pumps with parts available. When you call please have the following information available:

Name of pump,
Pump size,
Part Number and
Description of the part.



Some of the parts available are:

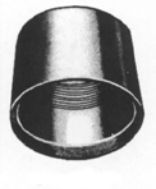
Liner - Chrome and Premium
Rods
Pistons
Piston Rubber
Valve Seat - Standard and Gravel
Valve Seat - Standard and Gravel
Valve Insert - Standard and Gravel
Valve Spring
Liner Packing
Rod Packing
Head Gasket
Valve Cover Gravel
Junk Ring
Lantern Ring
Gear End Packing
Eccentric Gear (Bull)
Eccentric Bushing
Pinion Gear (Driver)
Cross Pin
Cross Pin Bushing



Drilling Accessories

Drive Shoes

Steel Drive Shoes are available in threaded or weld on design. They are designed to be attached to the bottom of the casing enabling it to be driven into bedrock at the bottom of the hole. We will need to know the size, weight per foot, thread and inner or outer taper design.



Centralizers

The Centralizers are designed to attach to the casing or pipe and keep it centered in the hole to insure even distribution during the grouting process. Please specify the pipe diameter and carbon or stainless steel.

Pipe Thread Compound

Pipe Thread Compound is carried in stock in one gallon buckets but other sizes are available. The different types available are; JLS –multi purpose tool joint compound, Z-40 or Z-50 Zinc base tool joint compounds. We also stock Pipe Dope Brushes for application of the pipe thread compounds.

Pipe Thread Protectors

We stock both plastic and steel thread protectors in a broad range of thread types and sizes. We use this product to protect the threads on our hole openers, stabilizers, etc. during shipping.

Pipe Wipers

Pipe wipers come in a range of styles and diameters and include reinforced steel rings for rigidity and strength. Many sizes are available on request. Please let us know if you need the solid or split style.

Pipe Packers

Packers with either single or multiple sealing flanges are available with the expander tool assembly. Please call for price and availability.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Check our Web site:
www.MillsMachine.com

MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

Mills Machine Company has been manufacturing Drag Bits for **over 50 years** and has established industry standards for **Quality** and **Custom Design.**

In 1976 we introduced our **W6R** line of drag bits which featured weld on **field replaceable blades**. This particular style of drag bit is still available as well as the individual weld on blades.

After the W6R line had been out in the field for awhile we soon realized that our customers were starting to experience a problem in welding the blades back on to the shanks properly. One of the problems was that the old weld was not being removed from the shank and some blades stuck out further than the others and the other problem was that the proper cutting pitch was not being added so, the bits did not cut efficiently.

So, in 1990 we introduced our new **NW6R** line of bits that features a two piece design. The first piece is an NW6R connector, which is made from heat, treated alloy steel that has the thread of your choice on one end and our special tapered NW6R box thread on the other end. The second piece is an NW6R Head which features a replaceable and interchangeable cutting head that has carbide inserted blades and our NW6R pin thread on the other end.

The main advantages to using the **NW6R System** are versatility and economics. This system offers the option of merely unscrewing the NW6R Head and throwing it away when it is worn out or you may increase or decrease the size by screwing on a larger or smaller NW6R Head. You may also, change the bit style to a **heavy duty** design which features **thicker steel blades and carbide inserts** or change it to a different blade configuration like a **Chevron** or **Apex** style for tougher formations.

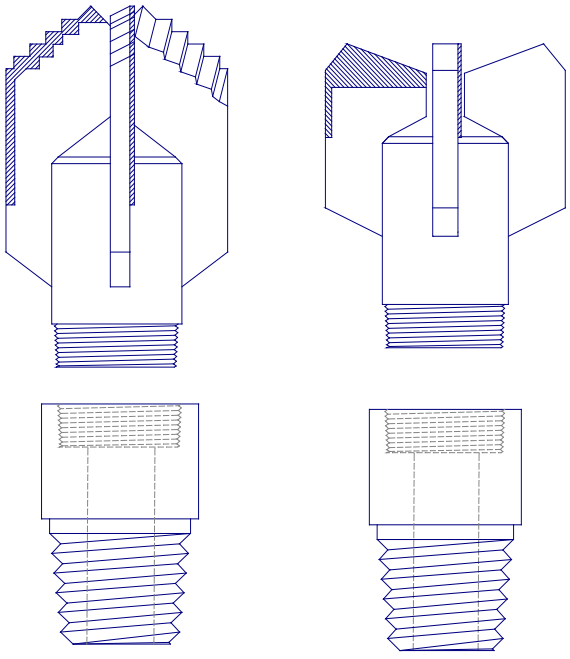
The NW6R System is economical because, it saves you the cost of the alloy heat treated shank each time that you need a new bit and eliminates the reworking process of a one piece bit where the blades would have to be torched off and new ones welded on.

NW6R Reamers and Stabilizers may be added between the connector and head to ream out the hole or stabilize the bit, both of these options are inexpensive alternatives to buying a one-piece design.

We also, have one piece **forged design** drag bits available in a step or chevron type and with standard pin or box threads.

For larger size holes we offer our D6R Drag Bit line which features heavy duty bolt on teeth with carbide inserts. Sizes range from 12 1/4 - 110 diameter and can be manufactured for Regular or reverse circulation.

Whether your application is in Water Well, Mining, Construction or Exploration Drilling, Mills Machine has the custom designed bit to meet your requirements.

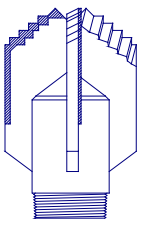


"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

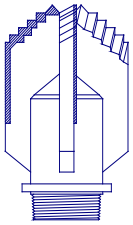
NW6R Drag Bits - 3 Wing - Standard Duty

Standard Duty drag bits have 3/4 thick blades and 3/16 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale). The standard design has three blades. We also offer 4, 5, or 6 blades in a multiple of custom shapes and styles.

Head Only



Standard



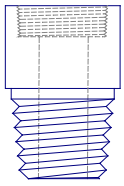
Stopper Ring

The NW6R heads and connectors listed below are what we consider to be stock standard sizes but we can custom manufacture any size that you need! The heads can be furnished with a stopper ring to provide a shouldered thread connection.

	Part #	Size Inches	(mm)	NW6R Pin Connection	Stabilizer Band	Weight Lbs.	Kgs.
S	NW6R512S3	5 1/2	(139.7)	3 1/2 NW6R		14	6.4
S	NW6R558S3	5 5/8	(142.9)	3 1/2 NW6R		14	6.4
S	NW6R578S3	5 7/8	(149.2)	3 1/2 NW6R		14	6.4
S	NW6R600S3	6	(152.4)	3 1/2 NW6R		15	6.8
S	NW6R618S3	6 1/8	(155.6)	3 1/2 NW6R		15	6.8
S	NW6R614S3	6 1/4	(158.8)	3 1/2 NW6R		15	6.8
S	NW6R612S3	6 1/2	(165.1)	3 1/2 NW6R		16	7.3
S	NW6R634S3	6 3/4	(171.4)	3 1/2 NW6R		16	7.3
S	NW6R700S3	7	(177.8)	3 1/2 NW6R		16	7.3
S	NW6R778S3	7 7/8	(200.0)	3 1/2 NW6R		20	9.1
S	NW6R812S3	8 1/2	(208.3)	3 1/2 NW6R		25	11.3
S	NW6R834S3	8 3/4	(222.2)	3 1/2 NW6R		26	11.8
S	NW6R978S3	9 7/8	(250.8)	3 1/2 NW6R		27	12.2
S	NW6R1058S3	10 5/8	(269.9)	3 1/2 NW6R		28	12.7
S	NW6R1214S3	12 1/4	(311.1)	3 1/2 NW6R		43	19.5
S	NW6R1434S3	14 3/4	(374.7)	4 1/2 NW6R		48	21.8
S	NW6R1712S3	17 1/2	(444.5)	4 1/2 NW6R	Yes	75	34.0

S-Stock Item *Other sizes available upon request.
Stopper ring is standard for 14 3/4 and 17 1/2 sizes.

Connector Only



Box To Pin Connector

	Part #	NW6R Box	
S	NW3-312RP	3 1/2 NW6R	3 1/2 Reg Pin
S	NW3-412RP	3 1/2 NW6R	4 1/2 Reg Pin
S	NW3-658RP	3 1/2 NW6R	6 5/8 Reg Pin
S	NW3-MJRB	3 1/2 NW6R	MJR Box
S	NW3-MRB	3 1/2 NW6R	MR Box
S	NW3-238IFB	3 1/2 NW6R	2 3/8 IF Box
S	NW3-278IFB	3 1/2 NW6R	2 7/8 IF Box
S	NW4-312RP	4 1/2 NW6R	3 1/2 Reg Pin
S	NW4-412RP	4 1/2 NW6R	4 1/2 Reg Pin
S	NW4-658RP	4 1/2 NW6R	6 5/8 Reg Pin

Lbs	Kgs.
15	6.8
22	10.0
55	24.9
12	5.4
15	6.8
20	9.1
22	10.0
20	9.1
22	10.0
55	24.9

Box to Box Connector

S-Stock Item *Other threads available upon request.
NW6R Connectors are manufactured from 4142 heat treated alloy steel and are offered in any thread you need.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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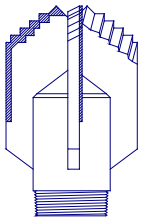
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

NW6R Drag Bits - 4 Wing - Standard Duty

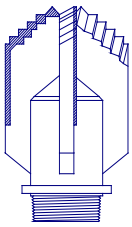
Standard Duty drag bits use 3/4 thick blades and 3/16 thick carbide. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale). The standard design has four blades. We also offer 3, 5 or 6 blades in a multiple of custom shapes and styles.

Head Only

The NW6R heads and connectors listed below are what we consider to be stock standard sizes but we can custom manufacture any size that you need! The heads can be furnished with a stopper ring to provide a shouldered thread connection.



Standard

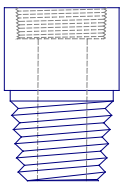


Stopper Ring

Part #	Size Inches	(mm)	NW6R Pin Connection	Stabilizer Band	Weight Lbs.	Kgs.
NW6R512S4	5 1/2	(139.7)	3 1/2 NW6R		15	6.8
NW6R558S4	5 5/8	(142.9)	3 1/2 NW6R		15	6.8
NW6R578S4	5 7/8	(149.2)	3 1/2 NW6R		15	6.84
NW6R600S4	6	(152.4)	3 1/2 NW6R		16	7.3
NW6R618S4	6 1/8	(155.6)	3 1/2 NW6R		16	7.3
NW6R614S4	6 1/4	(158.8)	3 1/2 NW6R		17	7.7
NW6R612S4	6 1/2	(165.1)	3 1/2 NW6R		17	7.7
NW6R634S4	6 3/4	(171.4)	3 1/2 NW6R		17	7.7
NW6R700S4	7	(177.8)	3 1/2 NW6R		17	7.7
NW6R778S4	7 7/8	(200.0)	3 1/2 NW6R		22	10.0
NW6R812S4	8 1/2	(208.3)	3 1/2 NW6R		26	11.8
NW6R834S4	8 3/4	(222.2)	3 1/2 NW6R		28	11.8
NW6R978S4	9 7/8	(250.8)	3 1/2 NW6R		31	12.7
NW6R1058S4	10 5/8	(269.9)	3 1/2 NW6R		31	14.1
NW6R1214S4	12 1/4	(311.1)	3 1/2 NW6R		48	21.8
NW6R1434S4	14 3/4	(374.7)	4 1/2 NW6R		54	24.4
NW6R1712S4	17 1/2	(444.5)	4 1/2 NW6R	Yes	82	37.2

***Other sizes available upon request.**
Stopper Ring is standard for 14 3/4 and 17 1/2 sizes.

Connector Only



Box to Pin Connector

	Part #	NW6R Box		Lbs.	Kgs.
S	NW3-312RP	3 1/2 NW6R	3 1/2 Reg Pin	15	6.8
S	NW3-412RP	3 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	NW3-658RP	3 1/2 NW6R	6 5/8 Reg Pin	55	24.9
S	NW3-MJRB	3 1/2 NW6R	MJR Box	12	5.4
S	NW3-MRB	3 1/2 NW6R	MR Box	15	6.8
S	NW3-238IFB	3 1/2 NW6R	2 3/8 IF Box	20	9.1
S	NW3-278IFB	3 1/2 NW6R	2 7/8 IF Box	22	10.0
S	NW4-312RP	4 1/2 NW6R	3 1/2 Reg Pin	20	9.1
S	NW4-412RP	4 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	NW4-658RP	4 1/2 NW6R	6 5/8 Reg Pin	55	24.9

Box To Box Connector

S-Stock Item *Other threads available upon request.
NW6R Connectors are manufactured from 4142 heat treated alloy steel and are offered in any thread you need.

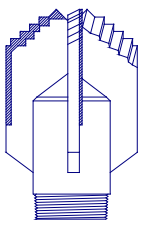
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

NW6R Drag Bits - 3 Wing - Heavy Duty

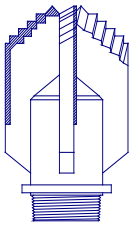
Heavy Duty drag bits use 1 thick blades and 1/4 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale) while the thicker blades and carbide extend the life of the bit. The standard design has three blades but we also offer 4, 5 or 6 blades in a variety of custom shapes and styles.

Head Only

The NW6R heads and connectors listed below are what we consider to be standard sizes but we can custom manufacture any size that you need! The heads can be furnished with a stopper ring to provide a shouldered thread connection.



Standard

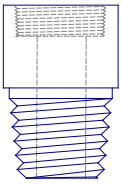


Stopper Ring

Part #	Size Inches	(mm)	NW6R Pin Connection	Stabilizer Band	Weight Lbs.	Kgs.
NW6R512S3HD	5 1/2	(139.7)	3 1/2 NW6R		31	14.1
NW6R558S3HD	5 5/8	(142.9)	3 1/2 NW6R		31	14.1
NW6R578S3HD	5 7/8	(149.2)	3 1/2 NW6R		32	14.5
NW6R600S3HD	6	(152.4)	3 1/2 NW6R		32	14.5
NW6R618S3HD	6 1/8	(155.6)	3 1/2 NW6R		32	14.5
NW6R614S3HD	6 1/4	(158.8)	3 1/2 NW6R		32	14.5
NW6R612S3HD	6 1/2	(165.1)	3 1/2 NW6R		33	15.0
NW6R634S3HD	6 3/4	(171.4)	3 1/2 NW6R		33	15.0
NW6R700S3HD	7	(177.8)	3 1/2 NW6R		33	15.0
NW6R778S3HD	7 7/8	(200.0)	3 1/2 NW6R		33	15.0
NW6R812S3HD	8 1/2	(208.3)	3 1/2 NW6R		43	19.5
NW6R834S3HD	8 3/4	(222.2)	3 1/2 NW6R		44	20.0
NW6R978S3HD	9 7/8	(250.8)	3 1/2 NW6R		45	20.4
NW6R1058S3HD	10 5/8	(269.9)	3 1/2 NW6R		48	21.8
NW6R1214S3HD	12 1/4	(311.1)	3 1/2 NW6R		52	23.8
NW6R1434S3HD	14 3/4	(374.7)	4 1/2 NW6R		74	33.6
NW6R1712S3HD	17 1/2	(444.5)	4 1/2 NW6R	Yes	112	50.8

***Other sizes available upon request.**
Stopper Ring is standard for 14 3/4 and 17 1/2 sizes.

Connector Only



Box To Pin Connector

	Part #	NW6R Box		Lbs.	Kgs.
S	NW3-312RP	3 1/2 NW6R	3 1/2 Reg Pin	15	6.8
S	MW3-412RP	3 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	MW3-658RP	3 1/2 NW6R	6 5/8 Reg Pin	55	24.9
S	NW3-MJRB	3 1/2 NW6R	MJR Box	12	5.4
S	NW3-MRB	3 1/2 NW6R	MR Box	15	6.8
S	NW3-238IFB	3 1/2 NW6R	2 3/8 IF Box	20	9.1
S	NW3-278IFB	3 1/2 NW6R	2 7/8 IF Box	22	10.0
S	NW4-312RP	4 1/2 NW6R	3 1/2 Reg Pin	20	9.1
S	NW4-412RP	4 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	NW4-658RP	4 1/2 NW6R	6 5/8 Reg Pin	55	24.9

Box To Box Connector

S-Stock Item *Other threads available upon request.
NW6R Connectors are manufactured from 4142 heat treated alloy steel and are offered in any thread you need.

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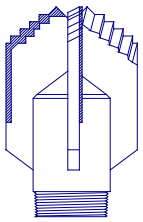
NW6R Drag Bits - 4 Wing - Heavy Duty

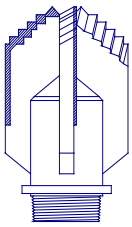
Heavy Duty drag bits use 1 inch thick blades and 1/4 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale)while the thicker blades and carbide extend the life of the bit. The standard design has four blades but we also offer 3, 5 or 6 blades in a variety of custom shapes and styles.

Head Only

The NW6R heads and connectors listed below are what we consider to be standard sizes but we can custom manufacture any size that you need! The heads can be furnished with a stopper ring to provide a shouldered thread connection.



Standard

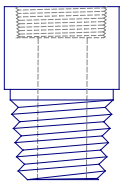


Stopper Ring

Part #	Size Inches	(mm)	NW6R Pin Connection	Stabilizer Band	Weight Lbs.	Kgs.
NW6R512S4HD	5 1/2	(139.7)	3 1/2 NW6R		32	14.5
NW6R558S4HD	5 5/8	(142.9)	3 1/2 NW6R		32	14.5
NW6R578S4HD	5 7/8	(149.2)	3 1/2 NW6R		33	15.0
NW6R600S4HD	6	(152.4)	3 1/2 NW6R		33	15.0
NW6R618S4HD	6 1/8	(155.6)	3 1/2 NW6R		33	15.0
NW6R614S4HD	6 1/4	(158.8)	3 1/2 NW6R		33	15.0
NW6R612S4HD	6 1/2	(165.1)	3 1/2 NW6R		34	15.4
NW6R634S4HD	6 3/4	(171.4)	3 1/2 NW6R		34	15.4
NW6R700S4HD	7	(177.8)	3 1/2 NW6R		34	15.4
NW6R778S4HD	7 7/8	(200.0)	3 1/2 NW6R		34	15.4
NW6R812S4HD	8 1/2	(208.3)	3 1/2 NW6R		45	20.4
NW6R834S4HD	8 3/4	(222.2)	3 1/2 NW6R		46	20.8
NW6R978S4HD	9 7/8	(250.8)	3 1/2 NW6R		47	21.3
NW6R1058S4HD	10 5/8	(269.9)	3 1/2 NW6R		50	22.7
NW6R1214S4HD	12 1/4	(311.1)	3 1/2 NW6R		55	24.9
NW6R1434S4HD	14 3/4	(374.7)	4 1/2 NW6R		78	35.4
NW6R1712S4HD	17 1/2	(444.5)	4 1/2 NW6R	Yes	116	52.6

***Other sizes available upon request.**
Stopper Ring is standard for 14 3/4 and 17 1/2 sizes.

Connector Only



Box To Pin Connector

	Part #	NW6R Box		Lbs.	Kgs.
S	NW3-312RP	3 1/2 NW6R	3 1/2 Reg Pin	15	6.8
S	NW3-412RP	3 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	NW3-658RP	3 1/2 NW6R	6 5/8 Reg Pin	55	24.9
S	NW3-MJRB	3 1/2 NW6R	MJR Box	12	5.4
S	NW3-MRB	3 1/2 NW6R	MR Box	15	6.8
S	NW3-238IFB	3 1/2 NW6R	2 3/8 IF Box	20	9.1
S	NW3-278IFB	3 1/2 NW6R	2 7/8 IF Box	22	10.0
S	NW4-312RP	4 1/2 NW6R	3 1/2 Reg Pin	20	9.1
S	NW4-412RP	4 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	NW4-658RP	4 1/2 NW6R	6 5/8 Reg Pin	55	24.9

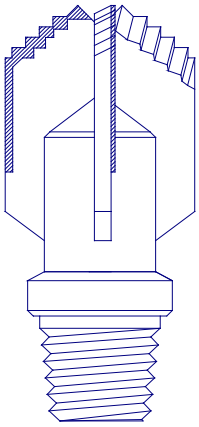
Box To Box Connector

S–Stock item *Other threads available upon request.
NW6R Connectors are manufactured from 4142 heat treated alloy steel and are offered in any thread you need.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

W6R Drag Bits - Step Type - Standard Duty - One Piece

Standard Duty Drag Bits use 3/4 thick blades and 3/16 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale). Listed below are standard sizes with three or four blades but we also offer 5 or 6 blades in a multiple of custom shapes and styles.



Standard Duty Drag Bit
Fabricated Blade Type

3 Wing

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs.	Weight Kgs.
W6R512S3	5 1/2	(139.7)			
W6R558S3	5 5/8	(142.9)			
W6R578S3	5 7/8	(149.2)			
W6R600S3	6	(152.4)			
W6R618S3	6 1/8	(155.6)			
W6R614S3	6 1/4	(158.8)			
W6R612S3	6 1/2	(165.1)			
W6R634S3	6 3/4	(171.4)			
W6R700S3	7	(177.8)			
W6R778S3	7 7/8	(200.0)			
W6R812S3	8 1/2	(208.3)			
W6R834S3	8 3/4	(222.2)			
W6R978S3	9 7/8	(250.8)			
W6R1058S3	10 5/8	(269.9)			
W6R1214S3	12 1/4	(311.1)			
W6R1434S3	14 3/4	(374.7)			
W6R1712S3	17 1/2	(444.5)	Yes		

4 Wing

	Size Inches	Range (mm)	Stab. Band	Weight Lbs.	Weight Kgs.
W6R512S4	5 1/2	(139.7)			
W6R558S4	5 5/8	(142.9)			
W6R578S4	5 7/8	(149.2)			
W6R600S4	6	(152.4)			
W6R618S4	6 1/8	(155.6)			
W6R614S4	6 1/4	(158.8)			
W6R612S4	6 1/2	(165.1)			
W6R634S4	6 3/4	(171.4)			
W6R700S4	7	(177.8)			
W6R778S4	7 7/8	(200.0)			
W6R812S4	8 1/2	(208.3)			
W6R834S4	8 3/4	(222.2)			
W6R978S4	9 7/8	(250.8)			
W6R1058S4	10 5/8	(269.9)			
W6R1214S4	12 1/4	(311.1)			
W6R1434S4	14 3/4	(374.7)			
W6R1712S4	17 1/2	(444.5)	Yes		

***Other sizes available upon request.**

Standard Pin or Box

We can supply these bits with the following standard connections.

Connection
MJR Box
MR Box
2 3/8 IF Box
2 7/8 IF Pin
2 3/8 Reg Pin
2 7/8 Reg Pin
3 1/2 Reg Pin
4 1/2 Reg Pin
6 5/8 Reg Pin

Other pin and box connections are available on request.

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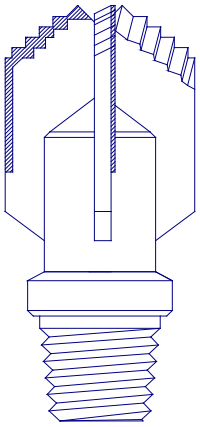
W6R Drag Bits - Step Type - Heavy Duty - One Piece



Heavy Duty drag bits have 1 inch thick blades and 1/4 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale) while the thicker blades and carbide extend the life of the bit. Listed below is our standard three and four blade but we also offer 5 or 6 blades in a variety of custom shapes and styles.

Heavy Duty Drag Bit Fabricated Blade Type

3 Wing

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs.	Weight Kgs.
W6R512S3HD	5 1/2	(139.7)			
W6R558S3HD	5 5/8	(142.9)			
W6R578S3HD	5 7/8	(149.2)			
W6R600S3HD	6	(152.4)			
W6R618S3HD	6 1/8	(155.6)			
W6R614S3HD	6 1/4	(158.8)			
W6R612S3HD	6 1/2	(165.1)			
W6R634S3HD	6 3/4	(171.4)			
W6R700S3HD	7	(177.8)			
W6R778S3HD	7 7/8	(200.0)			
W6R812S3HD	8 1/2	(208.3)			
W6R834S3HD	8 3/4	(222.2)			
W6R978S3HD	9 7/8	(250.8)			
W6R1058S3HD	10 5/8	(269.9)			
W6R1214S3HD	12 1/4	(311.1)			
W6R1434S3HD	14 3/4	(374.7)			
W6R1712S3HD	17 1/2	(444.5)	Yes		

4 Wing

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs.	Weight Kgs.
W6R512S4HD	5 1/2	(139.7)			
W6R558S4HD	5 5/8	(142.9)			
W6R578S4HD	5 7/8	(149.2)			
W6R600S4HD	6	(152.4)			
W6R618S4HD	6 1/8	(155.6)			
W6R614S4HD	6 1/4	(158.8)			
W6R612S4HD	6 1/2	(165.1)			
W6R634S4HD	6 3/4	(171.4)			
W6R700S4HD	7	(177.8)			
W6R778S4HD	7 7/8	(200.0)			
W6R812S4HD	8 1/2	(208.3)			
W6R834S4HD	8 3/4	(222.2)			
W6R978S4HD	9 7/8	(250.8)			
W6R1058S4HD	10 5/8	(269.9)			
W6R1214S4HD	12 1/4	(311.1)			
W6R1434S4HD	14 3/4	(374.7)			
W6R1712S4HD	17 1/2	(444.5)	Yes		

***Other sizes available upon request.**

Standard Pin or Box

We can supply these bits with the following standard connections.

Connection
MJR Box
MR Box
2 3/8 IF Box
2 7/8 IF Pin
2 3/8 Reg Pin
2 7/8 Reg Pin
3 1/2 Reg Pin
4 1/2 Reg Pin
6 5/8 Reg Pin

Other pin and box connections are available on request.

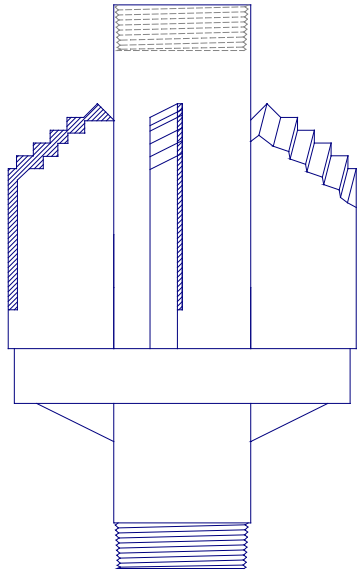
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

NW6R Drag Reamer - Standard Duty

The NW6R Drag Reamer (Holeopener) is designed to fit between a NW6R Connector (top) and a NW6R Drag Bit Head (bottom). The NW6R Drag Reamer can be used with any size NW6R Head and is available with 3 or 4 blades. The Standard Duty has 3/4 inch thick blades with 3/16 inch carbide inserts. Other shapes and sizes are available.

Standard Duty - 3 Wing - Drag Reamer

Part #	Inches	(mm)	Box to Pin	Weight Lbs	Kgs
NW6RREAM812-3	8 1/2	(208.3)	3 1/2 NW6R	26	11.8
NW6RREAM834-3	8 3/4	(222.2)	3 1/2 NW6R	26	11.8
NW6RREAM978-3	9 7/8	(250.8)	3 1/2 NW6R	28	12.7
NW6RREAM1058-3	10 5/8	(269.9)	3 1/2 NW6R	34	15.5
NW6RREAM1214-3	12 1/4	(311.1)	3 1/2 NW6R	42	19.1
NW6RREAM1434-3	14 3/4	(374.7)	3 1/2 NW6R**	49	22.2
NW6RREAM1712-3	17 1/2 *	(444.5)	3 1/2 NW6R**	71	32.2
NW6RREAM2000-3	20 *		3 1/2 NW6R**		
NW6RREAM2200-3	22 *		3 1/2 NW6R**		
NW6RREAM2400-3	24 *		3 1/2 NW6R**		



*** Reamer has Stabilizer Band.**
****Built with Heavy Duty Body.**
Other sizes available upon request.

Standard Duty - 4 Wing - Drag Reamer

Part #	Inches	(mm)	Box to Pin	Weight Lbs	Kgs
NW6RREAM778-4	7 7/8	(200.0)	3 1/2 NW6R	30	13,6
NW6RREAM812-4	8 1/2	(208.3)	3 1/2 NW6R	30	13.6
NW6RREAM834-4	8 3/4	(222.2)	3 1/2 NW6R	30	13.6
NW6RREAM978-4	9 7/8	(250.8)	3 1/2 NW6R	38	17.2
NW6RREAM1058-4	10 5/8	(269.9)	3 1/2 NW6R	40	18.1
NW6RREAM1214-4	12 1/4	(311.1)	3 1/2 NW6R	50	22.7
NW6RREAM1434-4	14 3/4	(374.7)	3 1/2 NW6R**	57	25.9
NW6RREAM1712-4	17 1/2	(444.5)	3 1/2 NW6R**	81	36.7
NW6RREAM2000-4	20 *		3 1/2 NW6R**		
NW6RREAM2200-4	22 *		3 1/2 NW6R**		
NW6RREAM2400-4	24 *		3 1/2 NW6R**		

***Reamer has a Stabilizer Band.**
****Built with Heavy Duty Body.**
Other sizes available upon request.

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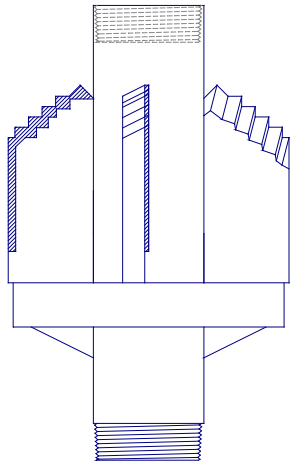
NW6R Drag Reamer - Heavy Duty

The NW6R Drag Reamer (Holeopener) is designed to fit between a NW6R Connector (top) and a NW6R Drag Bit Head (bottom). The NW6R Drag Reamer can be used with any size NW6R Head and is available in 3 or 4 blades. The Heavy Duty has 1 inch blades with 1/4 inch carbide. Other shapes and sizes are available.

Heavy Duty - 3 Wing - Drag Reamers



Part #	Inches	(mm)	Box to Pin	Weight Lb	Kgs.
NW6RREAM512-3HD	5 1/2	(139.7)	3 1/2 NW6R	18	8.2
NW6RREAM558-3HD	5 5/8	(142.9)	3 1/2 NW6R	18	8.2
NW6RREAM578-3HD	5 7/8	(149.2)	3 1/2 NW6R	18	8.2
NW6RREAM600-3HD	6	(152.4)	3 1/2 NW6R	18	8.2
NW6RREAM618-3HD	6 1/8	(155.6)	3 1/2 NW6R	19	8.6
NW6RREAM614-3HD	6 1/4	(158.8)	3 1/2 NW6R	19	8.6
NW6RREAM612-3HD	6 1/2	(165.1)	3 1/2 NW6R	19	8.6
NW6RREAM634-3HD	6 3/4	(171.4)	3 1/2 NW6R	21	9.5
NW6RREAM700-3HD	7	(177.8)	3 1/2 NW6R	21	9.5
NW6RREAM778-3HD	7 7/8	(200.0)	3 1/2 NW6R	21	9.5
NW6RREAM812-3HD	8 1/2	(208.3)	3 1/2 NW6R	26	11.8
NW6RREAM834-3HD	8 3/4	(222.2)	3 1/2 NW6R	26	11.8
NW6RREAM978-3HD	9 7/8	(250.8)	3 1/2 NW6R	28	12.7
NW6RREAM1058-3HD	10 5/8	(269.9)	3 1/2 NW6R	34	15.5
NW6RREAM1214-3HD	12 1/4	(311.1)	4 1/2 NW6R	42	19.1
NW6RREAM1434-3HD	14 3/4	(374.7)	4 1/2 NW6R	49	22.2
NW6RREAM1712-3HD	17 1/2	(444.5)	4 1/2 NW6R	71	32.2

17 1/2 has a Stabilizer Band

***Other sizes available upon request.**

Heavy Duty - 4 Wing - Drag Reamer

Part #	Inches	(mm)	Box to Pin	Weight Lbs.	Kgs.
NW6RREAM512-4HD	5 1/2	(139.7)	3 1/2 NW6R	19	8.6
NW6RREAM558-4HD	5 5/8	(142.9)	3 1/2 NW6R	19	8.6
NW6RREAM578-4HD	5 7/8	(149.2)	3 1/2 NW6R	19	8.6
NW6RREAM600-4HD	6	(152.4)	3 1/2 NW6R	19	8.6
NW6RREAM618-4HD	6 1/8	(155.6)	3 1/2 NW6R	20	9.1
NW6RREAM614-4HD	6 1/4	(158.8)	3 1/2 NW6R	20	9.1
NW6RREAM612-4HD	6 1/2	(165.1)	3 1/2 NW6R	20	9.1
NW6RREAM634-4HD	6 3/4	(171.4)	3 1/2 NW6R	27`	12.2
NW6RREAM700-4HD	7	(177.8)	3 1/2 NW6R	27	12.2
NW6RREAM778-4HD	7 7/8	(200.0)	3 1/2 NW6R	30	13,6
NW6RREAM812-4HD	8 1/2	(208.3)	3 1/2 NW6R	30	13.6
NW6RREAM834-4HD	8 3/4	(222.2)	3 1/2 NW6R	30	13.6
NW6RREAM978-4HD	9 7/8	(250.8)	3 1/2 NW6R	38	17.2
NW6RREAM1058-4HD	10 5/8	(269.9)	3 1/2 NW6R	40	18.1
NW6RREAM1214-4HD	12 1/4	(311.1)	4 1/2 NW6R	50	22.7
NW6RREAM1434-4HD	14 3/4	(374.7)	4 1/2 NW6R	57	25.9
NW6RREAM1712-4HD	17 1/2	(444.5)	4 1/2 NW6R	81	36.7

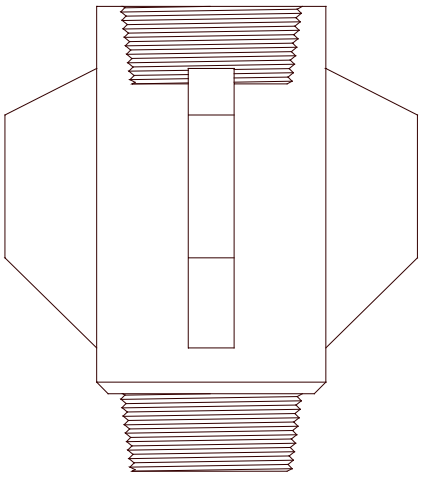
17 1/2 has a Stabilizer Band

***Other sizes available upon request.**

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

NW6R Drag Stabilizers

The NW6R Drag Stabilizer is designed to fit between a NW6R Connector (top) and a NW6R Drag Bit Head (bottom). The NW6R Drag Stabilizer can be used with any size NW6R Head and is available with 3 or 4 blades. The standard configuration has 3 - 3/4 inch thick blades with tungsten carbide hard faced blades. Other shapes and sizes are available.



3 Wing Stabilizer

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs.	Weight Kgs.
NW6RSTAB512-3	5 1/2	(139.7)		39	17.7
NW6RSTAB558-3	5 5/8	(142.9)		39	17.7
MW6RSTAB578-3	5 7/8	(149.2)		39	17.7
NW5RSTAB600-3	6	(152.4)		39	17.7
NW6RSTAB618-3	6 1/8	(155.6)		40	18.1
NW6RSTAB614-3	6 1/4	(158.8)		40	18.1
NW6RSTAB612-3	6 1/2	(165.1)		40	18.1
NW6RSTAB634-3	6 3/4	(171.4)		41	18.6
NW6RSTAB700-3	7	(177.8)		41	18.6
NW6RSTAB778-3	7 7/8	(200.0)		44	20.0
NW6RSTAB812-3	8 1/2	(208.3)		46	20.9
NW6RSTAB834-3	8 3/4	(222.2)		47	21.3
NW6RSTAB978-3	9 7/8	(250.8)		48	21.8
NW6RSTAB1058-3	10 5/8	(269.9)		49	22.2
NW6RSTAB1214-3	12 1/4	(311.1)		53	24.0
NW6RSTAB1434-3	14 3/4	(374.7)		83	37.6
NW6RSTAB1712-3	17 1/2	(444.5)	Yes	112	50.8

Other sizes and styles available upon request.

'PLEASE CALL FOR CUSTOM OTPIONS AND OTHER ACCESSORIES"

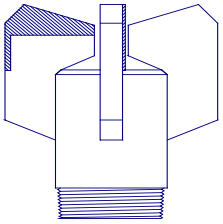
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

NW6R Drag Bits – Chevron - 3 Wing - Heavy Duty

NW6R Chevron drag bits are heavy duty with 1 inch thick blades and 1/4 carbide. The Chevron (Apex) style drag bit does not penetrate as fast as the step type, however it will cut harder formations such as medium soft to medium hard sand rock and shale. The standard design has three blades but we also offer 4, 5 or 6 blades in a variety of custom shapes and styles.

NW6R Chevron - Head Only - 3 Wing - Heavy Duty

The NW6R heads and connectors listed below are what we consider to be standard sizes but we can custom manufacture any size that you need! The heads can be furnished with a stopper ring to provide a shouldered thread connection.

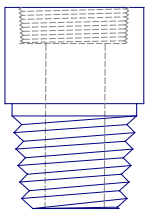


Standard

Part #	Inches	(mm)	Connection	Lbs.	Kgs.
NW6R512C-3	5 1/2	(139.7)	3 1/2 NW6R	18	8.2
NW6R558C-3	5 5/8	(142.9)	3 1/2 NW6R	18	8.2
NW6R578C-3	5 7/8	(149.2)	3 1/2 NW6R	19	8.6
NW6R600C-3	6	(152.4)	3 1/2 NW6R	19	8.6
NW6R618C-3	6 1/8	(155.6)	3 1/2 NW6R	19	8.6
NW65614C-3	6 1/4	(158.8)	3 1/2 NW6R	20	9.1
NW6R612C-3	6 1/2	(165.1)	3 1/2 NW6R	20	9.1
NW6R634C-3	6 3/4	(171.4)	3 1/2 NW6R	21	8.5
NW6R700C-3	7	(177.8)	3 1/2 NW6R	21	9.5
NW6R778C-3	7 7/8	(200.0)	3 1/2 NW6R	24	10.9
NW6R812C-3	8 1/2	(208.3)	3 1/2 NW6R	27	12.2
NW6R834C-3	8 3/4	(222.2)	3 1/2 NW6R	28	12.7
NW6R978C-3	9 7/8	(250.8)	3 1/2 NW6R	31	14.1
NW6R1258C-3	10 5/8	(269.9)	3 1/2 NW6R	38	17.2
NW6R1214C-3	12 1/4	(311.1)	3 1/2 NW6R	57	25.9
NW6R1434C-3	14 3/4	(374.7)	4 1/2 NW6R	71	32.2

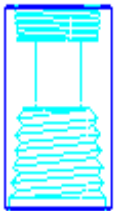
***Other sizes available upon request.**

Connector Only



Box to Pin Connector

	Part #	NW6R Box Connection	Connector	Weight Lbs.	Kgs.
S	NW3-312RP	3 1/2 NW6R	3 1/2 Reg Pin	15	6.8
S	NW3-412RP	3 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	NW3-658RP	3 1/2 NW6R	6 5/8 Reg Pin	55	24.9
S	NW3-MRB	3 1/2 NW6R	MR Box	15	6.8
S	NW3-238IFB	3 1/2 NW6R	2 3/8 IF Box	20	9.1
S	NW3-278IFB	3 1/2 NW6R	2 7/8 IF Box	22	10.0
S	NW4-312RP	4 1/2 NW6R	3 1/2 Reg Pin	20	9.1
S	NW4-412RP	4 1/2 NW6R	4 1/2 Reg Pin	22	10.0
S	NW4-658RP	4 1/2 NW6R	6 5/8 Reg Pin	55	24.9



Box to Box Connector

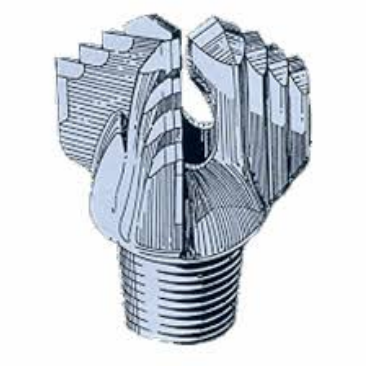
S-Stock item *Other threads available upon request.
NW6R Connectors are manufactured from 4142 heat treated alloy steel and are offered in any thread you need.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Drag Bits – Forged - Step Type - One Piece

Forged Step Type - 3 Wing - Pin

SIZES Inches	(mm)	Inches	(mm)	TYPE PIN	WEIGHT Lbs	Kgs
2 3/4	(69.9)	3 1/2	(88.9)	4 THD	3.5	1.6
3 5/8	(92.1)	4 3/4	(120.7)	2 3/8 Reg Pin	5	2.3
5	(127.0)			2 3/8 Reg Pin	6	2.8
5 1/8	(130.2)			2 3/8 Reg Pin	6	2.8
5 1/4	(133.4)			2 3/8 Reg Pin	7	3.2
5 1/2	(139.7)			2 3/8 Reg Pin	7.5	3.5
5 5/8	(144.1)			2 3/8 Reg Pin	8	3.7
6	(152.4)			2 3/8 Reg Pin	8.5	3.9
6 1/4	(158.8)			2 3/8 Reg Pin	8.5	3.9
6 1/2	(165.1)			2 3/8 Reg Pin	9	4.2
6 3/4	(171.5)			2 3/8 Reg Pin	9	4.2
5 1/2	(139.7)	6 3/4	(171.5)	3 1/2 Reg Pin	21	9.7
6 7/8	(174.6)	7 7/8	(200.0)	3 1/2 Reg Pin	25	11.6
8	(203.2)			3 1/2 Reg Pin	28	13.0
9 1/4	(231.8)	10	(254.0)	3 1/2 Reg Pin	32	14.8
10 1/8	(257.2)	10 7/8	(276.2)	3 1/2 Reg Pin	36	16.7
7 7/8	(200.0)	8 7/8	(225.4)	4 1/2 Reg Pin	38	17.6
9	(228.6)	9 7/8	(250.8)	4 1/2 Reg Pin	40	18.5
10	(254.0)	10 7/8	(276.2)	4 1/2 Reg Pin	42	19.5
11	(279.4)	12	(304.8)	3 1/2 OR 4 1/2 Reg Pin	45	20.9
12 1/8	(308.0)			3 1/2 OR 4 1/2 Reg Pin	47	21.8

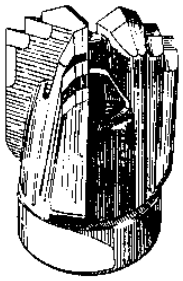


The Drag Bits listed below are STOCK items.

PART#	SIZE	TYPE PIN	WEIGHT Lbs	Kgs
DB378S238	3 7/8	2 3/8 Reg Pin	3.5	1.6
DB424S238	4 1/4	2 3/8 Reg Pin	3.8	1.7
DP412S238	4 1/2	2 3/8 Reg Pin	4.2	1.9
DB434S238	4 3/4	2 3/8 Reg Pin	5.0	2.3

Forged Step Type - Kelly Bit - 3 Wing - Box

SIZE Inches	(mm)	Inches	(mm)	TYPE BOX	WEIGHT Lbs	Kgs
3 7/8	(98.4)			ACRO, MHJR	5.5	2.5
4 3/4	(120.7)	5 1/4	(133.4)	MHJR, FA, MR, IF	10	4.6
5 1/2	(139.7)	6 3/4	(171.5)	MHJR, FA, MR, IF	12	5.6
6 7/8	(174.6)	7 7/8	(200.0)	MHJR, FA, MR, IF	14	6.5
8	(203.2)	9	(228.6)	MHJR, FA, MR, IF	16	7.4
9 1/4	(235.0)	10	(254.0)	MHJR, FA, MR, IF	18	8.3



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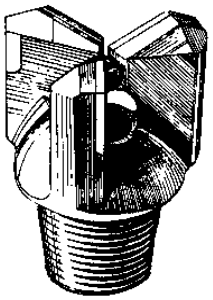
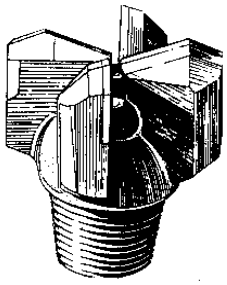
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

Drag Bits - Forged - Chevron Type - One Piece

Forged Chevron Type - 3 and 4 Wing - Pin





SIZE Inches	(mm)	Inches	(mm)	TYPE PIN	Three Wing WEIGHT Lbs	Three Wing WEIGHT Kgs	Four Wing WEIGHT Lbs	Four Wing WEIGHT Kgs
1 7/8	(47.6)	2 1/2	(63.5)	AW, A-ROD	2	0.9		
2 3/4	(69.9)			AW, A-ROD	2.5	1.1		
2 7/8	(70.0)			AW, A-ROD	2.5	1.1		
2 3/4	(69.9)	3 1/8	(79.4)	3 THD/4 THD, 2 IF	3	1.4	4	1.8
3 1/4	(82.6)			3 THD/4 THD, 2 IF	3.5	1.6	4	1.8
3 1/2	(88.9)			3 THD/4 THD, 2 IF	4	1.8	4.5	2
3 3/4	(95.3)			3 THD/4 THD, 2 IF	4	1.8	5	2.3
3 7/8	(98.4)	4	(101.6)	3 THD/4 THD, 2 IF	4.5	2	5.5	2.5
3 3/4	(95.3)	4 3/4	(120.7)	2 3/8 Reg Pin	5	2.3	8	3.6
4 7/8	(123.8)	5	(125.0)	2 3/8 Reg Pin	6	2.7	9	4.1
5 1/8	(130.2)			2 3/8 Reg Pin	6	2.7	9	4.1
5 1/4	(133.4)	5.5	(139.7)	2 3/8 Reg Pin	7	3.2	10	4.5
5 5/8	(142.9)			2 3/8 Reg Pin	7	3.2	10	4.5
4 5/8	(117.5)	4 7/8	(123.8)	2 7/8 Reg Pin	9	4.1		
5	(125.0)			2 7/8 Reg Pin	10	4.5		
5 1/8	(130.2)	5 5/8	(142.9)	2 7/8 Reg Pin	12	5.4		
5 1/2	(139.7)			3 1/2 Reg Pin	16	7.3	18	8.2
5 5/8	(142.9)			3 1/2 Reg Pin	16	7.3	18	8.2
6	(152.4)			3 1/2 Reg Pin	17	7.7	19	8.6
6 1/8	(155.6)			3 1/2 Reg Pin	17	7.7	20	9.1
6 1/4	(158.8)			3 1/2 Reg Pin	18	8.2	21	9.5
6 1/2	(165.1)			3 1/2 Reg Pin	19	8.6	23	10.4
6 3/4	(171.5)			3 1/2 Reg Pin	20	9.1	24	10.9
7	(177.8)			3 1/2 Reg Pin	20	9.1		
7 1/8	(181.0)			3 1/2 Reg Pin	21	9.5		
7 1/2	(190.5)			3 1/2 Reg Pin	22	10		
7 7/8	(200.0)			3 1/2 Reg Pin	23	10.4		
8	(203.2)			3 1/2 Reg Pin	24	10.9		

The Drag Bits listed below are STOCK items

PART #	Inches	TYPE PIN	Three Wing WEIGHT Lbs	Three Wing WEIGHT Kgs
DB378C238	3 7/8	2 3/8 Reg Pin	5	2.3
DB414C238	4 1/4	2 3/8 Reg Pin	6	2.7
DB412C238	4 1/2	2 3/8 Reg Pin	6	2.7
DB434C238	4 3/4	2 3/8 Reg Pin	7	3.2

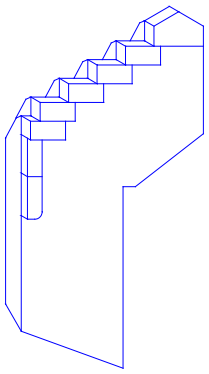
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Drag Bit Blades – Step Type for NW6R and W6R

Standard Duty 3/4 Inch Thick

Part #	Size Inches	(mm)	Description	Lbs	Weight Kgs
NW6RIW512S	5 1/2	(139.7)	Inserted Wing	2.0	0.9
NW6RIW558S	5 5/8	(142.9)	Inserted Wing	2.0	0.9
NW6RIW578S	5 7/8	(149.2)	Inserted Wing	2.0	0.9
NW6RIW600S	6	(152.4)	Inserted Wing	2.0	0.9
NW6RIW618S	6 1/8	(155.6)	Inserted Wing	2.7	1.2
NW6RIW614S	6 1/4	(158.8)	Inserted Wing	2.7	1.2
NW6RIW612S	6 1/2	(165.1)	Inserted Wing	2.7	1.2
NW6RIW634S	6 3/4	(171.4)	Inserted Wing	3.0	1.4
NW6RIW700S	7	(177.8)	Inserted Wing	3.0	1.4
NW6RIW778S	7 7/8	(200.0)	Inserted Wing	3.4	1.5
NW6RIW812S	8 1/2	(208.3)	Inserted Wing	4.4	2.9
NW6RIW834S	8 3/4	(222.2)	Inserted Wing	4.4	2.0
NW6RIW978S	9 7/8	(250.8)	Inserted Wing	5.0	2.3
NW6RIW1058S	10 5/8	(269.9)	Inserted Wing	5.4	2.3
NW6RIW1214S	12 1/4	(311.1)	Inserted Wing	5.7	2.6
NW6RIW1434S	14 3/4	(374.7)	Inserted Wing	10.0	4.5
NW6RIW1712S	17 1/2	(444.5)	Inserted Wing	12.7	5.8

Weld on replacement blades for NW6R and W6R Step Type Drag Bits made with 3/4 Steel Plate and 3/16 carbide. Other shapes and styles are available.



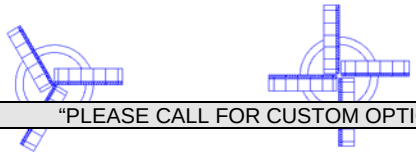
***5½-12 ¼ fit 3½ O.D. and 14¾ and larger fit 4½ O.D. shank**

Heavy Duty 1 Inch Thick

Part #	Size Inches	(mm)	Description	Weight Lbs	Kgs
NW6RIW512HD	5 1/2	(139.7)	Inserted Wing		
NW6RIW558HD	5 5/8	(142.9)	Inserted Wing		
NW6RIW578HD	5 7/8	(149.2)	Inserted Wing		
NW6RIW600HD	6	(152.4)	Inserted Wing		
NW6RIW618HD	6 1/8	(155.6)	Inserted Wing		
NW6RIW614HD	6 1/4	(158.8)	Inserted Wing		
NW6RIW612HD	6 1/2	(165.1)	Inserted Wing		
NW6RIW634HD	6 3/4	(171.4)	Inserted Wing		
NW6RIW700HD	7	(177.8)	Inserted Wing		
NW6RIW778HD	7 7/8	(200.0)	Inserted Wing		
NW6RIW812HD	8 1/2	(208.3)	Inserted Wing		
NW6RIW834HD	8 3/4	(222.2)	Inserted Wing		
NW6RIW978HD	9 7/8	(250.8)	Inserted Wing		
NW6RIW1058HD	10 5/8	(269.9)	Inserted Wing		
NW6RIW1214HD	12 1/4	(311.1)	Inserted Wing		
NW6RIW1434HD	14 3/4	(374.7)	Inserted Wing		
NW6RIW1712HD	17 ½	(444.5)	Inserted Wing		

Weld on Replacement Blades for Heavy Duty NW6R and W6R Step Type Drag Bits made with 1 inch Steel Plate and 1/4 inch carbide. Other shapes and styles are available.

***5½-12¼ fit 3½ O.D. and 14¾ and larger fit 4½ O.D. shank**
These blades are normally used to make 3 or 4 wing bits.



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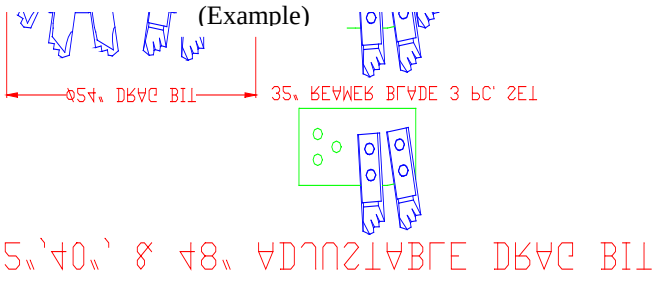
Check our Web site:
www.MillsMachine.com

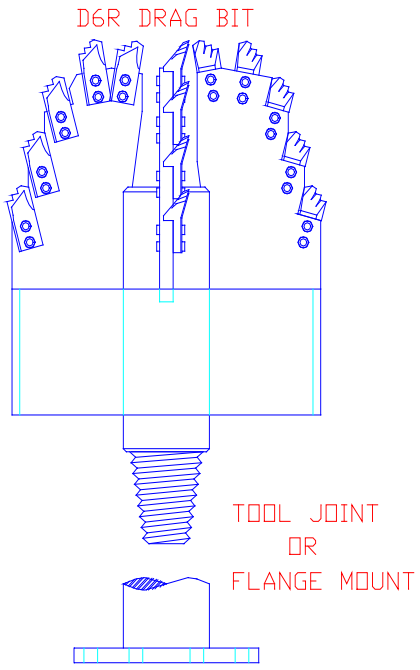
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

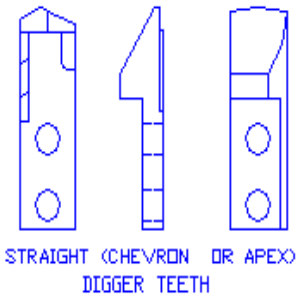
D6R Drag Bits

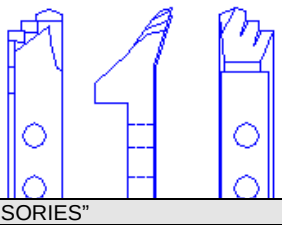
Mills Machine manufactures an extensive line of D6R bolt-on tooth drag bits that can be made for a specific hole size or can be enlarged with bolt on reamer blades (see example below). These bits start at 12 1/4 diameter and can be made as large as you need. The basic bit is designed for the specific diameter of the hole desired or as a Reamer (Holeopener). Bits are available for standard or reverse circulation (flanged or threaded).

The bolt-on digger teeth are heavy duty castings with carbide inserts, the outside teeth have additional carbide on the outer edge for gage protection. The teeth are available in Straight (chevron or apex) type for medium soft to medium hard formation or Scoop (step) type for soft to medium formation.









"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Application Questionnaire

D6R Drag Bits

D6R Drag Bits

Company _____ **Phone** _____
Address _____ **Fax** _____
_____
City, State Zip _____ **Contact**_____

Sketch:

Quantity:** _____ **Diameter** _____
Bolt-on Blade Type:** **Chevron** ☐ **Step** ☐

Circulation:** **Standard** ☐ **Reverse** ☐

Top Connection:** _____**Pin** ☐ **Box** ☐

***OR Flange Mount**: Flange OD*_____ *Flange ID*_____
Bolt Circle _____*Bolt Hole Size* _____*No of Bolts* ___

For Adjustable, Bolt-on Stages
Stage Diameter _____
Stage Diameter _____
Stage Diameter _____

****Must fill out these items. Fill out more if possible or custom product requested.**

Top Neck Dimensions: *OD*_____*ID*_____
Knurled ☐ *Length*_____
Breakout Flats: *Two Sided* ☐ *Four Sided* ☐
Special _____
*Flat Length*_____ *Location* _____
Dimensions: *Flat to Flat*_____
OR Depth per Side_____
*Location*_____
Float Valve: *Bore Only* ☐ *Install:* *Customer Furnished* ☐
Mills Furnished ☐
Brand _____ *Model & Size* _____

Special Requirements: _____
_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"