

Your Mills Catalog

We have compiled this catalog for two reasons, one is to offer a complete presentation of the products that Mills Machine Company has to offer and the second is to provide a reference resource that is not readily available to the average driller. Years and years of developing custom drilling tools and bits along with feedback from the field has enabled us to share our knowledge so, that others may benefit from it. Included are more complete part descriptions, sketches/pictures and application information. Our new product application questionnaires can provide us with the exact information that we need to provide you with a product to meet your personal requirements.

We manufacture a wide array of custom manufactured products in many categories. It is sometimes difficult to classify products under specific categories. If you have trouble finding a product, please look under the product index or contact us for assistance.

We will provide Regular updates to this catalog so, it is important that we have your current address at all times. **Please notify us of any changes in your address.**

Credit

Page Intro-7 of this introduction is the Mills Machine credit application form. To establish credit with us please fill out this form, sign the bottom front of the credit application page, read the terms and conditions on the rear, and return the form to us. We will review your references and notify you of the credit terms that we can extend to your company. Our standard terms are **Net 30 days**.

Terms and Conditions

Our terms and conditions of sale and limited warranty are located on the back of the credit application form.

Minimum Order

Our **minimum order** size is **\$50.00**

Prices

Printed and quoted prices are subject to change without notice. Taxes, if applicable, must be added to all quoted prices. **All prices are F.O.B. Shawnee, Oklahoma**, unless stated otherwise.

Returns

We cannot accept the return of any goods without written authorization or after 60 days from date of shipment. Our sales staff will furnish you with a return authorization number. **Standard restocking charge is 25%. Custom built products are non-returnable.**

Design

Mills Machine strives to continually improve the technology of our product and service; as a result, designs may be modified from time to time.

"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

0303

Intro- 1

Your Mills Catalog

Blank Page

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

0103

Intro-2

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

Founded in 1908



Mills Machine Company circa 1920, L to R Frank Mills, Evan Mills, (two unknowns) Les Thompson & Homer Mills

90 plus years of business in the same family indicates that something has been going right along the way. Mills Machine has been doing the right thing since being founded in 1908. The company is built on a line of strong people and a history of innovation.

At the end of the Civil War, Samuel and Lucinda Mills were making a meager living in Bowling Green, Kentucky. Looking for greener pastures they left in a covered wagon, first for Kansas and then to the Indian Territory, when the free land opened. W. H. (Homer) Mills, born in 1890, the youngest of nine, was born in Kansas and rose in the new state of Oklahoma.

One day in 1908, at the age of 18, Homer came in from the fields and told his parents that he was tired of farming and trying to scratch a living in the hard red clay of central Oklahoma. He said that he was taking his tools and going into town (Shawnee) to start a business. He founded Mills Repair Shop on Main Street. The mechanically inclined Homer soon gained a reputation for being able to repair almost anything. He worked on guns, bicycles, motorcycles, lawn mowers, and was a locksmith. Shortly afterward his brother, Frank, joined the business. After a few years Frank sold his share to Les Thompson for the grand

price of \$15.00 and the name was changed to Mills & Thompson Repair Shop.

An electric motor driven central shaft powered the lathes, presses and drills. A smithy with a hand driven blower helped create the special shapes needed for repair of the motorcycles, guns and custom machine parts.

In 1924 Homer bought out Les and changed the name of the company to Mills Machine Company. Around this time a big oil boom hit Oklahoma with one of the worlds largest oil fields in the booming town of Earlsboro, five miles East of Shawnee. Oklahoma Seismograph Company moved into Shawnee and decided that Mills Machine had the technical skills to repair their drilling rigs and bits. As their experience grew, Mills Machine began to manufacture bits and tooling for seismic crews in Oklahoma and beyond.

David Mills, the son of Homer and Edna, was born in 1916, after graduation from Shawnee High School in 1935, he attended Oklahoma A & M (now Oklahoma State University). He had worked for his dad as a teenager and now returned to the business. After serving in the Army Corps of Engineers in the Pacific Theater during W.W.II, he returned to become a partner with Homer and his brother Oscar.

After David's return in 1946 they immediately started constructing the current factory and 1947 began soliciting larger jobs. For a brief time they built and mounted water tanks, drilling rigs and other accessories onto their customer's trucks.

The local oil boom declined in the early 1950's and the company started moving into the water and irrigation markets. Farmers were switching from dry land farming to irrigation farming and needed lots of wells drilled. Mills Machine sent salesman all over Nebraska, Kansas, Texas and Oklahoma to deliver new bits and tooling and pick up bits to be repaired.

"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

0799

Intro-5

Founded in 1908

Starting on the ground floor of the water well business allowed Mills Machine to become and remain a leader and innovator of custom manufactured down hole drilling tools. The markets have expanded as uses by utilities, mining, construction, and environmental industries appeared.

Homer and David bought out Oscar in 1970 and David bought out his dad, Homer, in 1972. David was able to land some large contracts with some drill rig manufacturers and expand business to over one million dollars in sales for the first time. He also bought five lots adjacent to the business.

In 1979 Charles D. (Chuck) Mills joined the company after graduating from Central State University with a BBA in marketing and management and brought a burning desire to take the company into the international business arena. Chuck started working at Mills Machine when he was 11 years old, learning to weld, operate the machines in the shop, shipping and receiving, purchasing and finally, inside sales.

In 1981, David retired and Chuck bought the stock in the company and became President and CEO of Mills Machine Company. Due to his own ambition, aggression and the upward growing economy, Chuck was able to expand the business into a multi-million dollar concern. In the late 1980's he led the company in the design and development of a full line of hollow stem augers for the environmental markets. In 1989 he received a domestic patent and three

international patents for the MILCLAW Bit, an innovative mining, water well & shallow oil well drilling bit.



In 1992 Chuck bought the rest of the land surrounding the building for future expansion and is still deeply involved in the development of new products, industries and opportunities to provide custom manufactured earth drilling tools and bits.

The company has developed into an international full line manufacturer of specialty earth boring tools and accessories for water, mining, construction, utility and environmental applications. Products include hollow stem augers, stabilizers, underreamers, pipe handling tools, drilling adapters, soil sampling equipment, claw bits, drag bits, core bits, horizontal roller rock heads and miscellaneous drilling accessories.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Mills Machine Company, Inc.

P. O. Box 1514
Shawnee, OK 74802-1514

Phone: 405-273-4900
800-654-2703
Fax: 405-273-4956
E-Mail: Sales@MillsMachine.com
Web Site: www.MillsMachine.com

Credit Application

Name of Firm		Date	<input type="checkbox"/> Taxable <input type="checkbox"/> Non-Taxable*
Federal Employers Identification Number (FEI)		Resale Tax Number	
Street Address		P O Box	Telephone Fax
City		State	Zip Code

* If tax exempt, please provide exempt certificate for applicable states.

Corporation <input type="checkbox"/> or Partnership <input type="checkbox"/> or Proprietorship <input type="checkbox"/>	Years in business	State Incorporated	Year
Name of President or Owner	Parent Company: Headquarters Address:		
Home Office	Are Purchase Orders Required? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Person to contact Regarding Accounts Payable	Title	Phone Fax E-Mail	

Bank Reference

Bank	Account Number	Account Executive
Address	City, State, Zip Code	Telephone Fax

Trade References - Minimum of three required.

First Trade Reference	Type of Business	Person to Contact
Complete Mailing Address	City, State, Zip Code	Phone Fax
Second Trade Reference	Type of Business	Person to Contact
Complete Mailing Address	City, State, Zip Code	Phone Fax
Third Trade Reference	Type of Business	Person to Contact
Complete Mailing Address	City, State, Zip Code	Phone Fax
Fourth Trade Reference	Type of Business	Person to Contact
Complete Mailing Address	City, State, Zip Code	Phone Fax
Fifth Trade Reference	Type of Business	Person to Contact
Complete Mailing Address	City, State, Zip Code	Phone Fax

I understand that the information furnished you on this page is only for the purpose of obtaining credit from your firm; that I am authorized in my capacity to bind my form accordingly; that all accounts for monies due you shall be due and payable at your place of business; that all past due accounts, notes or judgments shall automatically draw interest at the rate of two percent (2%) per month (24% per annum).

In consideration of such credit being extended, the undersigned firm agrees that should Mills Machine Company be compelled to collect a past due account(s) by Court action, the jurisdiction and venue for such action shall be Pottawatomie County, Oklahoma, and shall be governed by the laws of the State of Oklahoma. Service of process shall be deemed proper if given by certified mail, return receipt requested, at the firm address listed above.

In consideration of credit being extended to the undersigned firm, I personally guarantee all indebtedness here under. I further agree that this guaranty is an absolute, completed and continuing one and no notice of the indebtedness or any extension of credit already or here after contracted by or extended need be given. The terms may be rearranged, extended and/or renewed without notice to me. That I will, within five days from date of notice the account is past due, pay the amount due. I have read, understand and agree to this statement **and the Terms and Conditions on the reverse side of this form.**

Signature	Title	Signature	Title
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	0103 Intro-7

TERMS AND CONDITIONS

Mills Machine Company, Inc.

1. **DELIVERY:** Except as specified otherwise in the Quotation or Acknowledgment, delivery shall be F.O.B. Seller's point of manufacture with all transportation charges being the Buyer's responsibility. Buyer assumes all risk of loss or damage to goods in transit. Seller will use its best efforts to make deliveries as scheduled, but delivery dates are approximate only and based on normal plant operation. Seller shall not be liable to Buyer for any damages which Buyer may claim are caused by late delivery.
2. **TAXES:** Prices are exclusive of all taxes and duties, however designated, including sales, use, property, import and excise taxes (but excluding taxes on Sellers net income). These taxes and other taxes measured in whole or part by gross receipts applicable to this transaction shall be borne by Buyer. If Buyer claims exemption from any of these taxes, Buyer shall promptly furnish proof of exemption.
3. **PAYMENT TERMS:** Payment shall be due 30 days from date of invoice. Overdue payments shall bear interest at the rate of 2% per month or the maximum rate permitted by law. Products are sold F.O.B., Shawnee, Oklahoma, unless otherwise stated. Cash discount payments must be received within 10 days from the invoice date. In order to expedite this type of payment we will be happy to Fax the invoice to you upon request. On Custom Manufactured products Seller may require full or partial payment before production can begin. In cases of continuance or repeated delays in payment, the Seller reserves the right to charge interest on delinquent balances at the rate of 2% per month. All accounts over 60 days will automatically be placed on HOLD (no sales till payment.) If Buyer requests Seller to hold goods, other than stock items, for later delivery, the invoice will be dated on the scheduled delivery date and payment will be due as if shipment had been made on the scheduled delivery date. Buyer shall assume all risk of loss or damage while goods held for later delivery are in the possession of Seller, and shall pay reasonable storage charges if such goods are stored by Seller for a period exceeding two months, and shall reimburse Seller for all use or personal property taxes levied at any time while said goods remain in Seller's possession. If the financial responsibility of Buyer becomes impaired or unsatisfactory in Seller's judgment, or if Buyer becomes in default to Seller under any contract, advance cash payment or satisfactory security shall be given by Buyer upon demand by Seller, and shipments may be withheld until such payment or security is received. Buyer expressly waives any right of set-off and shall make no deduction from payments due hereunder or for any damages of any type claimed by Buyers against Seller.
4. **CREDIT INFORMATION:** The extension of credit is a privilege and as a result, Seller takes seriously any application for credit which it receives. To receive a credit line Seller must have a completed and signed credit application from Buyer listing a bank and three trade references as well as pertinent business information. Seller will commence the processing of Buyer's credit application upon receipt of the first confirmed order. As this process takes approximately seven to ten working days, the first order may be shipped on a C.O.D. basis. Seller will send written confirmation concerning the line of credit as soon as that determination has been made.
5. **PRICES:** All prices are F.O.B. Factory, unless otherwise specified. Freight; Boxing, Forwarder's Fees, etc. are additional and prices will be quoted upon request. Prices are subject to change without notice.
6. **RETURN OF MATERIAL:** No material may be returned to Seller without prior authorization and a Seller return number. Material authorized to be returned must be shipped prepaid with the Seller return number on the packing list, and will be subject to a restocking charge. Any item that is not a stock item or is custom manufactured can not be returned for credit at any time. No products may be returned for credit after 90 days (domestic) or 180 days (international) from the Seller invoice date. In the event that an order for a non standard or custom manufactured product is canceled, the Buyer will be charged for all costs which have incurred in connection with the processing and manufacture of such items up to the point at which the order was canceled.
7. **CHANGES:** Seller assumes no responsibility for any changes to the specifications outlined in the original order, unless such changes are confirmed in writing by Buyer and accepted in writing by Seller. Any price variation resulting from such changes shall become effective immediately upon the acceptance of such changes. Seller assumes no responsibility for additional costs which result from changes made by Buyer in shipping or production schedules if such changes cause and increase in seller's cost or in the time of performance of this order, unless such changes are confirmed in writing by the Buyer and accepted in writing by the Seller. Additional costs arising from changes which have not been accepted in writing by the Seller will be claimed against the Buyer upon presentation.
8. **EQUIPMENT:** Any tools or equipment which Seller constructs or acquires specifically and solely for use on Buyer's order shall be and remain Seller's property and in Seller's property and in Seller's sole possession and control, and any charges made by Seller therefor shall be for the use of such equipment only. When for a period of one (1) year no orders are accepted from Buyer for products to be made with such equipment. Sellers may make such disposition thereof as it desires without liability to Buyer. Seller shall have no responsibility for loss or damages to such equipment or any material owned or furnished by Buyer while in Seller's possession. Tool charges designated as estimated will vary in accordance with actual costs.
9. **BUYER NOTIFICATION:** Within 10 days after tender of delivery to or receipt by Buyer of any shipment, Buyer shall inform Seller in writing if the goods are found defective or short in any respect. Failure to so inform Seller or use of the goods delivered hereunder shall constitute conclusive evidence that Seller has satisfactorily performed and Buyer waives any right to reject such goods thereafter.
10. **INSPECTION AND TESTS:** Seller's products are inspected and, where practicable, submitted to Seller's standard tests at Seller's plant of manufacture before delivery. Buyer agrees to pay Seller reasonable additional charges for any additional tests which Buyer requires Seller to perform including any tests or inspections which Seller is required to perform in the presence of Buyer's agent or representative. In the event of any delay on Buyer's part in attending such tests, after three day advance notice by Seller of the scheduled time of test, the test shall proceed in Buyer's absence and shall be deemed to have been in Buyer's presence.
11. **LIMITED WARRANTY:** Seller warrants the goods to be free from defects in materials and workmanship under normal use and service. Seller's obligation under this warranty is limited to making good at its factory the goods or any part thereof which are defective in material or workmanship and which within 90 days after delivery of the goods to the original purchaser are returned to the Seller with transportation charges prepaid. This warranty does not apply to goods which have been repaired or altered by other than authorized representative of the Seller, which have been subject to misuse, negligence or accident or which have been operated, maintained or inspected other than in strict accordance with the applicable manuals or instructions furnished by Seller. Furthermore, this warranty shall not apply to goods which have been subject to or damaged by torsional vibrations, critical resonant speeds, or by the misalignment of the goods as installed by Buyer or others, or by the misalignment of input or output shafts or devices installed by Buyers or others. Equipment and accessories not of Seller's manufacture, if any, are warranted only to the extent that they are warranted by the manufacturers thereof, and Seller hereby assigns its interest under any such warranty to Buyer. SELLER MAKES NO OTHER WARRANTY, ALL OTHER WARRANTIES WHETHER EXPRESS, IMPLIED OR STATUTORY, SUCH AS WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXCLUDED AND DISCLAIMED TO THE EXTENT THAT THEY EXCEED THE WARRANTIES EXPRESSLY GRANTED IN THIS WARRANTY CLAUSE. IN NO EVENT SHALL SELLER BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. Seller neither assumes, nor authorizes any other person to assume for it, any liability in connection with the goods other than the liability expressed in this warranty. Any representation or warranty made by any other person, including distributors, dealers, employees and representatives of Seller which are inconsistent or in conflict with or additive to the terms of warranty, shall not be binding on Seller unless reduced to writing and approved in writing by an officer of Seller.
12. **NO OTHER REPRESENTATIONS:** There are no understandings, agreements, representations or warranties, either written or oral relative to the goods, including statements made in conduct implied from past dealings that are not fully expressed herein. No statement recommendation or assistance made or offered by Seller through its preservatives or by sales literature in connection with the use of any goods, shall be or constitute a waiver by Seller of any of the provisions hereof. The provisions of this document supersede and cancel any previous understanding or agreement between the parties with respect to the subject matter hereof, and except for clerical errors, the document shall express the complete and final understanding of the parties.
13. **FORCE MAJEURE:** Seller shall not be responsible or liable for any loss, damage or delay caused or occasioned by acts of God, fire strikes, civil or military authority, insurrection or riot, machinery failure, failure of a vendor to make timely delivery of materials, the requirements of any statute, order or directive of any governmental authority or without limiting the generality of the foregoing, by any other cause which is unavoidable or beyond Seller's reasonable control.
14. **LIMITATION OF LIABILITY:** SELLER'S LIABILITY ON ANY CLAIM OF ANY KIND, INCLUDING CLAIMS BASED UPON SELLER'S NEGLIGENCE, FOR ANY LOSS OR DAMAGE ARISING OUT OF, CONNECTED WITH, OR RESULTING FROM THIS CONTRACT, OR FROM THE PERFORMANCE OF BREACH THEREOF, OR FROM THE MANUFACTURE, SALE, DELIVERY, RESALE, REPAIR OR USE OF ANY GOODS COVERED BY OR FURNISHED UNDER THIS CONTRACT SHALL IN NO CASE EXCEED THE PURCHASE PRICE ALLOCABLE TO THE GOODS OR PART THEREOF WHICH GIVE RISE TO THE CLAIM. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES.
15. **HOLD HARMLESS PROVISION:** IF ANY OF THE GOODS ARE USED FOR SEASURFACE, SUBSEA, OR SUBSEABOTTOM (SUBSURFACE) HYDROCARBON OIL EXPLORATION, DRILLING OR TRANSPORTATION, THE BUYER AGREES TO HOLD SELLER HARMLESS FROM ANY AND ALL LIABILITY AND CLAIMS FOR LOSS, DAMAGE AND EXPENSES (INCLUDING ATTORNEY'S FEES) ARISING OUT OF SUCH USE. THIS HOLD HARMLESS PROVISION SHALL APPLY TO THE PROPERTY RIGHTS AND INTERESTS OF THE BUYER. THE PUBLIC AND ANY THIRD PARTY.
16. **DESIGN AND SPECIFICATIONS:** Except for goods of Buyer's design, Seller reserves all proprietary rights in the design and configuration of, and any data describing the goods. Weights, dimensions and performance characteristics set forth in sales literature, drawings specifications and in other documents are approximate only and are not guaranteed.
17. **WAIVERS:** No waiver by Seller or any breach of any provision hereof shall constitute a waiver of any other breach or of such provision. Seller's failure to object to provisions contained waiver of the provisions hereof.
18. **LIMITATION PERIOD:** Causes of action for breach of this contract shall not be asserted after one (1) year from the date said cause of action accrues, provides that this limitation shall not apply to actions by Seller to recover the purchase price of articles sold hereunder.
19. **SHIPPING WEIGHTS:** Seller shall not be responsible for the accuracy of shipping weights. Such weights are correct only within the limits necessary for estimating freight.
20. **CANCELLATION:** The contract arising out of Buyer's order is noncancellable except as may be mutually agreed to in writing between the parties and may at the option of the Seller require the Buyer to reimburse the Seller for all cost incurred by the Seller as a result of the cancellation.
21. **GOVERNMENT REQUIREMENTS:** If the goods to be provided hereunder are for the end use of the United States Government, Seller agrees that those mandatory clauses of the Federal Acquisition Regulation or other Federal Regulation which Buyer is required by contract to impose upon its vendors are made a part hereof, provide that Buyer gives Seller written notice of each such clause prior to order placement and subject to any exception taken prior to order placement by Seller.
22. **APPLICABLE LAW:** Seller reserves any and all rights and remedies provided by law. The contract arising out of Buyer's order shall be interpreted and construed in accordance with the laws of the state of Seller's point of manufacture.

PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES

0103

Check our Web site:
www.MillsMachine.com

Intro-8

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

Introduction

Hollow stem augers are used extensively for **soil sampling** and **ground water monitoring** in industrial and commercial installations. The auger flighting acts as a **screw conveyor** to move the dirt from the bottom of the hole while the cutterhead and pilot bit break up and drill the material. The auger pitch determines the efficiency and lifting speed of the auger. The cutterhead is slightly larger than the auger flighting diameter to increase the life of the flighting edges and improve soil removal.

The advantages of hollow stem augers are many. Unlike the solid stem method, drill rods can pass through the center of the auger section and an **undisturbed sample** of the soil can be taken for analysis or **ground water monitoring** pipe can be installed.

Mills Machine Augers

Mills Machine Company has been a leader in the development of Hollow Stem Augers and their related components. Several of our designs have **established a standard in the industry.**

Mills Machine hollow stem augers are fully **reversible** through the use of drive keys that transfer the torque directly from auger to auger. The auger lock bolts are used when **lifting** the auger string. We furnish double key or triple key systems depending on the application along with standard and heavy-duty tool joints.

Drilling Operation

For normal hole advancement, a **pilot bit** is inserted through the **cutterhead** to drill the center of the hole. The drill rod is bolted to the inside of the drive cap with a rod to cap adapter so that the pilot bit can turn in tandem with the augers.

Drill rods must be added each time an auger is added. In soft formations (dirt and sand), a **tapered plug** may be inserted into the end of the cutterhead to prevent material from going up inside the augers and to eliminate the use of drill rod. When the hole is completed the plug may be knocked out the bottom of the auger string. The next step is to insert the monitoring screen and casing which is then grouted into place to prevent contamination from the top of the hole.

The center section may also be used for **intermittent or continuous sampling.** Mills Machine Company, Inc. manufactures a broad line of soil sampling tools.

In some applications hollow stem augers are used as temporary casings to **prevent caving and sloughing** of the borehole wall. In other applications, the auger walls may be **slotted** to allow water to pass through the center of the auger for sampling of the ground water as it passes through the auger.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Hollow Stem Augers

Hollow Stem Auger Specifications

The tubing and flighting are made from **premium carbon steel**, the tool joint ends are manufactured from **4142 heat-treated alloy steel** and the flighting has continuous hardfacing for durability. Our **flighting is thicker** than most of our competitors' augers with 3/8 being the standard on 2 1/4 to 12 1/4 I.D. augers.

The standard outside diameter of the Mills hollow stem augers ranges from 5 5/8 to 17. The inside diameters of the stocked augers range from 2 1/4 to 12 1/4. Special internal and external diameters are available upon request. Auger lengths are normally 5 feet or metric versions at 1.5 meters with shorter or longer lengths available with or without flighting to meet specific requirements.

The **standard duty augers** are designed for use in shallow hole applications and are recommended for **depths up to seventy feet**. For **deeper drilling, the tapered, heavy-duty augers** should be used. These augers have heavier tool joints and feature larger drive keys, nuts, and bolts for added strength.

The heavy-duty auger tool joints are tapered for **easy makeup and breakout** and can be

used in depths exceeding 70 feet. We also have extra heavy-duty augers available that features our heavy-duty tapered tool joints and a thicker wall tube.

Often the first step is to drill through a layer of concrete to reach the soil to be examined. Mills Machine was the **first** manufacturer to design and market an efficient and economical concrete cutting bit that fits on the bottom of the auger. The Mills **Concrete Bullet Bit** is available in sizes ranging from 6 - 24 O.D. with any size or make of tool joint.

Variations in auger specifications are common. Mills Machine stands ready to meet those differences with a strong **history of design and development** that has established us as a leader in the field. We carry an **inventory** of all the standard components and are ready to meet your special needs with **rapid design and delivery time**.

The auger line complements the standard line of rotary drilling equipment manufactured by Mills Machine Company.

Call on us for drag bits, claw bits, core bits, rock bits, underreamers, backreamers, hole-openers, stabilizers, fishing tools and related accessories

➔ 3/8 THICK FLIGHTING STANDARD

➔ CONTINUOUS MACHINE WELDS

➔ KEY AND BOLT CONNECTIONS

➔ DOUBLE OR TRIPLE KEY

➔ STANDARD AND HEAVY DUTY CONSTRUCTION

➔ SIX STYLES OF CUTTERHEADS

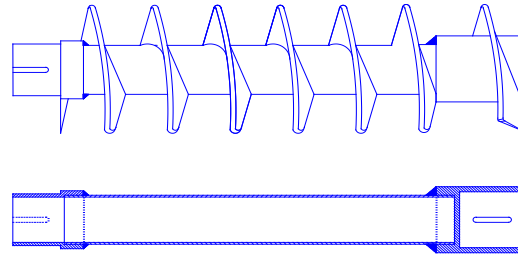
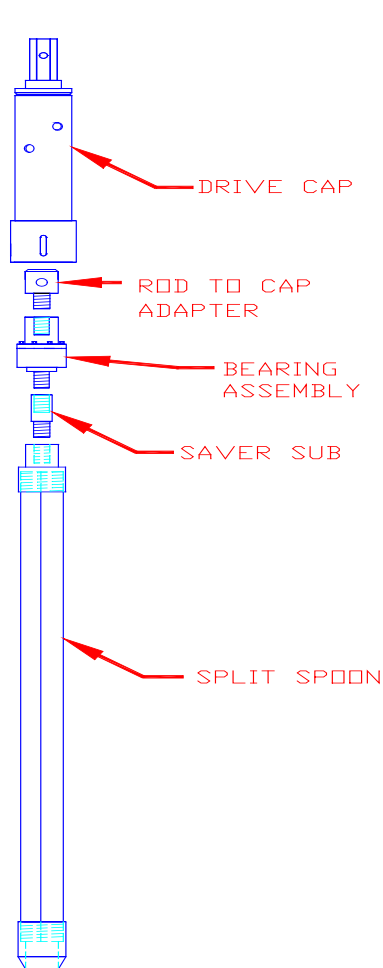
➔ HARD FACED EDGES

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

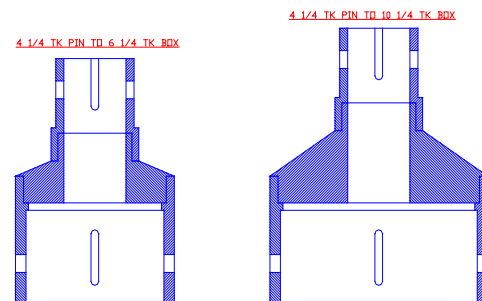
Hollow Stem Auger Variations

Wireline Systems, Auger Extensions, Tool Joints, Adapters

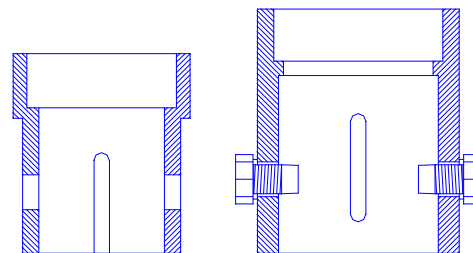
Standard Continuous
Sampling System.



Auger Extensions - Flighted and Flightless.



Auger Adapters



Auger Tool Joints

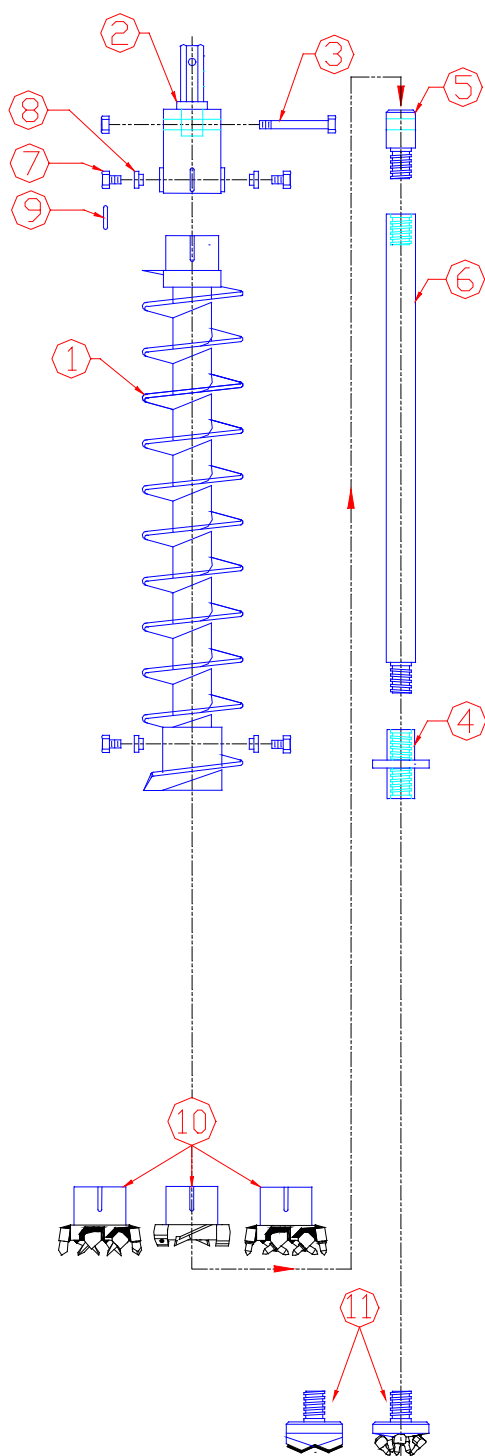
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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

0103
1-3

Hollow Stem Auger Construction



The complete Hollow Stem Auger string is shown at the left. The numbers correspond with the numbers on each page of the auger sizes. The 2 ¼, 3 ¼ and 3 ¾ size augers are single bolt (only one lock bolt and nut), items **(7)** and **(8)**, (Double bolt is available on the 3 ¼ and all 3 ¾ On request)

The heavy-duty versions of the augers have a taper on the tool joint to make them easier to remove. All 8 ¼, 10 ¼ and 12 ¼' augers are heavy-duty.

Augers are connected in 5' strings to reach the depth required (we also make the augers in 1 ½ meter sections); the flighting is timed so the sections match.

The outside components are the drive cap **(2)** that connects the auger string to your drive, the auger **(1)** that moves the material from the bottom of the hole and the cutterhead **(10)**. Depending on the size, there are up to six different cutterheads available depending on the formation of material being drilled. The spade/bullet style is the most universal type available.

The inside components will drill a complete hole using the drill-string and a pilot bit or act as a sampling center hole when the auger reaches the desired sampling area. The inner string consists of the nut and bolt that holds the rod to cap adapter **(3)**, the drill rod **(6)**, and the pilot bit connector **(4)** that centers the pilot bit **(11)**.

Sampling can be done using the center pipe and sampling tubes or one of the four other sampling systems as shown in section three of this catalog.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

2 1/4" (57mm) and 3 1/4" (83mm) HOLLOW STEM AUGER COMPONENTS

Double Key Design

Featuring continuous hardfaced flighting design, 3/8 (9.5 mm) thick on outer edge with single bolt connection. The 4142 alloy steel connectors ensure strength and durability for environmental ground water monitoring well installations. The auger pitch is 5 (127 mm).

Standard Duty

				Auger Section		
				2 1/4 ID	3 1/4 ID	
DESCRIPTION	PART#	Lbs.	Kg.	PART#	Lbs.	Kg.
1 Auger 2 1/4 (57 mm) ID x 5 5/8 (143 mm) OD x 5' (1524 mm)	A214200	52	23.5	A314200	81	36.7
1 Auger 3 1/4 (83 mm) ID x 6 5/8 (168 mm) OD x 5' (1524 mm)						
Manufactured with Bushing Nuts, Lock Bolts and Drive Keys						
2 DRIVE CAP W/ 1 5/8 (41 mm) HEX MALE SHANK	ADC214210	16	7.3	ADC314210	22	10.0
2 DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK				ADC314211	23	10.4
3 NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB2	0.9	0.4	ANAB3	0.9	0.4
4 PILOT BIT CONNECTOR (AW BOX - A-ROD BOX)	APBC218AWB	5	2.3	APBC318AWB	11	5.0
4 PILOT BIT CONNECTOR (AWJ BOX - A-ROD BOX)	APBC218AWJB	5	2.3	APBC318WJB	12	5.4
4 PILOT BIT CONNECTOR (AW BOX - 4 THREAD N-ROD BOX)				APBC318NW	8	3.6
4 PILOT BIT CONNECTOR (AWJ BOX - 4 THREAD N-ROD BOX)				APBC318NWJ	11	5.0
4 PILOT BIT CONNECTOR (NW BOX - 4 THREAD N-ROD BOX)						
4 PILOT BIT CONNECTOR (NWJ BOX - 4 THREAD N-ROD BOX)						
5 ROD TO CAP ADAPTER - AW PIN	ARCAAWP	3	1.4	Same		
5 ROD TO CAP ADAPTER - AWJ PIN	ARCAAWJP	3	1.4	Same		
5 ROD TO CAP ADAPTER - NW PIN				ARCNWP	7	3.2
5 ROD TO CAP ADAPTER - NWJ PIN				ARCWNJP	6	2.7
6 AW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AW	31	9.5	Same		
6 AWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AWJ	35	10.4	Same		
6 NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	9.5	Same		
6 NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	10.4	Same		
1A TOOL JOINT - 2 1/4 (57 mm) DOUBLE KEY PIN	ATJ2142P	6	2.7	ATJ3142P	7	3.2
1B TOOL JOINT - 2 1/4 (57 mm) DOUBLE KEY BOX	ATJ2142B	5	2.3	ATJ2142B	6	2.7
1A TOOL JOINT - 3 1/4 (83 mm) DOUBLE KEY PIN						
1B TOOL JOINT - 3 1/4 (83 mm) DOUBLE KEY BOX						
Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys						
7 REPLACEMENT LOCK BOLTS (1 REQUIRED/ AUGER)	ALB2	0.3	0.1	Same		
8 REPLACEMENT BUSHING NUTS (1 REQUIRED/AUGER)	ABN2	0.3	0.1	Same		
9 REPLACEMENT DRIVE KEYS (2 REQUIRED/ AUGER)	ADK1	0.3	0.1	Same		
Auger Cutterheads and Pilot Bits.						
10 SPADE CUTTERHEAD - 6 1/2 (165 mm) 2 1/4	ACH214251	10	4.5	ACH314250	11	5.0
10 SPADE/BULLET COMBO CUTTERHEAD - 6 1/2 (165 mm) 2 1/4	ACH214261	9	4.1	ACH314251	12	5.5
10 BULLET CUTTERHEAD - 6 1/2 (165 mm) 2 1/4	ACH214270	10	4.5	ACH314260	14	6.4
10 4 BIT 5-T SQUARE FINGER BIT - 6 1/2 (165 mm) 2 1/4	ACH214271			ACH214261	9	4.1
10 BLADE CUTTERHEAD - 7 1/2 (190 mm) 3 1/4				ACH214270	10	4.5
10 SPADE CUTTERHEAD - 7 1/2 (190 mm) 3 1/4				ACH214271		
10 BLADE/BULET CUTTERHEAD - 7 1/2 (190 mm) 3 1/4						
10 SPADE/BULLET COMBO CUTTERHEAD - 7 1/2 (190 mm) 3 1/4						
10 BULLET CUTTERHEAD - 7 1/2 (190 mm) 3 1/4						
10 4 BIT 5-T SQUARE FINGER BIT - 7 1/2 (190 mm) 3 1/4						
11 2 1/8 (54 mm), PILOT BIT, HEAVY DUTY APEX TYPE, A-ROD PIN	APB218APX	2.5	1.3	APB318APX	2.5	1.3
11 3 1/8 (79 mm), PILOT BIT, HEAVY DUTY APEX TYPE, 4-THD N-ROD PIN				APB318APX	5	2.3
11 3 1/8 (79 mm), PILOT BIT, BULLET TYPE, 4-THD N-ROD PIN						
12 KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13 FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP078	3	1.4	Same		

See Reference Page 2-10 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

3 3/4" I D (95 mm) HOLLOW STEM AUGER COMPONENTS

Double Key Design

Featuring continuous hard faced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors ensure strength and durability for environmental ground water monitoring well installations. The auger pitch is 5 (127 mm) and single key design on the Standard Duty and 6 (152.4 mm) and double key design on the Heavy Duty

Standard Duty

Heavy Duty

Auger Section

	DESCRIPTION	PART#	WEIGHT		PART#	WEIGHT	
			Lbs.	Kg		Lbs.	Kg
1	3 3/4 (95 mm) I. D. X 7 1/8 (181 mm) O.D. X 5' (1524 mm) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys	A334200	81	36.7	A334200HD	84	38.1
2	DRIVE CAP W/ 1 5/8 (41 mm) HEX MALE SHANK	ADC334210	22	10.0	ADC334210HD	25	11.3
2	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK	ADC334211	25	11.3	ADC334211HD	28	12.7
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB4	0.9	0.4	Same		
4	PILOT BIT CONNECTOR (AW BOX - 2 3/8 REG. BOX)	APBC358AWB	8	3.6	Same		
4	PILOT BIT CONNECTOR (AWJ BOX - 2 3/8 REG. BOX)	APBC358AWJB	11	5.0	Same		
4	PILOT BIT CONNECTOR (NW BOX - 2 3/8 REG. BOX)	APBC358NWB	11	5.0	Same		
4	PILOT BIT CONNECTOR (NWJ BOX - 2 3/8 REG. BOX)	APBC358NWJ	12	5.4	Same		
5	ROD TO CAP ADAPTER - AW PIN	ARCAAWP	3	1.4	Same		
5	ROD TO CAP ADAPTER - AWJ PIN	ARCAAWJP	3	1.4	Same		
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2	Same		
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7	Same		
6	AW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AW	21	9.5	Same		
6	AWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AWJ	23	10.4	Same		
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1	Same		
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9	Same		

Auger Repair Parts

1A	TOOL JOINT - 3 3/4 (95 mm) DOUBLE KEY PIN	ATJ3342P	6	2.7	ATJ3342PHD	8	3.6
1B	TOOL JOINT - 3 3/4 (95 mm) DOUBLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ3342B	5	2.3	ATJ3342BHD	7	3.2
7	REPLACEMENT LOCK BOLTS (1 REQUIRED/ AUGER)	ALB2	0.3	0.1			
8	REPLACEMENT BUSHING NUTS (1 REQUIRED/AUGER)	ABN2	0.3	0.1			
9	REPLACEMENT DRIVE KEYS (2 REQUIRED/ AUGER)	ADK1	0.3	0.1	ADK2	0.3	0.1
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)				ALB3	0.4	0.2
8	NUTS (REPLACEMENT BUSHING 2 REQUIRED/AUGER)				ABN3	0.2	0.1

Auger Cutterheads and Pilot Bits.

10	BLADE CUTTERHEAD - 8 1/2 (216 mm)	ACH334250	16	7.3	ACH334250HD	16	7.3
10	SPADE CUTTERHEAD - 8 1/2 (216 mm)	ACH334251	20	9.1	ACH334261HD	20	9.1
10	BLADE/BULLET COMBO CUTTERHEAD - 8 1/2 (216 mm)	ACH334260	20	9.1	ACH334260HD	20	9.1
10	SPADE/BULLET COMBO CUTTERHEAD - 8 1/2 (216 mm)	ACH334261	22	10.0	ACH334261HD	22	10.0
10	BULLET CUTTERHEAD - 8 1/2 (216 mm)	ACH334270	22	10.0	ACH334270HD	22	10.0
10	5-T SQUARE FINGER BIT - 8 1/2 (216 mm)	ACH334271	22	10.0	ACH334271HD	22	10.0
11	APEX PILOT BIT - 3 5/8 (92 mm), 2 3/8 PIN	APB358APX	5	2.3	Same		
11	BULLET PILOT BIT - 3 5/8 (92 mm), 2 3/8 PIN	APB358BUL	8	4.1	Same		
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP078	3	1.4	Same		

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

4 1/4" (108 mm) HOLLOW STEM AUGER COMPONENTS

Double Key Design

Featuring continuous hard faced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors ensure strength and durability for environmental ground water monitoring well installations. The auger pitch is 5 (127 mm) on the Standard Duty and 6 (152.4 mm) on the Heavy Duty.

Standard Duty Heavy Duty

Auger Section

	DESCRIPTION	PART#	WEIGHT		PART#	WEIGHT	
			Lbs.	Kg		Lbs.	Kg
1	4 1/4 (108 mm) I. D. X 7 5/8 (194 mm) O.D. X 5' (1524 mm) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys	A414200	99	44.9	A334200HD	102	46.2
2	DRIVE CAP W/ 1 5/8 (41 mm) HEX MALE SHANK	ADC414210	22	10.0	ADC414210HD	25	11.3
2	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK	ADC414211	25	11.3	ADC414211HD	28	12.7
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB4	0.9	0.4	Same		
4	PILOT BIT CONNECTOR (AW BOX - 2 3/8 REG. BOX)	APBC418AWB	8	3.6	Same		
4	PILOT BIT CONNECTOR (AWJ BOX - 2 3/8 REG. BOX)	APBC418AWJB	11	5.0	Same		
4	PILOT BIT CONNECTOR (NW BOX - 2 3/8 REG. BOX)	APBC418NWB	11	5.0	Same		
4	PILOT BIT CONNECTOR (NWJ BOX - 2 3/8 REG. BOX)	APBC418NWJB	12	5.4	Same		
5	ROD TO CAP ADAPTER - AW PIN	ARCAAWP	3	1.4	Same		
5	ROD TO CAP ADAPTER - AWJ PIN	ARCAAWJP	3	1.4	Same		
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2	Same		
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7	Same		
6	AW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AW	21	9.5	Same		
	AWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AWJ	23	10.4	Same		
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1	Same		
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9	Same		

Auger Repair Parts

1A	TOOL JOINT - 2 1/4 (57 mm) DOUBLE KEY PIN	ATJ4142P	8	3.6	ATJ3342PHD	9	4.1
1B	TOOL JOINT - 2 1/4 (57 mm) DOUBLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ4142B	7	3.2	ATJ3342BHD	8	3.6
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)	ALB2	0.3	0.1	ALB3	0.4	0.2
8	REPLACEMENT BUSHING NUTS (2 REQUIRED/AUGER)	ABN2	0.3	0.1	ABN3	0.2	0.1
9	REPLACEMENT DRIVE KEYS (2 REQUIRED/ AUGER)	ADK1	0.3	0.1	ADK2	0.3	0.1

Auger Cutterheads and Pilot Bits.

10	BLADE CUTTERHEAD - 8 3/4 (222 mm)	ACH414250	16	7.3	ACH414250HD	16	7.3
10	SPADE CUTTERHEAD - 8 3/4 (222 mm)	ACH414251	20	9.1	ACH414261HD	20	9.1
10	BLADE/BULLET COMBO CUTTERHEAD - 8 3/4 (222 mm)	ACH414260	20	9.1	ACH414260HD	20	9.1
10	SPADE/BULLET COMBO CUTTERHEAD - 8 3/4 (222 mm)	ACH414261	22	10.0	ACH414261HD	22	10.0
10	BULLET CUTTERHEAD - 8 3/4 (222 mm)	ACH414270	22	10.0	ACH414270HD	22	10.0
10	5-T SQUARE FINGER BIT - 8 3/4 (222 mm)	ACH414271	22	10.0	ACH414271HD	22	10.0
11	APEX PILOT BIT - 4 1/8 (105 mm), 2 3/8 PIN	APB418APX	5	2.3	Same		
11	BULLET PILOT BIT - 4 1/8 (105 mm), 2 3/8 PIN	APB418BUL	8	4.1	Same		
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP078	3	1.4	Same		

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

6 1/4" I D (159 mm) HOLLOW STEM AUGER COMPONENTS

Double Key Design

Featuring continuous hard faced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors ensure strength and durability for environmental ground water monitoring well installations. The auger pitch is 6 (152.4 mm) on both styles.

Standard Duty

Heavy Duty

Auger Section

	DESCRIPTION	PA RT#	WEIGHT		PART#	WEIGHT	
			Lbs.	Kg		Lbs.	Kg
1	6 1/4 (159 mm) I. D. X 9 5/8 (244 mm) O.D. X 5' (1524 mm) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys	A614200	131	59.4	A614200HD	135	61.2
2	DRIVE CAP W/ 1 5/8 (41 mm) HEX MALE SHANK	ADC614210	39	17.7	ADC614210HD	40	18.1
2	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK	ADC614211	42	19.1	ADC614211HD	43	19.5
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB6	1.3	0.4	Same		
4	PILOT BIT CONNECTOR (AW BOX – 3 1/2 REG. BOX)	APBC618AWB	8	3.6	Same		
4	PILOT BIT CONNECTOR (AWJ BOX – 3 1/2 REG. BOX)	APBC618AWJB	11	5.0	Same		
4	PILOT BIT CONNECTOR (NW BOX – 3 1/2 REG. BOX)	APBC618NWB	11	5.0	Same		
4	PILOT BIT CONNECTOR (NWJ BOX – 3 1/2 REG. BOX)	APBC618NWJB	12	5.4	Same		
5	ROD TO CAP ADAPTER - AW PIN	ARCAAWP	3	1.4	Same		
5	ROD TO CAP ADAPTER - AWJ PIN	ARCAAWJP	3	1.4	Same		
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2	Same		
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7	Same		
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1	Same		
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9	Same		

Auger Repair Parts

1A	TOOL JOINT - 6 1/4 (210 mm) DOUBLE KEY PIN	ATJ6142P	13	5.9	ATJ6142PHD	13	5.9
1B	TOOL JOINT - 6 1/4 (210 mm) DOUBLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ6142B	12	5.4	ATJ6142BHD	12	5.4
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)	ALB2	0.3	0.1	ALB3	0.4	0.2
8	REPLACEMENT BUSHING NUTS (2 REQUIRED/AUGER)	ABN2	0.3	0.1	ABN3	0.2	0.1
9	REPLACEMENT DRIVE KEYS (2 REQUIRED/ AUGER)	ADK1	0.3	0.1	ADK2	0.3	0.1

Auger Cutterheads and Pilot Bits.

10	BLADE CUTTERHEAD – 11 (279 mm)	ACH614250	23	10.4	ACH614250HD	23	10.4
10	SPADE CUTTERHEAD – 11 (279 mm)	ACH614251	22	10.0	ACH614251HD	22	10.0
10	BLADE/BULLET COMBO CUTTERHEAD – 11 (279 mm)	ACH614260	28	12.7	ACH614260HD	28	12.7
10	SPADE/BULLET COMBO CUTTERHEAD – 11 (279 mm)	ACH614261	27	12.2	ACH614261HD	27	12.2
10	BULLET CUTTERHEAD – 11 (279 mm)	ACH614270	29	13.2	ACH614270HD	29	13.2
10	6 BIT, 5-T SQUARE FINGER BIT – 11 (279 mm)	ACH614271-6			ACH614271HD-6		
	8 BIT, 5-T SQUARE FINGER BIT – 11 (279 mm)	ACH614271-8			ACH614271HD-8		
11	APEX PILOT BIT – 6 1/8 (156 mm), 3 1/2 REG PIN	APB618APX			Same		
11	BULLET PILOT BIT – 6 1/8 (156 mm), 3 1/2 REG PIN	APB618BUL			Same		
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP078	3	1.4	Same		

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

7 1/4" and 8 1/4" I D (210 mm) HOLLOW STEM AUGER COMPONENTS

Double Key Design

Featuring continuous hard faced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors ensure strength and durability for environmental ground water monitoring well installations. The auger pitch is 6 (152.4 mm). All 7 1/4 and 8 1/4 augers are Heavy Duty.

7 1/4 Heavy Duty

8 1/4 Heavy Duty

DESCRIPTION		Part #	Weight Lbs. Kgs.		Part #	WEIGHT Lbs. Kgs.	
1	7 1/4 (184 mm) I. D. 11 (279 mm) O. D. X 5' (1524 mm)	A714200HD					
1	8 1/4 (210 mm) I. D. 12 (305 mm) O.D. X 5' (1524 mm) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys				A814200HD	183	83.0
2	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK	ADC714211HD	39	17.6	ADC814211HD	42	19.1
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB7	1	0.5	ANAB4	1	0.5
4	PILOT BIT CONNECTOR (NW BOX – 3 1/2 REG. BOX)	APBC718NWB	11	5.0	APBC818NWB	11	5.0
4	PILOT BIT CONNECTOR (NWJ BOX – 3 1/2 REG. BOX)	APBC718NWB	12	5.4	APBC818NWB	12	5.4
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2	Same		
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7	Same		
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1	Same		
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9	Same		

Auger Repair Parts

1A	TOOL JOINT – 7 1/4 (184 mm) DOUBLE KEY PIN				ATJ7142PHD	12	5.4
1B	TOOL JOINT - 7 1/4 (184 mm) DOUBLE KEY BOX				ATJ7142BHD	11	5.0
1A	TOOL JOINT - 8 1/4 (210 mm) DOUBLE KEY PIN	ATJ8142PHD	13	5.9			
1B	TOOL JOINT - 8 1/4 (210 mm) DOUBLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ8142BHD	12	5.4			
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)	ALB3	0.3	0.1	ALB3	0.3	0.1
8	REPLACEMENT BUSHING NUTS (2 REQUIRED/AUGER)	ABN3	0.3	0.1	ABN3	0.3	0.1
9	REPLACEMENT DRIVE KEYS (2 REQUIRED/ AUGER)	ADK2	0.3	0.1	ADK3	0.3	0.1

Auger Cutterheads and Pilot Bits.

10	BLADE CUTTERHEAD – 12 (310 mm) for 7 1/4 Auger	ACH714250	33	15.0			
10	SPADE CUTTERHEAD – 12 (310 mm) for 7 1/4 Auger	ACH714251	33	15.0			
10	BLADE/BULLET COMBO CUTTERHEAD – 12 (310 mm) for 7 1/4 Auger	ACH714260	38	17.2			
10	SPADE/BULLET COMBO CUTTERHEAD – 12 (310 mm) for 7 1/4 Auger	ACH714261	35	15.9			
10	BULLET CUTTERHEAD – 12 (310 mm) for 7 1/4 Auger	ACH714270	35	15.9			
10	BLADE CUTTERHEAD – 13 (330 mm) for 8 1/4 Auger				ACH814250	35	15.9
10	SPADE CUTTERHEAD – 13 (330 mm) for 8 1/4 Auger				ACH814251	35	15.9
10	BLADE/BULLET COMBO CUTTERHEAD – 13 (330 mm) for 8 1/4 Auger				ACH814260	40	18.1
10	SPADE/BULLET COMBO CUTTERHEAD – 13 (330 mm) for 8 1/4 Auger				ACH814261	37	16.8
10	BULLET CUTTERHEAD – 13 (330 mm) for 8 1/4 Auger				ACH814270	37	16.8
11	APEX PILOT BIT – 7 1/8 (184 mm), 3 1/2 REG PIN for 7 1/4 Auger	APB718APX	22	10.0			
11	BULLET PILOT BIT – 7 1/8 (184 mm), 3 1/2 REG PIN for 7 1/4 Auger	APB718BUL	27	12.2			
11	APEX PILOT BIT – 8 1/8 (206 mm), 3 1/2 REG PIN for 8 1/4 Auger				APB818APX	22	10.0
11	BULLET PILOT BIT – 8 1/8 (206 mm), 3 1/2 REG PIN for 8 1/4 Auger				APB818BUL	27	12.2
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP078	3	1.4	Same		

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"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

0103

1-9

3 1/4" I D (83 mm) HOLLOW STEM AUGER COMPONENTS

TRIPLE KEY DESIGN

Featuring continuous hardfaced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors ensure strength and durability for environmental ground water monitoring well installations. The auger pitch is 5 (117 mm).

Standard Duty

Auger Section

	DESCRIPTION	PART#	WEIGHT	
			Lbs.	Kg.
1	3 1/4 (83 mm) I.D. X 6 5/8 (169 mm) O.D. X 5' (1525 MM) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys	A314300	81	36.7
2	DRIVE CAP W/ 1 5/8 (41 mm) HEX MALE SHANK	ADC314310	21	9.5
2	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK	ADC314311	25	11.3
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB3	.9	.4
4	PILOT BIT CONNECTOR (AW BOX - 4-THREAD BOX)	APBC318AWB	11	5.0
4	PILOT BIT CONNECTOR (AWJ BOX - 4-THREAD BOX)	APBC318AWJB	12	5.4
4	PILOT BIT CONNECTOR (NW BOX - 4-THREAD BOX)	APBC318NWB	8	3.6
4	PILOT BIT CONNECTOR (NWJ BOX - 4-THREAD BOX)	APBC318NWJB	11	5.0
5	ROD TO CAP ADAPTER - AW PIN	ARCAWP	3	1.4
5	ROD TO CAP ADAPTER - AWJ PIN	ARCAWJP	3	1.4
5	ROD TO CAP ADAPTER - NW PIN	ARCNWP	7	3.2
5	ROD TO CAP ADAPTER - NWJ PIN	ARCNWJP	6	2.7
6	AW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AW	21	9.5
6	AWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AWJ	23	10.4
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWRD	31	14.1
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9

Auger Repair Parts

1A	TOOL JOINT - 3 1/4 (83 mm) TRIPLE KEY PIN	ATJ3143P	7	3.2
1B	TOOL JOINT - 3 1/4 (83 mm) TRIPLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ3143B	6	2.7
7	REPLACEMENT LOCK BOLTS (1 REQUIRED/ AUGER)	ALB1	0.3	0.1
8	REPLACEMENT BUSHING NUTS (1 REQUIRED/AUGER)	ABN1	0.2	0.1
9	REPLACEMENT DRIVE KEYS (3 REQUIRED/ AUGER)	ADK1	0.3	0.1

Auger Cutterheads and Pilot Bits

10	BLADE CUTTERHEAD - 7 1/2 (190 mm)	ACH314350	11	5.0
10	SPADE CUTTERHEAD - 7 1/2 (190 mm)	ACH314351	12	5.5
10	BLADE/BULLET COMBO CUTTERHEAD - 7 1/2 (190 mm)	ACH314360	14	6.4
10	SPADE/BULLET COMBO CUTTERHEAD - 7 1/2 (190 mm)	ACH314361	12	5.5
10	BULLET CUTTERHEAD - 7 1/2 (190 mm)	ACH314370	12	5.5
10	4 BIT 5-T SQUARE FINGER BIT - 7 1/2 (190 mm)	ACH314371		
11	3 1/8 (79 mm), PILOT BIT, HEAVY DUTY APEX TYPE	APB318APX	4	1.8
11	3 1/8 (79 mm), PILOT BIT, BULLET TYPE Pilot Bits have a 4-Thread Pin Connection	APB318BUL	5	2.3
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP078	3	1.4

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

3 1/4" I D (83 mm) HOLLOW STEM AUGER COMPONENTS

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

0103

1-10

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

4 1/4" I D (108 mm) HOLLOW STEM AUGER COMPONENTS

Triple Key Design

Featuring continuous hardfaced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors feature bigger nuts, bolts and drive keys for added strength and have a tapered surface. The taper provides a better seal and reduced friction, enabling the tool joint to slide in and out easier. The auger pitch is 5 on Standard Duty and 6 (152.4 mm) on Heavy Duty.

Standard Duty

Heavy Duty Auger Section

		WEIGHT			WEIGHT		
DESCRIPTION		Part #	Lbs.	Kg.	Part #	Lbs.	Kg.
1	4 1/4 (108 mm) I.D. X 7 5/8 (194 mm) O.D. X 5' (1525 MM)	A414300	103	46.7	A414300HD	107	48.5
	Manufactured with Bushing Nuts, Lock Bolts and Drive Keys						
2	DRIVE CAP W/ 1 5/8 (41 mm) HEX MALE SHANK - HD TPRD	ADC414310	26	11.8	ADC414310HD	25	11.3
2	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK - HD TPRD	ADC414311	30	13.6	ADC414311HD	28	12.7
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB4	1	.5	Same		
4	PILOT BIT CONNECTOR (AW BOX - 2 3/8 REG BOX)	APBC418AWB	21	9.5	Same		
4	PILOT BIT CONNECTOR (AWJ BOX - 2 3/8 REG BOX)	APBC418AWJB	20	9.1	Same		
4	PILOT BIT CONNECTOR (NW BOX - 2 3/8 REG BOX)	APBC418NWB	19	8.6	Same		
4	PILOT BIT CONNECTOR (NWJ BOX - 2 3/8 REG BOX)	APBC414NWJB	20	9.1	Same		
5	ROD TO CAP ADAPTER - AW PIN	ARCAAWP	3	1.4	Same		
5	ROD TO CAP ADAPTER - AWJ PIN	ARCAAWJP	3	1.4	Same		
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2	Same		
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7	Same		
6	AW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AW	21	9.5	Same		
6	AWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AWJ	23	10.4	Same		
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1	Same		
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9	Same		

Auger Repair Parts

1A	TOOL JOINT - 4 1/4 (105 mm) TRIPLE KEY PIN	ATJ41433P	8	3.6	ATJ41433PHD	8	3.6
1B	TOOL JOINT - 4 1/4 (105 mm) TRIPLE KEY BOX	ATJ41433B	8	3.6	ATJ41433BHD	8	3.6
	Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys						
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)	ALB1	0.3	0.1	ALB3	0.4	0.2
8	REPLACEMENT BUSHING NUTS (2 REQUIRED/AUGER)	ABN1	0.3	0.1	ABN3	0.2	0.1
9	REPLACEMENT DRIVE KEYS (3 REQUIRED/ AUGER)	ADK1	0.3	0.1	ADK2	0.3	0.1

Auger Cutterheads and Pilot Bits

10	BLADE CUTTERHEAD - 8 3/4 (222 mm)	ACH414350	12	5.4	ACH414350HD	16	7.3
10	SPADE CUTTERHEAD - 8 3/4 (222 mm)	ACH414351	14	6.4	ACH414351HD	20	9.1
10	BLADE/BULLET COMBO CUTTERHEAD - 8 3/4 (222 mm)	ACH414360	18	8.2	ACH414360HD	20	9.1
10	SPADE/BULLET COMBO CUTTERHEAD - 8 3/4 (222 mm)	ACH414361	16	7.3	ACH414361HD	22	10.0
10	BULLET CUTTERHEAD - 8 3/4 (222 mm)	ACH414370	16	7.3	ACH414370HD	22	10.0
10	4 BIT 5-T SQUARE FINGER BIT - 8 3/4 (222 mm)	ACH414371			ACH414371HD		
11	4 1/8 (104 mm), PILOT BIT, HEAVY DUTY APEX TYPE	APB418APX	5	2.3	Same		
11	4 1/8 (104 mm), PILOT BIT, BULLET TYPE	APB418BUL	9	4.1	Same		
11	4 1/8 (104 mm), PILOT BIT, SPADE TYPE BLADE	APB418SPD	9	4.1	Same		
	Pilot Bits have a 2 3/8 Reg. Pin Connection						
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP100	3	1.4	Same		

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

6 5/8" (169 mm) HOLLOW STEM AUGER COMPONENTS

TRIPLE KEY DESIGN

Featuring continuous hardfaced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors ensure strength and durability for environmental ground water monitoring well installations. The auger pitch is 6 (152.4 mm).

Auger Section		Standard Duty			Heavy Duty		
		DESCRIPTION	PART#	WEIGHT Lbs. Kg.	PART#	WEIGHT Lbs. Kg.	
1	6 5/8 (169 mm) I. D. X 10 1/8 (257 mm) O.D. X 5' (1524 mm) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys	A658300	143	64.9	A658300HD	145	65.8
2	DRIVE CAP W/ 1 5/8 (41 mm) HEX MALE SHANK	ADC658310	47	21.3	ADC658310HD	48	21.8
	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK	ADC658311	50	22.7	ADC658311HD	51	23.1
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB6	1.3	0.6	Same		
4	PILOT BIT CONNECTOR (AW BOX - 3 1/2 REG BOX)	APBC612AWB	64	29.0	Same		
4	PILOT BIT CONNECTOR (AWJ BOX - 3 1/2 REG BOX)	APBC612AWJB	64	29.0	Same		
4	PILOT BIT CONNECTOR (NW BOX - 3 1/2 REG BOX)	APBC612NWB	64	29.0	Same		
4	PILOT BIT CONNECTOR (NWJ BOX - 3 1/2 REG BOX)	APBC612NWJB	64	29.0	Same		
5	ROD TO CAP ADAPTER - AW PIN	ARCAAWP	3	1.4	Same		
5	ROD TO CAP ADAPTER - AWJ PIN	ARCAAWJP	3	1.4	Same		
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2	Same		
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7	Same		
6	AW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AW	21	9.5	Same		
6	AWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5AWJ	23	10.4	Same		
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1	Same		
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9	Same		

Auger Repair Parts

1A	TOOL JOINT - 6 5/8 (168 mm) TRIPLE KEY PIN	ATJ6583P	13	5.9	ATJ6583PHD	16	7.3
1B	TOOL JOINT - 6 5/8 (168 mm) TRIPLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ6583B	12	5.4	ATJ6583BHD	13	5.8
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)	ALB1	0.3	0.1	ALB3	0.4	0.2
8	REPLACEMENT BUSHING NUTS (2 REQUIRED/AUGER)	ABN1	0.3	0.1	ABN3	0.2	0.1
9	REPLACEMENT DRIVE KEYS (3 REQUIRED/ AUGER)	ADK1	0.3	0.1	ADK3	0.3	0.1

Auger Cutterheads and Pilot Bits

10	BLADE CUTTERHEAD - 11 1/2 (292 mm)	ACH658350	28	12.7	ACH658350HD	29	13.2
10	SPADE CUTTERHEAD - 11 1/2 (292 mm)	ACH658351	25	11.8	ACH658351HD	26	11.8
10	BLADE/BULLET COMBO CUTTERHEAD - 11 1/2 (292 mm)	ACH658360	33	15.0	ACH658360HD	34	15.4
10	SPADE/BULLET COMBO CUTTERHEAD - 11 1/2 (292 mm)	ACH658361	30	13.6	ACH658361HD	30	13.6
10	BULLET CUTTERHEAD - 11 1/2 (292 mm)	ACH658370	34	15.4	ACH658370HD	34	15.4
10	6 BIT 5-T SQUARE FINGER BIT - 11 1/2 (292 mm)	ACH658371-6			ACH658371-6HD		
10	8 BIT 5-T SQUARE FINGER BIT - 11 1/2 (292 mm)	ACH658371-8			ACH658371-8HD		
11	6 1/2 (165 mm), PILOT BIT, HEAVY DUTY APEX TYPE	APB612APX	15	6.8	Same		
11	6 1/2 (165 mm), PILOT BIT, BULLET TYPE	APB612BUL	20	9.1	Same		
11	6 1/2 (165 mm), PILOT BIT, SPADE TYPE BLADE Pilot Bits have a 3 1/2 Reg. Pin Connection	APB612SPD	21	9.5	Same		
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP078	3	1.4	Same		

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

8 1/4" (210 mm) HOLLOW STEM AUGER COMPONENTS

Triple Key Design

Featuring continuous hardfaced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors feature bigger nuts, bolts and drive keys for added strength and have a tapered surface. The taper provides a better seal and reduced friction, enabling the tool joint to slide in and out easier. The auger pitch is 6 (152.4 mm). All 8 1/4 augers are Heavy Duty.

Heavy Duty Auger Section

	DESCRIPTION	PART#	WEIGHT	
			Lbs.	Kg.
1	8 1/4 (210 mm) I. D. X 12 (305 mm) O.D. X 5' (1524 mm) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys	A814300HD	183	83.0
2	DRIVE CAP W/ 2 (51 mm) HEX MALE SHANK	ADC814311HD	71	32.2
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB4	1	0.5
4	PILOT BIT CONNECTOR (NW BOX - 3 1/2 REG BOX)	APBC818NWB	55	24.9
4	PILOT BIT CONNECTOR (NWJ BOX - 3 1/2 REG BOX)	APBC818NWJB	56	25.4
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9

Auger Repair Parts

1A	TOOL JOINT - 8 1/4 (210 mm) TRIPLE KEY PIN	ATJ8143PHD	13	5.9
1B	TOOL JOINT - 8 1/4 (210 mm) TRIPLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ8143BHD	12	5.4
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)	ALB1	0.3	0.1
8	REPLACEMENT BUSHING NUTS (2 REQUIRED/AUGER)	ABN1-M	0.3	0.1
9	REPLACEMENT DRIVE KEYS (3 REQUIRED/ AUGER)	ADK1-S	0.3	0.1

Auger Cutterheads and Pilot Bits

10	BLADE CUTTERHEAD -13 (330 mm)	ACH814350	35	15.9
10	SPADE CUTTERHEAD - 13 (330 mm)	ACH814351	35	15.9
10	BLADE/BULLET COMBO CUTTERHEAD - 13 (330 mm)	ACH814360	40	18.1
10	SPADE/BULLET COMBO CUTTERHEAD - 13 (330 mm)	ACH814361	37	16.8
10	BULLET CUTTERHEAD - 13 (330 mm)	ACH814370	37	16.8
11	PILOT BIT, HEAVY DUTY APEX TYPE, 3 1/2 REG PIN	APB818APX	22	10.0
11	PILOT BIT, BULLET TYPE , 3 1/2 REG PIN	APB818BUL	27	12.2
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP100	3	1.4

See Reference Page 2-10 for specific component information (# of cutters, blocks, etc.)

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

0103

1-13

12 1/4" (432 mm) HOLLOW STEM AUGER COMPONENTS

Triple Key Design

Featuring continuous hardfaced flighting design, 3/8 (9.5 mm) thick on outer edge with double bolt connection. The 4142 alloy steel connectors feature a taper and bigger nuts, bolts and drive keys for added strength. The taper provides a better seal and reduced friction, enabling the tool joint to slide in and out easier. The auger pitch is 7 1/2 (190.5 mm). All 10 1/4 and 12 1/4 augers are heavy duty.

10 1/4 ID

12 1/4 ID

Auger Section		WEIGHT		WEIGHT			
	DESCRIPTION	PART#	Lbs.	Kg.	PART#	Lbs.	Kg.
1	10 1/4 (260 mm) I.D. X 14 1/2 (362 mm) O.D. X 5' (1524 mm) 12 1/4 (311 mm) I.D. X 17 (432 mm) O.D. X 5' (1524 mm) Manufactured with Bushing Nuts, Lock Bolts and Drive Keys	A1014300HD	265	120.2	A1214300HD	183	83.0
2	DRIVE CAP W/ 3 1/4 (83 mm) AUGER CONNECTOR	ADC101433HD	84	38.1	ADC121433HD	90	40.8
2	DRIVE CAP W/ 4 1/4 (108 mm) AUGER CONNECTOR	ADC101433HD	86	39.0	ADC121434HD	91	41.3
3	NUT AND BOLT FOR ROD TO CAP ADAPTER	ANAB4	1	.5	Same		
4	PILOT BIT CONNECTOR (NW BOX - 3 1/2 REG BOX)	APBC1018NWB	36	16.3	APCB1218NWB	46	20.9
4	PILOT BIT CONNECTOR (NWJ BOX - 3 1/2 REG BOX)	APBC1018NWJB	36	16.3	APCB1218NWJB	46	20.9
5	ROD TO CAP ADAPTER - NW PIN	ARCANWP	7	3.2	Same		
5	ROD TO CAP ADAPTER - NWJ PIN	ARCANWJP	6	2.7	Same		
6	NW DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NW	31	14.1	Same		
6	NWJ DRILL ROD FOR HOLLOW STEM AUGERS - 5' (1524 mm)	ADR5NWJ	35	15.9	Same		

Auger Repair Parts

1A	TOOL JOINT - 10 1/4 (260 mm) TRIPLE KEY PIN	ATJ10143PHD	32	14.1			
1B	TOOL JOINT - 10 1/4 (260 mm) TRIPLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys	ATJ10143BHD	31	14.0			
1A	TOOL JOINT - 12 1/4 (311 mm) TRIPLE KEY PIN				ATJ12143PHD	13	5.9
1B	TOOL JOINT - 12 1/4 (311 mm) TRIPLE KEY BOX Box Tool Joint Manufactured with Nuts, Bolts and Drive Keys				ATJ12143BHD	12	5.4
7	REPLACEMENT LOCK BOLTS (2 REQUIRED/ AUGER)	ALB4	0.4	0.2	Same		
8	REPLACEMENT BUSHING NUTS (2 REQUIRED/AUGER)	ABN3-M	0.2	0.1	Same		
9	REPLACEMENT DRIVE KEYS (3 REQUIRED/ AUGER)	ADK3	0.3	0.1	Same		

Auger Cutterheads and Pilot Bits

10	BLADE CUTTERHEAD -15 (381 mm)	ACH1014350	52	23.6			
10	SPADE CUTTERHEAD - 15 (381 mm)	ACH1014351	48	21.8			
10	BLADE/BULLET COMBO CUTTERHEAD - 15 (381 mm)	ACH1014360	55	24.9			
10	SPADE/BULLET COMBO CUTTERHEAD - 15 (381 mm)	ACH1014361	54	24.5			
10	BULLET CUTTERHEAD - 15 (381 mm)	ACH1014370	56	25.4			
10	BLADE CUTTERHEAD -17 3/4 (451 mm)				ACH1214350	80	36.3
10	SPADE CUTTERHEAD - 17 3/4 (431 mm)				ACH1214351	74	33.6
10	BLADE/BULLET COMBO CUTTERHEAD - 17 3/4 (431 mm)				ACH1214360	69	31.3
10	SPADE/BULLET COMBO CUTTERHEAD - 17 3/4 (431 mm)				ACH1214361	78	35.4
10	BULLET CUTTERHEAD - 17 3/4 (431 mm)				ACH1214370	69	31.3
11	10 1/8 (257 mm), PILOT BIT, APEX, 3 1/2 R. PIN	APB1018APX	33	15.0			
11	10 1/8 (257 mm), PILOT BIT, BULLET, 3 1/2 R. PIN	APB1018BUL	46	20.9			
11	12 1/8 (308 mm), PILOT BIT, APEX, 3 1/2 R. PIN				APB1218APX	48	21.8
11	12 1/8 (308 mm), PILOT BIT, BULLET, 3 1/2 R. PIN				APB1218BUL	61	27.7
12	KNOCK OUT WRENCH FOR BULLET CUTTERS	C123	4.4	2.0	Same		
13	FLEX HEAD SOCKET WRENCH FOR AUGER BOLT	KP100	3	1.4	Same		

See Reference Page 2-8 for specific component information (# of cutters, blocks, etc.)

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Hollow Stem Auger Modifications

Auger Extensions

Auger Extensions are used to compensate for the distance from the ground up to the rig. To order these extensions please specify:

1. Length: standards are 24, 30, 36, 42, or 48 shoulder to shoulder.
2. Tool Joint: Double Key or Triple Key in Standard or Heavy Duty Tapered
3. Auger I.D. (inside diameter)
4. Flighted or flightless. All flightless augers are made with heavy duty tube.

Laser Slotted Augers

These special hollow stem augers are designed to enable sampling of the ground water as it flows through the inside of the auger tube. To maintain the integrity and strength of the auger we use an industrial laser to cut the slots through the auger tube wall. The vertically cut slots are .0015 wide with the number of slots depending on diameter of the auger.

Heavy Duty Flighting

Our standard flighting is 3/8 (9.5 mm) at the outer edge with hardfacing material applied to the working edge. Where severe conditions exist we have cobble chasers available which feature double thick heavy-duty flighting, or any other thickness you desire.

Wide Flighting

Each size auger has a standard flighting size as listed on the catalog sheet. Often there is a need for wider flighting to drill larger size holes. We will custom manufacture augers to meet your width specifications.

Flighting Pitch

The pitch on an auger is the distance between the flights. The standard pitch for our augers is listed on each individual catalog sheet. If you need a different pitch we will be more than happy to make the auger pitch to whatever dimension you need.

I D of Auger

The I.D. (inside diameter) of the Hollow Stem Augers is considered to be the working area of the auger. We manufacture to industry standards or we can make any I.D. that you might require.

Auger Length

Our augers are available in a standard industry length of 5 feet but we have manufactured augers up to 40 feet long and metric lengths are available on request.

Special Connections

Other connections are available: Tapered threads, Acker, Diedrich, etc. We also manufacture extra heavy-duty tool joints for harsh applications.

Special Materials

The standard auger comes with 4142 heat-treated alloy tool joints, mild steel tube and 3/8 (9.5 mm) heavy duty steel flighting with hardfacing on the outer edge. These materials may be modified to meet special needs. We are able to work with unusual requirements such as non-magnetic material and corrosion resistant material.

Other Modifications

There are special needs for augers that have yet to be defined. Mills Machine stands ready to satisfy those needs. We have a full line of augers and have been a leader in the development and design of special augers for the individual requirements of our customers.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Auger Cutter Heads and Their Components

Auger Cutter Heads

All cutter heads are available with Double Key or Triple Key, Standard or Heavy Duty, Acker or Diedrich style tool joints. Auger cutter heads are designed to cut at the gage dimension listed for each auger size as follows:

Auger ID Size		Cutting Diameter
2 1/4	57 mm	6 1/2 165 mm
3 1/4	83 mm	7 1/2 190 mm
3 3/4	95 mm	8 1/4 210 mm
4 1/4	108 mm	8 3/4 222 mm
6 1/4	159 mm	11 279 mm
6 5/8	168 mm	11 1/2 292 mm
7 1/4	184 mm	12 305 mm
8 1/4	210 mm	13 330 mm
10 1/4	260 mm	15 381 mm
12 1/4	451 mm	17 3/4 451 mm

For details on formation capabilities and see the four color bulletin at the front of this catalog section.

Components for Cutter Heads and Pilot Bits

Component	Part #	Lbs	Kgs
Mini-bullet	CMM4	0.2	0.1
Standard Bullet	C23	0.4	0.2
Standard Blade, Carbide	CO11	1	0.5
Flat Head Screws for Blade 5/8-11 x 1 1/2	CO12	0.2	0.1
Spade Type Blade Cutters, .868 (22.0 mm)	C87L	1	0.5
Cutter Block for Mini-bullet	CMM4	0.4	0.2
Cutter Block for Standard Bullet	C20	0.7	0.3
Cutter Block, Heavy Duty for Standard Bullet	C20HD	1.3	0.6
Cutter Block for Spade Type Blade	C87B	1	0.5
5-T Square Finger Bit	C5T	.2	0.1
Square Finger Bit Cutter Block without Flighting	C5TB	.7	0.3
Square Finger Bit Cutter Block with Flighting	C5TBF	1	0.5
Knock out wrench for C23 Bullet	C123	4.4	2.0

"PLEASE CALL FOR CUSTOM OPTIONSSAND OTHER ACCESSORIES"

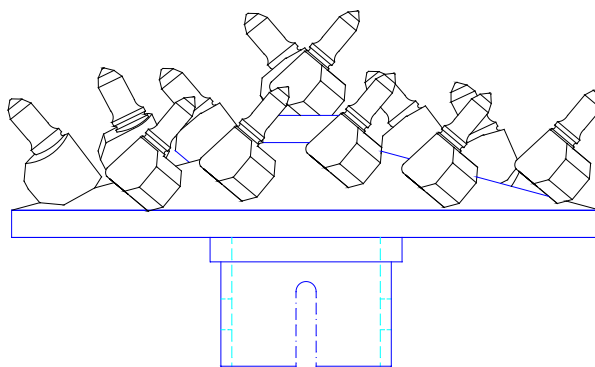
Concrete Cutter Bits

Concrete Cutter Bits

The concrete cutter bit has been specially **designed to drill through concrete to set manhole covers** and give access to the earth below the concrete. The bits feature our inexpensive field replaceable bullet carbide cutters. They make a clean round hole with rapid penetration. **They are not manufactured to drill below the concrete.** We also, manufacture a complete line of solid face cutter heads to drill through and below the concrete. Our Concrete Cutter Bits are available in a variety of sizes and tool joint connections with some of our more **common configurations listed below.**

Part #	Description	Number of Cutters	Weight	
			Lbs.	Kgs.
ACBB600158HXP	6 Concrete Bullet Bit with 1 5/8 Hex Pin	6		
ACBB700314DKP	7 Concrete Bullet Bit with 3 1/4 Auger DK Pin	7		
ACBB800414TKP	8 Concrete Bullet Bit with 4 1/4 Auger TK Pin	9		
ACBB900414TKPHD	9 Concrete Bullet Bit with 4 1/4 Auger TK HD Pin	10		
ACBB1000414DKP	10 Concrete Bullet Bit with 4 1/4 Auger DK Pin	12		
ACBB1200614DKP	12 Concrete Bullet Bit with 6 1/4 Auger DK Pin	15		
ACBB1400614DKPHD	14 Concrete Bullet Bit with 6 1/4 Auger DK HD Pin	18		
ACBB1500658TKP	15 Concrete Bullet Bit with 6 5/8 Auger TK Pin	20		
ACBB1600658TKPHD	16 Concrete Bullet Bit with 6 5/8 Auger TK HD Pin	21		
ACBB1800814DKP	18 Concrete Bullet Bit with 8 1/4 Auger DK Pin	24		
ACBB2000814TKP	20 Concrete Bullet Bit with 8 1/4 Auger TK Pin	30		
ACBB22001014TKP	22 Concrete Bullet Bit with 10 1/4 Auger TK Pin	33		
ACBB24001214TKP	24 Concrete Bullet Bit with 12 1/4 Auger TK Pin	36		

The bits are available with any auger or threaded tool joint. Call your Mills Sales Representative for specific pricing information.



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Hollow Stem Auger Accessories

Auger plugs are used to block the ID of the auger when drilling without the pilot bit. Plugs may be left in the hole when sampling or the sampling tube will pass through the flex plug.

Auger Plugs

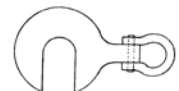
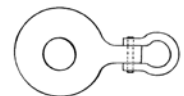
High Density Polyethylene			
Auger Size	Part #	Weight	
		Lbs	Kgs
3 1/4	APEP314HD		
4 1/4	APEP414HD	.5	.2
6 5/8	APEP614	.7	.3
8 1/4	APEP814		
Plastic Flex Plug			
2 1/4	APFP214	.1	.05
3 1/4	APFP314	.2	.1
4 1/4	APFP414	.3	.1
6 1/4	APFP614	.4	.2
Wooden Plug			
2 1/4	APW214	2	.9
3 1/4	APW314	3	1.4
4 1/4	APW414	4	1.8
6 1/4	APW614	5	2.3
6 5/8	APW658	5	2.3
8 1/4	APW614		
10 1/4	APW1014		
12 1/4	APW1214		
Wooden Plug - Heavy Duty			
3 1/4	APW314HD	4	1.8
4 1/4	APW414HD	5	2.3



Pulling Plates and Holding Irons

For holding or pulling 1 3/4 OD, 2 3/8 and 2 5/8 OD Drill Rod

Pulling Plate Closed		Lbs	Kgs
AW and AWJ Rod	AHIPPCAW-AWJ	11	5.0
NW and NWJ Rod	AHIPPCNW-NWJ	23	23
Pulling Plate Open			
AW and AWJ Rod	AHIPPOAW-AWJ	9	4.1
NW and NWJ Rod	AHIPPONW-NWJ	20	9.1
2 3/8 ID	AHIPPO238ID	21	9.5
Holding Iron Closed			
AW	AHICAW-AWJ	16	7.3
NW	AHICNW-NWJ	16	7.3
Holding Iron Open			
AW	AHIONW-NWJ	13	5.9
NW	AHIOAW-AWJ	15	6.8



Hex Extension Rod

These extension rods are used to compensate for the drill base height above the ground or to extend the drive cap.

Solid Rods 1 5/8 (41.3 mm) Hex Pin to 1 5/8 (41.3 mm) Hex Box - 5' (1524 mm) length.

AEXT158-5

Adjustable Rod 1 5/8 (41.3 mm) Hex Pin to 1 5/8 (41.3 mm) Hex Box,
Adjustable from 2' to 3' (610 mm to 914 mm).

AEXT158-2-3



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Hollow Stem Auger Accessories

Auger Hoisting Assembly

The hoisting assembly is used to lift the auger string with the main hoist and features a heavy-duty wire cable bridal assembly with two snap on safety hooks.

Description	Part #	Capacity	Lbs	Kgs
2 1/4 (57 mm) Double key, standard duty	AHA2142	3 Ton	20	9.1
3 1/4 (83 mm) Double key, standard duty	AHA3142	3 Ton	21	9.5
3 1/4 (83 mm) Double key, heavy duty	AHA3142HD	3 Ton	21	9.5
3 1/4 (83 mm) Triple key, standard duty	AHA3143	3 Ton	21	9.5
3 1/4 (83 mm) Triple key, heavy-duty	AHA314HD	3 Ton	21	9.5
4 1/4 (108 mm) Double key, standard duty	AHA4142	3 Ton	22	10
4 1/4 (108 mm) Double key, heavy-duty	AHA4142HD	3 Ton	22	10
4 1/4 (108 mm) Triple key, standard duty	AHA4143	3 Ton	22	10
4 1/4 (108 mm) Triple key, heavy-duty	AHA4143TP	3 Ton	22	10
6 1/4 (159 mm) Double key, standard duty	AHA6142	3 Ton	27	12.2
6 1/4 (159 mm) Double key, heavy-duty	AHA6142TP	3 Ton	27	12.2
6 5/8 (168 mm) Triple key, standard duty	AHA6583	3 Ton	28	12.7
6 5/8 (168 mm) Triple key, heavy-duty	AHA6583HD	3 Ton	28	12.7
8 1/4 (210 mm) Double key, heavy-duty	AHA8142	5 Ton	36	16.3
8 1/4 (210 mm) Triple key, standard-duty	AHA8143	5 Ton	36	16.3
10 1/4 (260 mm) Triple key, heavy-duty	AHA10143	5 Ton	48	21.8
12 1/4 (311 mm) Triple key, heavy-duty	AHA12143	5 Ton	59	26.8

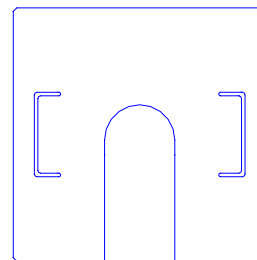
Hoisting Assemblies are available in Acker, Diedrich or other special tool joints. The removable wire cable assembly may be used for other lifting jobs within the capacity of the lifting hook.



Auger Forks

These forks are used as temporary support for hollow stem augers.

Description	Part #	Lbs	Kgs
2 1/4 (57 mm) with side handles	AFRK2143	6	2.7
3 1/4 (83 mm) with side handles	AFRK3143	7	3.2
3 3/4 (95 mm) with side handles	AFRK3343	10	4.5
4 1/4 (108 mm) with side handles	AFRK4143	10	4.5
4 7/8 (124 mm) with side handles	AFRK4873	10	4.5
6 1/4 (159 mm) with side handles	AFRK6143	14	6.4
6 5/8 (168 mm) with side handles	AFRK6583	14	6.4
8 1/4 (210 mm) with side handles	AFRK8143	21	9.5
10 1/4 (260 mm) with side handles	AFRK10143	25	11.3
12 1/4 (311 mm) with side handles	AFRK12143	38	17.2



Auger Hook

This hand hook is made to handle all augers - made from 3/4 (19 mm) round bar.

Description
Auger Hook

Part #
AH075



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Hollow Stem Auger Accessories

Auger Drill Pipe

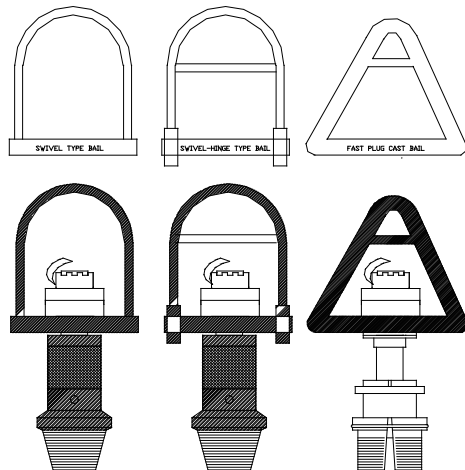
Auger Drill Pipe is carried in inventory in the following sizes:



NWJRD10	NWJ Rod X 10'	68	30.8
---------	---------------	----	------

Part #	Description	Weight	
		Lbs	Kgs
AWRD5	AW Rod X 5'	21	9.5
AWRD10	AW Rod X 10'	45	20.4
NWRD5	NW Rod X 5'	31	14.1
NWRD10	NW Rod X 10'	60	27.2
AWJRD5	AWJ Rod X 5'	23	10.4
AWJRD10	AWJ Rod X 10'	49	22.2
NWJRD5	NWJ Rod X 5'	35	15.9

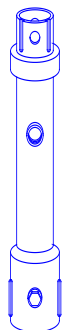
Hoist Plugs



In addition to the hoisting assembly and auger forks on the previous page, page 2-5, Mills Machine carries Swivel Hoist Plugs, Swivel-Hinged Hoist Plugs, Lifting Plugs and Murphy Fast Plugs. The full line is described in the Pipe handling Tools section of this catalog. Following are specific plugs we inventory:

Size	Swivel	Swivel Hinged	Murphy Fast Plug
NW Pin	X	X	
NWJ Pin	X	X	X
AW Pin	X	X	
AWJ Pin	X	X	
NW Box	X	X	
NWJ Box	X	X	
AW Box	X	X	
AWJ Box	X	X	

Hollow Stem Wash Tee



Used for mud rotary drilling, the hollow stem wash tee has a pipe thread coupling located on the side of the tube, a 2 NPT on the smaller sizes and a 3 NPT on the larger sizes. Our wash tees have tool joints the same as the auger string. We can supply special tool joints to meet your specific needs or lengths as required. The standard length is 18 (457 mm) shoulder to shoulder with the wash tee 6 (152 mm) below the bottom edge of the top tool joint.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Hollow Stem Auger Construction Components - Reference Sheet

Hollow Stem Auger Hardware

	Auger Size	Qty.	Bolt #	Qty.	Bushing #	Qty.	Key #	Pitch	Rod to Cap Bolt
Standard Double Key	2 1/4 (57 mm)	1	ALB2	1	ABN2	2	ADK1	5 Pitch	ANAB2
	3 1/4 (83 mm)	1	ALB2	1	ABN2	2	ADK1	5 Pitch	ANAB3
	3 3/4 (95 mm)	1	ALB2	1	ABN2	2	ADK1	5 Pitch	ANAB4
	4 1/4 (108 mm)	2	ALB2	2	ABN2	2	ADK1	5 Pitch	ANAB4
	6 1/4 (159 mm)	2	ALB2	2	ABN2	2	ADK1	6 Pitch	ANAB6
Heavy Duty - Double Key	3 3/4 (95 mm)	2	ALB3	2	ABN3	2	ADK2	5 Pitch	ANAB4
	4 1/4 (108 mm)	2	ALB3	2	ABN3	2	ADK2	6 Pitch	ANAB4
	6 1/4 (159 mm)	2	ALB3	2	ABN3	2	ADK2	6 Pitch	ANAB6
	8 1/4 (210 mm)	2	ALB3	2	ABN3	2	ADK2	6 Pitch	ANAB4
Standard Triple Key	3 1/4 (83 mm)	1	ALB1	1	ABN1	3	ADK1	5 Pitch	ANAB3
	4 1/4 (108 mm)	2	ALB1	2	ABN1	3	ADK1	5 Pitch	ANAB4
	6 5/8 (168 mm)	2	ALB1	2	ABN1	3	ADK1	6 Pitch	ANAB6
	8 1/4 (210 mm)	2	ALB1	2	ABN1M	3	ADK1-S	6 Pitch	ANAB4
Heavy Duty - Triple Key	4 1/4 (108 mm)	2	ALB3	2	ABN3	3	ADK2	6 Pitch	ANAB4
	6 5/8 (168 mm)	2	ALB3	2	ABN3	3	ADK2	6 Pitch	ANAB6
	10 1/4 (260 mm)	2	ALB4	2	ABN3-M	3	ADK3	7 1/2 Pitch	ANAB4
	12 1/4 (311 mm)	2	ALB4	2	ABN3-M	3	ADK3	7 1/2 Pitch	ANAB4

Auger Cutter Head Hardware

Auger Size	Carbide Blade	Spade Type Blade	Blade-Bullet Combo	Spade-Bullet Combo	Bullet Cutter	5-T Cutter Head
2 1/4 (57 mm)		2 - C87L Spade Type Blades 2 - C87B Blocks		2 - C87L Spade Blades 2 - C87B Blocks 2 - C23 Bullets 2 - C20 Blocks	4 - C23 Bullets 2 - C20 Blocks 2 - ACHF214BU Bullet Flights	4 - C5T Finger Bits 2 - C5TBF Cutter Blocks/Fighting 2 - CFTB Cutter Blocks No Fighting
3 1/4 (83 mm)	2 - C011 Carbide Blades 2 - C012 Cap Screws 2 - ACHF314BL Blade Flights	3 - C87L Spade 3 - C87B Blocks	2 - C011 Carbide Blades 2 - C012 Cap Screw 2 - ACHF314BL Blade Flights 2 - C23 Bullets 2 - C20 Blocks	2 - C87L Spade Blades 2 - C87B Blocks 2 - C23 Bullets 2 - C20 Blocks	4 - C23 Bullets 4 - C20 Blocks 2 - ACHF314BU Bullet Flights	4 - C5T Finger Bits 2 - C5TBF Cutter Blocks/Fighting 2 - C5TB Cutter Blocks No Fighting
3 3/4 (95 mm) or 4 1/4 (108 mm)	3 - C011 Carbide Blades 3 - C012 Cap Screws 3 - ACHF414BL Blade Flights	4 - C87L Spade Type Blades 4 - C87B Blocks	3 - C011 Carbide Blades 3 - C012 Cap Screw 3 - ACHF414BL Blade Flights 3 - C23 Bullets 3 - C20 Blocks	3 - C87L Spade Blades 3 - C87B Blocks 3 - C23 Bullets 3 - C20 Blocks	6 - C23 Bullets 6 - C20 Blocks 3 - ACHF414BU Bullet Flights	4 - C5T Finger Bits 2 - C5TBF Cutter Blocks/fighting 2 - C5TB Cutter Blocks No Fighting
6 1/4 (159 mm)	4 - C011 Carbide Blades 4 - C012 Cap Screws 4 - ACHF614BL Blade Flights	5 - C87L Spade Type Blades 5 - C87B Blocks	4 - C011 Carbide Blades 4 - C012 Cap Screw 4 - ACHF614BL Blade Flights 4 - C23 Bullets 4 - C20 Blocks	4 - C87L Spade Blades 4 - C87B Blocks 4 - C23 Bullets 4 - C20 Blocks	8 - C23 Bullets 8 - C20 Blocks 4 - ACHF614BU Bullet Flights	4 - C5T Finger Bits 2 - C5TBF Cutter Blocks/Fighting 2 - C5TB Cutter Blocks/no Fighting
6 5/8 (168 mm)	4 - C011 Carbide Blades 4 - C012 Cap Screws 4 - ACHF658BL Blade Flights	5 - C87L Spade Type Blades 5 - C87B Blocks	4 - C011 Carbide Blades 4 - C012 Cap Screw 4 - ACHF658BL Blade Flights 4 - C23 Bullets 4 - C20 Blocks	4 - C87L Spade Blades 4 - C87B Blocks 4 - C23 Bullets 4 - C20 Blocks	8 - C23 Bullets 8 - C20 Blocks 4 - ACHF658BU Bullet Flights	6 - C5T Finger Bits 3 - C5TBF Cutter Blocks/Flt. 3 - C5TB Cutter Blocks No Fighting 8 - Bit Available
8 1/4 (210 mm)	5 - C011 Carbide Blades 5 - C012 Cap Screws 5 - ACHF814BL Blade Flights	5 - C87L Spade Type Blades 5 - C87B Blocks	5 - C011 Carbide Blades 5 - C012 Cap Screw 5 - ACHF814BL Blade Flights 5 - C23 Bullets 5 - C20 Blocks	4 - C87L Spade Blades 4 - C87B Blocks 4 - C23 Bullets 4 - C20 Blocks	10 - C23 Bullets 10 - M20 Blocks 5 - ACHF814BU Bullet Flights	6 - C5T Finger Bits 3 - C5TBF Cutter Blocks/Fighting 3 - C5TB Cutter Blocks No Fighting 8 - Bit Available
10 1/4 (260 mm)	6 - C011 Carbide Blades 6 - C012 Cap Screws 6 - ACHF1014BL Blade Flights	8 - C87L Spade Type Blades 8 - C87B Blocks	6 - C011 Carbide Blades 6 - C012 Cap Screw 6 - ACHF1014BL Blade Flights 6 - C23 Bullets 6 - C20 Blocks	5 - C87L Spade Blades 5 - C87B Blocks 5 - C23 Bullets 5 - C20 Blocks	10 - C23 Bullets 10 - C20 Blocks 5 - ACHF1014BU Bullet Flights	
12 1/4 (311 mm)	7 - C011 Carbide Blades 7 - C012 Cap Screws 7 - ACHF1214BL Blade Flights	10 - MMC87L Spade Type Blades 10 - MMC87B Blocks	7 - CC011 Carbide Blades 7 - C012 Cap Screw 7 - ACHF1214BL Blade Flights 7 - C23 Bullets 7 - C20 Blocks	6 - 87L Spade Blades 6 - 87B Blocks 6 - CC23 Bullets 6 - C20 Blocks	12 - CC23 Bullets 12 - CC20 Blocks 6 - ACHF1214BU Bullet Flights	

Pilot Bit Hardware

	Auger Size						
	3 1/4 (83 mm)	3 3/4 (95 mm) or 4 1/4 (108 mm)	6 1/4 (159 mm)	6 5/8 (168 mm)	8 1/4 (210 mm)	10 1/4 (260 mm)	12 1/4 (311 mm)
Bullet	3-CMM4 Bullets 3-CMM4B Blocks	3-C23 Bullets 3-C20 Blocks	6-C23 Bullets 6-C20 Blocks	6-C23 Bullets 6-C20 Blocks	8-C23 Bullets 8-C20 Blocks	10-C23 Bullets 10-C20 Blocks	12-C23 Bullets 12-C20 Blocks
Spade		2-C87L Spaded 2-C87B Blocks	4-87L Spade 4-C87B Blocks	4-C87L Spaded 4-C87B Blocks	6-C87L Spade 6-C87B Blocks	8-C87L Spade 8-C87B Blocks	10-C87L Spade 10-C 87B Blocks

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Mills machine offers two distinctive types of sampling systems ranging from the simple, inexpensive to the more complex, time saving system. Our full range of hollow stem augers and auger accessories give you the versatility to accomplish your sampling needs. All augers are available in English or Metric lengths.

1. Standard Intermittent Sampling. The first type uses standard hollow stem augers and the normal interior drill rod. As sampling is required you remove the interior rod from the augers, attach a split tube sampler and drive it into the ground with an above-ground 140# safety hammer or if the sample is deeper down, an in-hole 140 # hammer. Dimensions for the in-hole hammers are shown on the components page. When the sampler is full you remove the drill rod, retrieve the sample and reinsert the drill rod and pilot bit and continue to drill to the next zone to be sampled.

Components for this type of system may be purchased individually or your Mills sales representative will put together a package of parts that will make up a complete system.

2. Standard Continuous Sampling. This method uses drill rod for continuous sampling. Similar to the first method with the exception of a modified, longer drive cap and the use of a five-foot sampling tube. The drive cap has adjustment holes for easy adjustment, at any time, for proper positioning of the sampling tube behind the cutter head, even with the cutter head or in front of the cutter head and as the soil conditions vary.

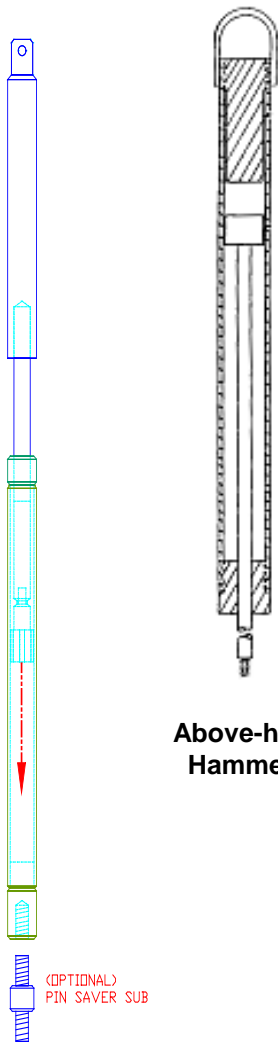
Below the rod-to-cap adapter, a bearing assembly is inserted to keep the sampling tube from rotating and shearing the soil sample. The five-foot split-sampling barrel is pulled from the hole each five feet and an empty split barrel inserted. In normal operating conditions two split barrel tubes are required.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Standard Intermittent Sampling.

This is the basic method used to take a soil sample through a hollow stem auger. The interior drill rod along with the pilot bit and connector are removed. A sampling tube is attached to the bottom of the drill rod and pounded into the formation with a 140 lb. safety hammer until it is full.

The pilot bit, connector and drill rod are reinserted and standard auguring is continued to the next zone to be sampled. The components for this system, hammers, sampling tubes and swivels are found in the Sampling System Components section of this catalog.

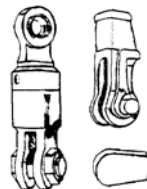


Above-hole Hammer

In-hole Sampler Hammer



Shelby Tube Sampler
Split Tube Sampler



3EJM Swivel
(With Open Wedge Socket)



C-611Z Swivel

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Sampling Systems

"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

Standard Continuous Sampling.

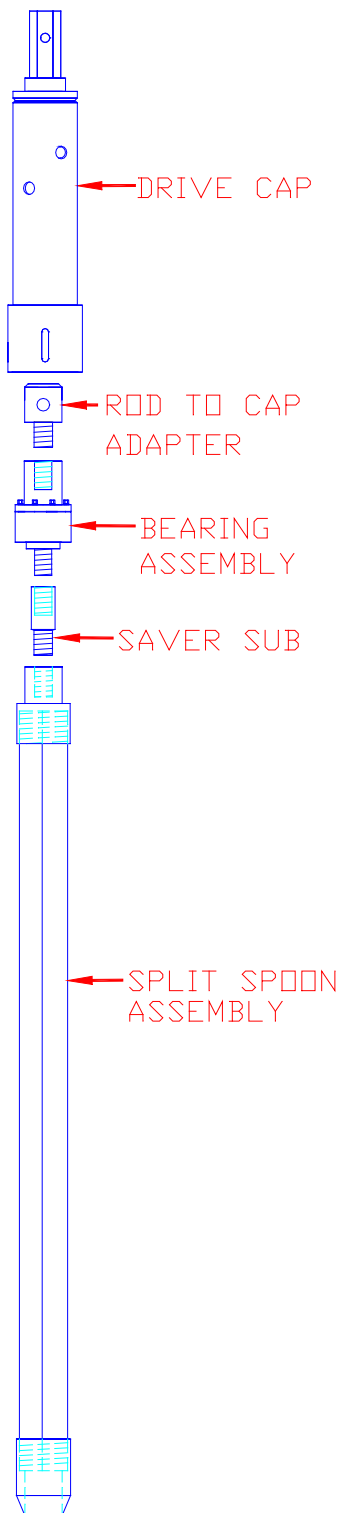
For shallow sampling the simplest and lowest total cost system is the standard continuous sampling system. Drill rod is used to connect to the split tube sampler. There is a modified drive cap with adjustment holes for positioning of the sampling tube required with various soil conditions or sampling specifications. The position of the sampling shoe can be changed from 1 inside the auger to approximately 4 ahead of the auger bit.

A bearing system is required below the rod to cap adapter to prevent the sampler from rotating and disturbing the soil sample. This system is usually used with a five foot split tube sampler. When the tube is full, it is removed and a spare five-foot tube is inserted in the hole to continue the sampling operation.

In addition to the normal drill string the following are required for this system:

- Extended Drive Cap
- Rod to Cap Adapter (included in your drive string)
- Bearing Assembly
- Nut and Bolt for Rod to Cap Adapter
- Saver Sub/any combo of auger pipe Tool Joints
- Sampling Tube, 1/4 wall 5' long with Head and Shoe
- Spare Sampling Tube with Barrel and Shoe only

The 5' split spoon assembly is available in 3 OD for the 3 1/4 and 3 3/4 augers and 4 OD for larger augers. With a 6 1/4 ID auger and above, a shroud is used around the drive shoe to insure the sampler is centered. The top box connection of the sampler is the same as your drill string pin-down connection.



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Sampling System Components

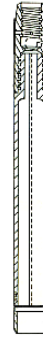
Split Tube Samplers

2 O.D. X 24 - COMPLETE ASSEMBLY

SS224AW	AW ROD BOX
SS224AWJ	AWJ ROD BOX

3 O.D. X 24 - COMPLETE ASSEMBLY

SS324AW	AW ROD BOX
SS324AWJ	AWJ ROD BOX
SS324NW	NW BOX
SS324NWJ	NWJ BOX



← Split Tube Sampler

Shelby Tube Samplers

Shelby Tube Head (Holds Shelby Tube)**

SSHEL2HAW	2 O.D. AW Box
SSHEL2HAWJ	2 O.D. AWJ Box
SSHEL3HNW	3 O.D. NW Box
SSHEL3HNWJ	3 O.D. NWJ Box

Shelby Tube ***

SSHEL224T	2 Dia. X 24 long Shelby Tube for AW or AWJ
SSHEL324T	3 Dia. X 24 long Shelby Tube for NW or NWJ

End Caps for Shelby Tubes. (Two required on each tube.)

SSHEL2C	2 Diameter
SSHEL3C	3 Diameter

*** 4 Thread is Standard, 8 Thread is available check factory. Also check for other sizes, Lynac Samplers, Shelby tube parts.

*** Other lengths of tubes are available such as 18 or 30 – refer to factory.

Shelby Tube Sampler →



In Hole Hammer →



OPTIONAL PIN SAVER SUB

In-Hole Safety Hammer

Mills Machine Complete 140 In-Hole Safety Hammer

Overall length including swivel - 158 open and 119 closed.

SSIHHAM200	2 O.D.	SPECIAL
SSIHHAM258	2 5/8 O.D.	SPECIAL
SSIHHAM278	2 7/8 O.D.	STANDARD

Above Hole Hammer →



Above-Hole Hammer

SSAHHAM140AW	AW Pin	
SSAHHAM140AWJ	AWJ Pin	

Swivels for In-Hole Hammers and Wireline Systems

Swivel	Description	Lbs.	Kgs.
SSINSW3EJM	3 Ton Ball Bearing Swivel, 3EJM	8	3.5
SSINSWWS4	Wedge for 3EJM Swivel	3	1.3
SSINSWC-611Z	3 Ton Ball Bearing Swivel, C-611/Thimble Top & Zert Ftg.		



Subs for Hammers and Wirelines

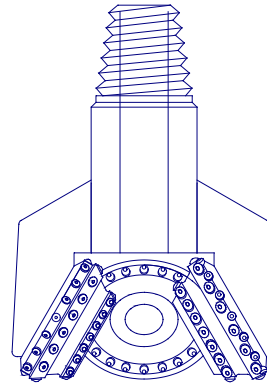
AW Pin to ?? Pin	Adaptor Sub with AW, AWJ, NW or NWJ Pin	\$70.00
AW Box to ?? Box	Adaptor Sub with AW, AWJ, NW or NWJ Box	\$70.00



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

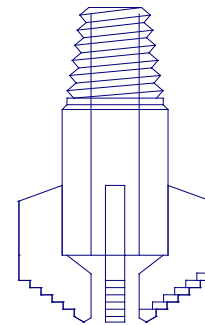
The Rotary Core Bit is an innovative option for taking core samples through standard rotary drill rods. These bits are designed to take intermittent samples of dirt or rock.

When you reach the desired sampling zone you simply insert a standard 2 OD split spoon sampler connected to the bottom of 1 5/8 OD AW or AWJ drill rod down the I.D. of the larger drill rod. Connecting an above ground-sampling hammer the drill rod and pounding it into the formation take the actual core. We also, offer a special in hole sampling hammer to eliminate the use of drill rod.

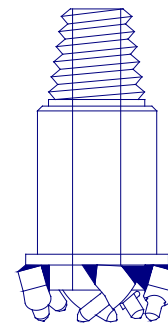


Bit sizes start at 6 OD and are available in new, rerun or retip steel tooth or TCI button cones with standard or sealed bearings. This type of core bit is built with standard roller rock bit segments.

The drag bit style is designed for softer formations with sizes starting at 6 OD. Standard wing configurations consist of three or more wings in a step or chevron shape. The thickness of the blade and carbide inserts is offered in a standard or heavy-duty style.



Bullet type core bits are designed for soft to medium hard formations with sizes starting at 6 OD. Our standard carbide tipped bullet cutter is used to manufacture these specialty bits. We also offer other styles of carbide tipped cutters for more versatility.



Typical thread connections are 2 7/8 I.F., 3 1/2 I.F. Box or 4 1/2 Regular Pin with 2 1/4 I.D.

See the Sampling System Components section of this catalog for sampling tubes and the sampling hammers to drive the sampling tube.

The questionnaire on the opposite page will assist in determining the construction.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Core Bit**Application Questionnaire****Core Bit**

Company _____
Address _____
City, State Zip _____

Phone _____
Fax _____
E-Mail _____
Contact _____

Quantity: _____ Bit OD _____ Core Minimum ID _____
OR Sampling Tube OD _____
Connection: _____ Box ☐ or Pin ☐ Flats: _____

Drag Type

Step ☐ Chevron ☐ Number of Blades _____

Claw Type

Type of Cutters _____

Roller Type

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 ☐

Special Requirements: _____

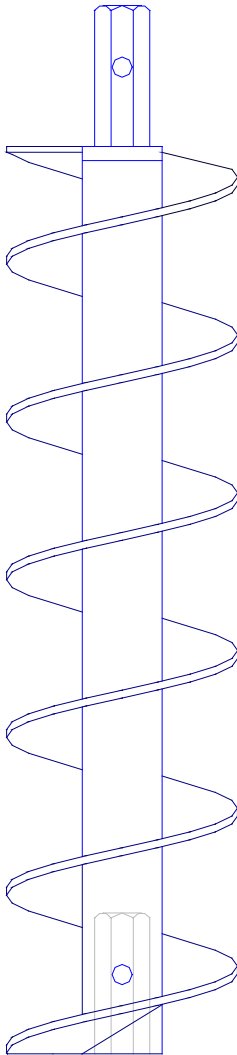
Sketch:

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

0103

3-6**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



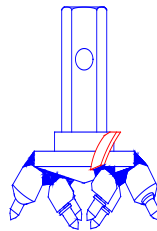
Solid (construction) augers from Mills Machine are furnished with rugged steel flighting, heavy-duty steel center shaft and have a variety of cutting heads available. Used for utility, industrial, mining, and construction applications, they are available in standard diameters from 3 1/2 to 48 and larger 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.

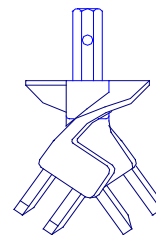
Mills Machine Company excels in custom designed augers and cutter heads. We have presented several drawings on this page to show some of the versatility in our product design. Available are standard flow and jet auger designs (drill rod with flighting), cutting heads for standard duty or heavy duty for 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.**

Solid Auger Section



Bullet Cutter Head



Finger Bit Cutter Head

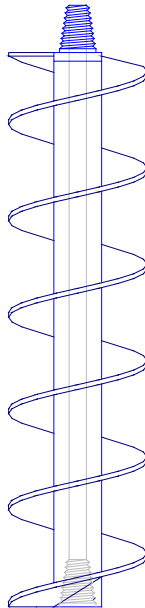
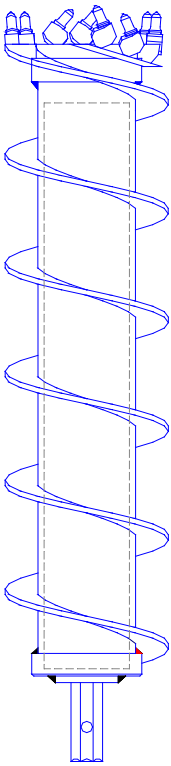
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

**Check our Web Site
www.MillsMachine.com**

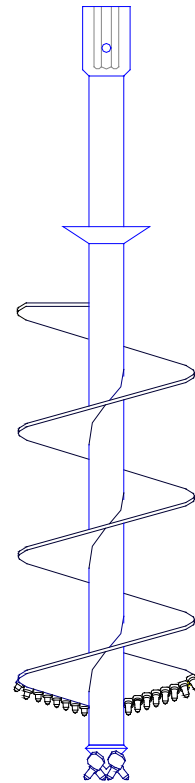
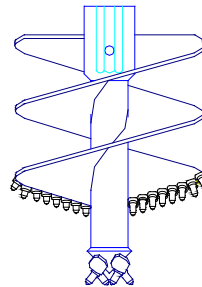
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

0103

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.



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



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.

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.

“PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES”

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	Weight	
				Diameter	Lbs	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

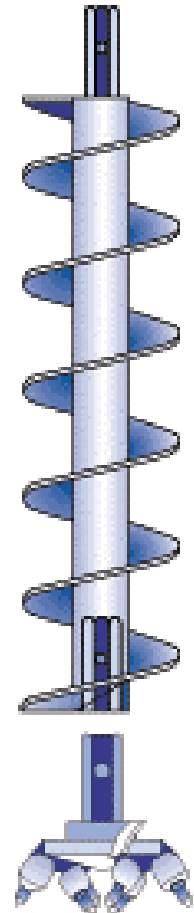
2 3/8 Dia. Center Tube with 1 5/8 Hex Shank

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 O.D. Hole Size	2	9	10	110	50.0

* Solid Augers 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.



"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

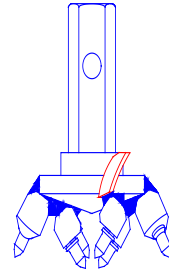
0103

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	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		

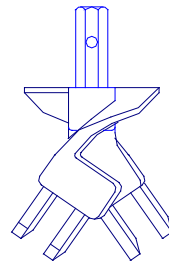


Bullet Bit Cutter Head

Finger Bit, Solid Auger Cutter Head

The finger bit cuts a 1/2 larger diameter hole, on the 5 and larger sizes, than the corresponding bullet bit or fish tail bit.

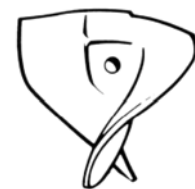
SAFB312118	3 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	2.5	1.2
SAFB412118	4 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	10	4.5
SAFB512118	5 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	11	5.0
SAFB612118	6 1/2 O.D. Tungsten Carbide Finger Bit	1 1/8	15	6.8
SAFB412158	4 1/2 O.D. Tungsten Carbide Finger Bit	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	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.

SASBSHK118M	1 1/8 Medium Shank		
SASBSHK118L	1 1/8 Large Shank		
SASBSHK158M	1 5/8 Medium Shank		
SASBSHK158L	1 5/8 Large Shank		



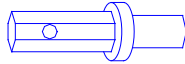
Screw Bit Shank

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Solid Auger Components

Hex Components

Hex Repair Shanks



Part #	Description	Weight	
		Lbs	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

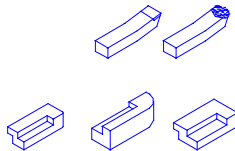
RK-1687	1 1/8 Hex Box Repair Socket for 1 11/16 Tube		
RK-2375	1 5/8 Hex Box Repair Socket for 2 3/8 Tube		
RK-2875	1 5/8 Hex Box Repair Socket for 2 7/8 Tube		



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

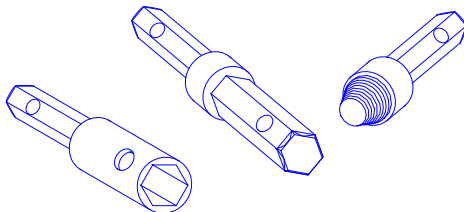


158EXT	Adjustable 1 5/8 Hex Male Shank to Female Socket, 24 to 36		
--------	--	--	--

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

"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

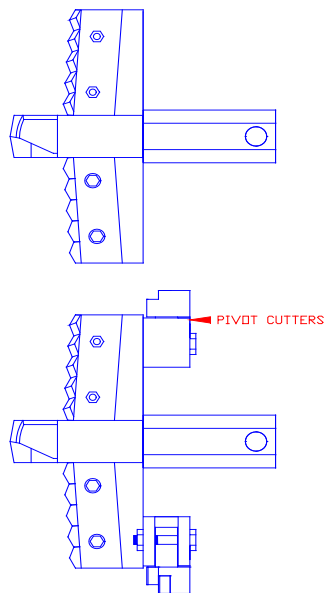
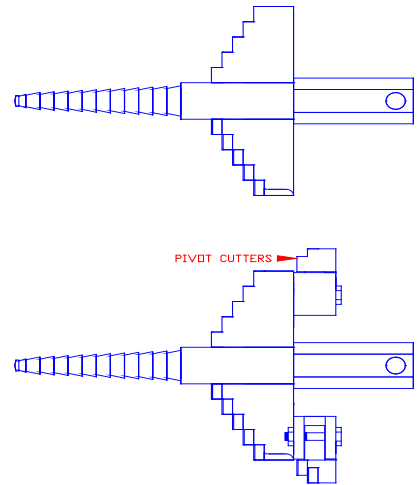
0103

4-5

Horizontal Drilling Bits

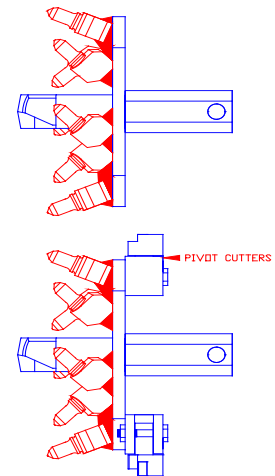
Mills Machine's horizontal drilling bits are designed to cut a variety of formations. The different cutter configurations include Step, Apex (Chevron) or Claw (Bullet) type configurations to drill from dirt to hard rock formations. Two popular styles are available in Free Bore and Casing Push with retractable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



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

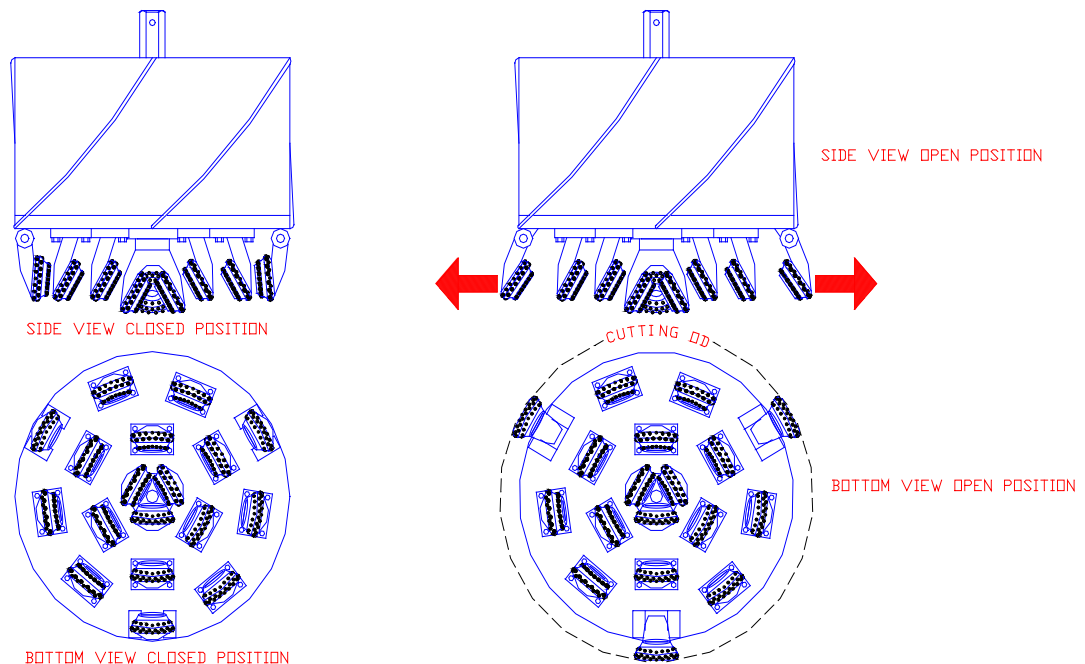
Horizontal Drilling Bits

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.

HORIZONTAL ROLLER ROCK BIT



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 _____
Address _____
City, State Zip _____

Phone _____
Fax _____
Contact _____

****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: _____

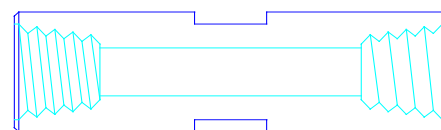
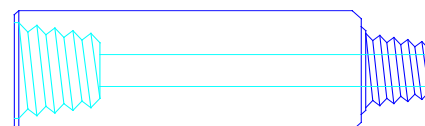
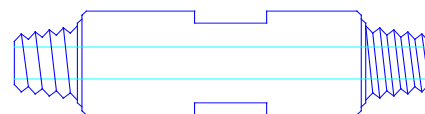
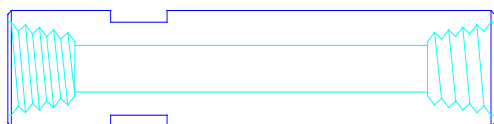
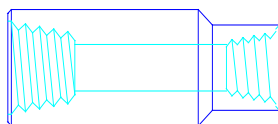
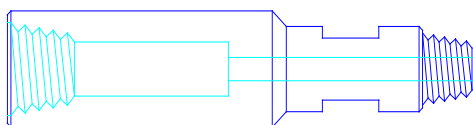
Sketch:

PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES

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 questionnaire for Subs on the next page.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

SUB

Application Questionnaire Rotary Substitute Adapter

SUB

Company _____

Phone _____

Address _____

Fax _____

City, State Zip _____

Contact _____

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: _____

Sketch:

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

0103

5-2

Check our Web site:

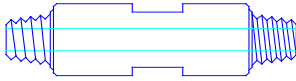
www.MillsMachine.com

MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802

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

Sub Variations

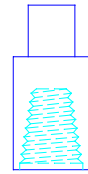
Mills Machine will furnish you any variation of the sub needed to complete your drill string or job requirements. Some of the variations that we normally find are the breakout flats, special flats, breakout lugs, extra length, bottle necks, knurling and float valves. These are listed in the following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

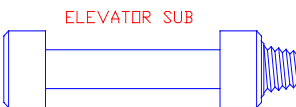


Shock Subs. These are specialized subs designed to absorb the shock vibrations created by a down-hole hammer and prevent damage to the drill string and the top head drive.

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.

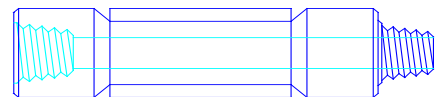
Special ID. We will furnish subs bored to a special ID, either smaller or larger than standard or for special cases with no ID bore.

Jet Subs. These subs are designed with the water flow to jet out the sides of the sub to assist in 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.

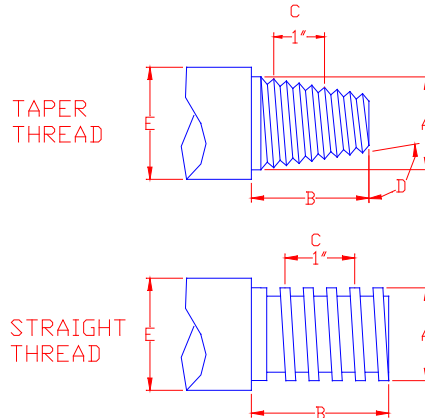


"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Sub Measurement

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:

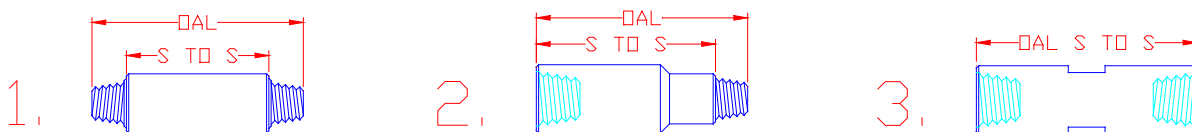
- A. The diameter of the base of the pin where it meets the sub body (shoulder).
- B. The thread length. Measured from shoulder to the end of the tool joint.
- C. The number of threads per inch - put the 0 mark of a ruler on the center of the first thread, don't count that thread, then count the threads 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..



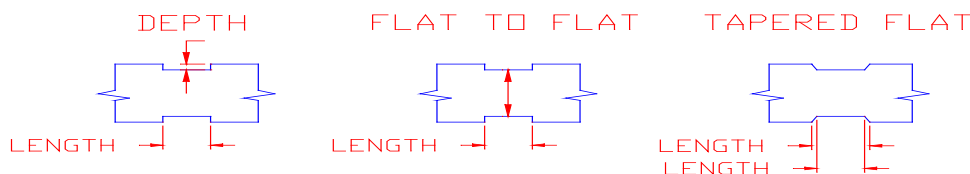
Your free thread ruler is at the beginning of this catalog. It will assist you in determining the thread. If you need additional copies, please contact your sales representative

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 jaws 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.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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.

Box to Box	Dimensions O.D x I. D.	Working Length
MJR to 2 3/8 Reg	2 3/4 – 3 1/8 BN x 1 1/2	10
MJR to 2 7/8 Reg	2 3/4 – 3 3/4 BN x 1 1/2	10
MJR to 3 1/2 Reg	2 3/4 – 4 1/2 BN x 1 1/2	10
MJR to 4 1/2 Reg	2 3/4 – 5 1/2 BN x 1 1/2	12
MR to 2 3/8 Reg	3 1/4 x 1 1/2	10
MR to 2 7/8 Reg	3 1/4 – 3 3/4 BN x 2	10
MR to 3 1/2 Reg	3 1/4 – 4 1/2 BN x 2	10
MR to 4 1/2 Reg	3 1/4 – 5 1/2 BN x 2	12
2 3/8 IF to 2 3/8 Reg	3 1/2 x 1 1/2	10
2 3/8IF to 2 7/8 Reg	3 1/2 – 3 3/4 BN x 2	10
2 3/8IF to 3 1/2 Reg	3 1/2 – 4 1/2 BN x 2	10
2 3/8IF to 4 1/2 Reg	3 1/2 – 5 1/2 BN x 2	10
2 7/8IF to 3 1/2 Reg	4 1/2 x 2	10
2 7/8IF to 4 1/2 Reg	4 1/2 – 5 1/2 BN x 2	10
Pin to Box		
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 FEDP, 2 7/8 FEDP and Mayhew Full Hole Box to Regular Box.

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

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Tool Joint Thread Chart

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		5	3 1/2	5.975	5 1/4	4 3/4	2	4	TAPER
7 5/8 REG	8 7/8		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

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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

DRILL ROD CONNECTIONS

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
B Q	2 3/16		4 3/4	1 13/16		2	1 13/16	1/2	3	TAPER
H W	3 1/2		3 1/4	2 1/4		3 1/2	2 13/16		3	SQUARE
E W	1 3/8		1 9/16	7/16'	1.050	1 3/4	7/8		3	SQUARE
N W	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

"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

0103

5-7

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

Section 2 - Other Sizes

API X-HOLE (XH)

3 1/2 XH	4 7/8		3.5	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.										

API HACKER

HACKER JR	3 1/8		2 1/4	1 7/8	2.685	2 3/4	2 1/8	1 3/4	5	TAPER
HACKER SR	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		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

HF

6 5/8 HF	8		3.5	6	7.310	4 1/2	6 1/2	1.5	4	TAPER
----------	---	--	-----	---	-------	-------	-------	-----	---	-------

MOBILE

2 5/8 MOBILE	2 5/8		2.5	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

"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

0103

5-9

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"

Rock Bits

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 subclassification from softest to hardest within each series.

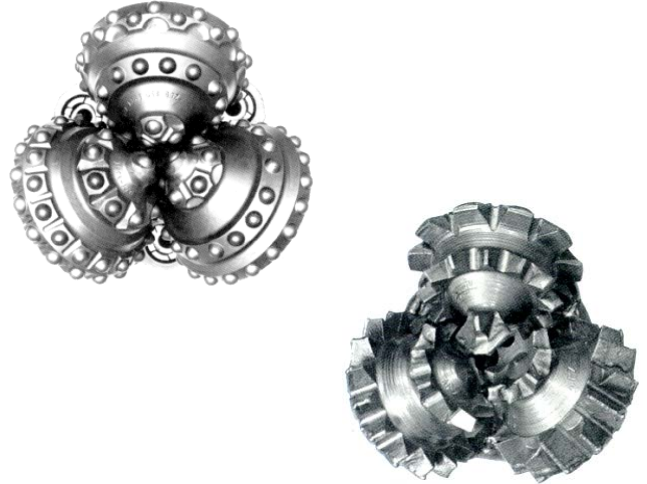
X-1-X
X-2-X
X-3-X
X-4-X

The third position designates the common construction features.

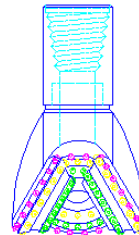
- X-X-1 Standard 3 cone rock bit
- X-X-2 T type gage row teeth.
- X-X-3 Tungsten carbide inserts in face.
- X-X-4 Sealed roller bearings.
- X-X-5 Sealed bearings with inserts in gage face.
- X-X-6 Sealed friction bearings.
- X-X-7 Sealed friction bearings and inserts in gage face.

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.

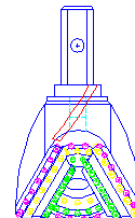
There is no guarantee concerning the footage these bits will drill. The quality of the used bits is determined by our years of experience using sight and feel.



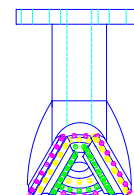
Mills Machine can also modify rock bits to special requirements such as box up, reverse circulation or hex mount as you may require. Our objective is to serve the needs of the drilling industry. How can we help you?



Box Tool Joint



Hex Pin Tool Joint



Reverse Circulation Flange Mount

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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

0103

5-11

Rock Bit**Application Questionnaire****Rock Bit**

Company _____

Address _____

City, State Zip _____

Phone _____

Fax _____

Contact _____

Quantity**: _____ Size _____

Pin Size**: _____

Bearing**: Conventional ☐ Sealed ☐Steel Tooth**: New ☐ Retip ☐ IADC Code _____Formation: Soft ☐, Med. Soft ☐, Medium ☐,
Med. Hard ☐, Hard ☐ORTCI 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 _____

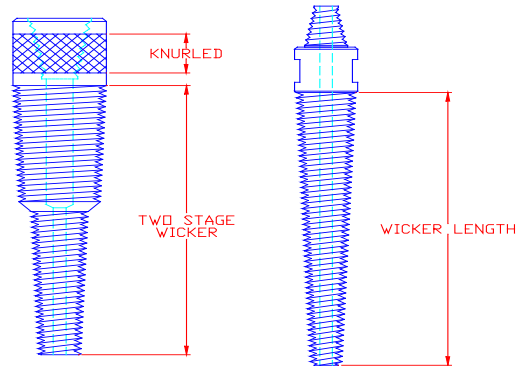
Special Requirements: _____

PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES

0103

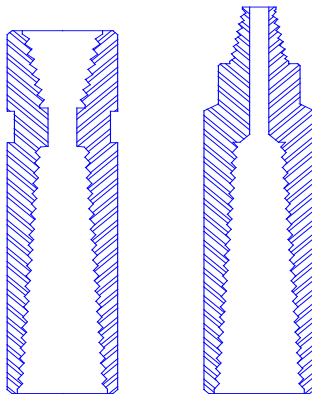
5-12Check our Web site:
www.MillsMachine.comMILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

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 and an application questionnaire are on catalog pages 5-15 & 16.

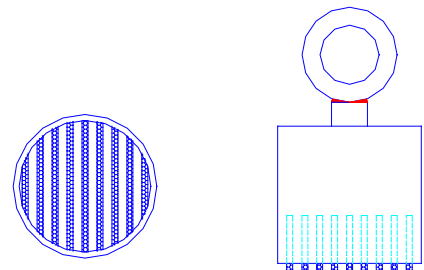


Overshots Overshots (rotary die collar) are manufactured like taper taps except they are **made to go over the OD of the object lost down hole** (pages 5-17 & 18). Like taper taps, overshots are **stocked in a variety of sizes** and connections so we are able to **ship immediately**. Overshots and taper taps share the same options

Information of overshots and an application questionnaire are on catalog pages 5-17 & 18.

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 and the application questionnaire are listed on catalog page 5-19.

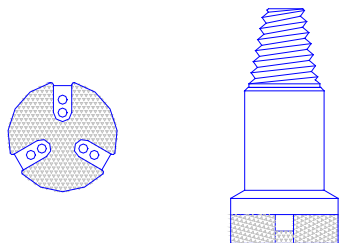
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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

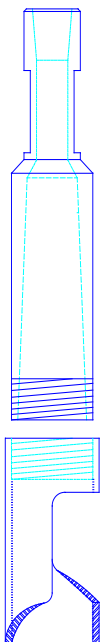
0103

Fishing Tools



Junk Mills: Our junk mills, described in detail on catalog page 5-20, are **designed to eliminate steel objects that cannot be fished** by milling them up with a special carbide coated face.

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.



OVERSHOT W/ WALL HOOK



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.

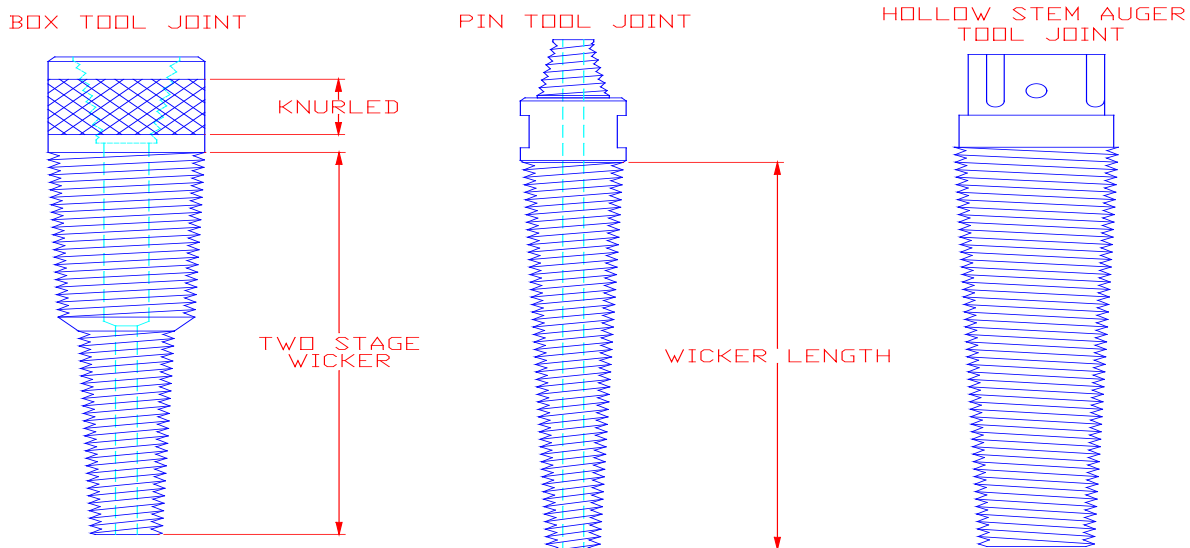
We **stock** several different sizes with standard connections. We also manufacture to your **special requirements** with options of breakout flats, right-hand or left-hand wickers, any thread, special length, oversize guides, mill guide or wall hooks.

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

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 questionnaire for Taper Taps on the next page.



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.

"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

0103

5-15

Application Questionnaire

Taper Tap

Taper Tap

Date _____

Company _____

Phone _____

Address _____

Fax _____

City, State Zip _____

Contact _____

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

Sketch:

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.

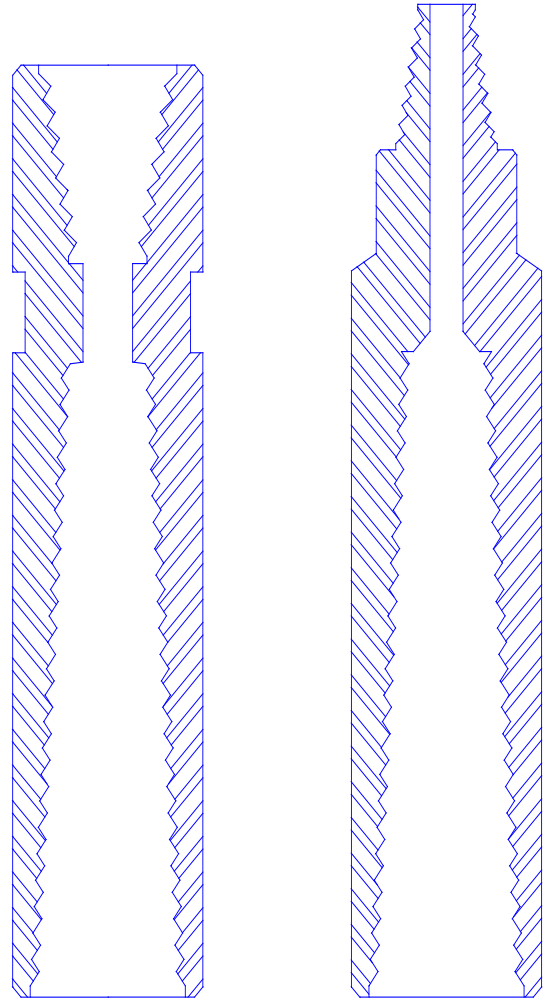
We can build the overshot with oversize guides to more easily catch the fish or with a wall hook to snag behind a fish leaning against the drill hole wall.

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 questionnaire for overshots on the next page.



"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

0103

5-17

Application Questionnaire

Die Collar Overshot

Die Collar Overshot

Company	_____	Date	_____
Address	_____	Phone	_____
	_____	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"

0103

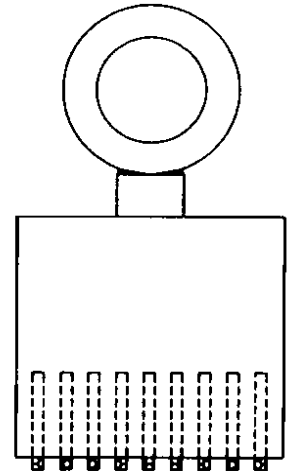
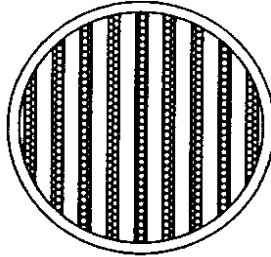
Check our Web site:

5-18 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

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.

"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

0203

5-19

Junk Mills

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 _____

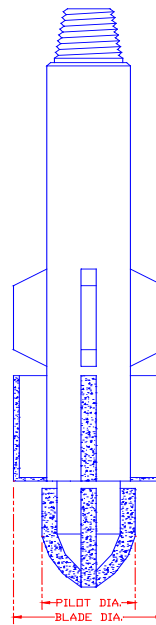
Stabilizer ribs _____

Fishing neck dimensions _____

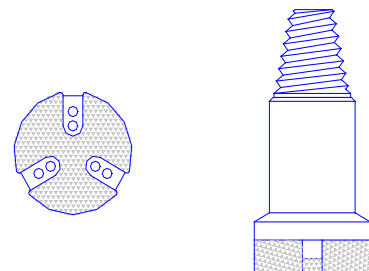
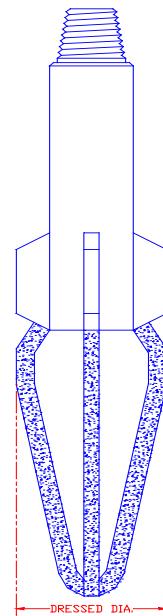
Hole size or if inside casing, casing
size _____

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.

PILOT MILL



TAPER MILL



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

The rugged Mills Machine stabilizers are used to stabilize the drill rod in the hole. They are available in a wide range of construction with all wear surfaces coated with tungsten carbide for long life.

Smaller ribbed stabilizers, under 7 1/2 OD, are made with a 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 four styles of stabilizer (or a combination of these styles). The first is the smooth stabilizer. The outer surface is a single

diameter and normally couple of inches smaller than the borehole ID.

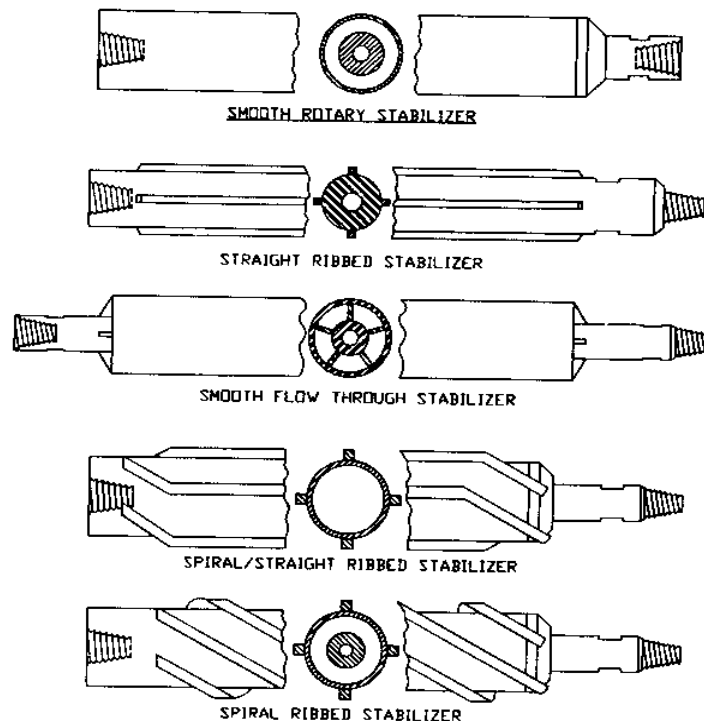
Straight ribbed stabilizers can have three or more ribs depending on the application. The ribs are welded to the steel tubing and have a tungsten carbide coated face on the outer surface.

A variation on the straight rib design is the spiral-ribbed stabilizer. Here the ribs are spiraled around the steel body to give 360° 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.

As shown in the smooth stabilizer below any of these units can be made in flow-through construction.

Finally there is the overhammer stabilizer on the following page of the catalog.



"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

0103

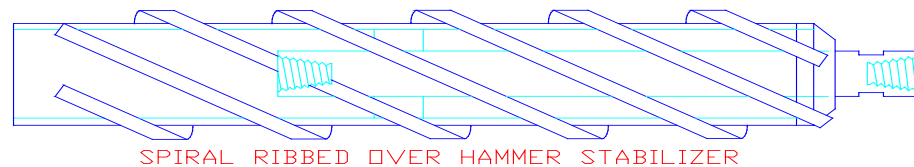
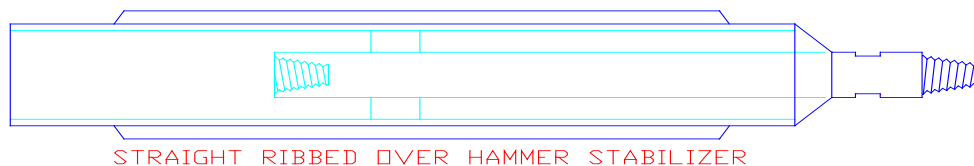
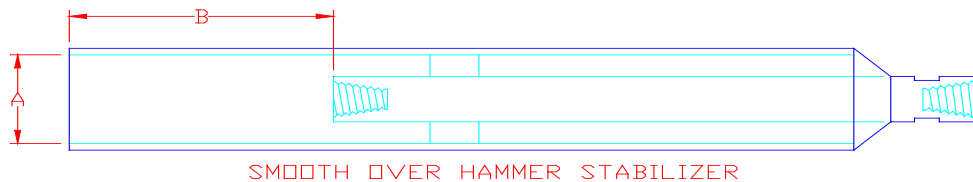
Over-hammer Stabilizers

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 questionnaire on the reverse side of this sheet 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.

"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

0103

5-23

Application Questionnaire	
Overhammer Stabilizers	Overhammer Stabilizers

Company _____	Phone _____
Address _____	Fax _____
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 _____

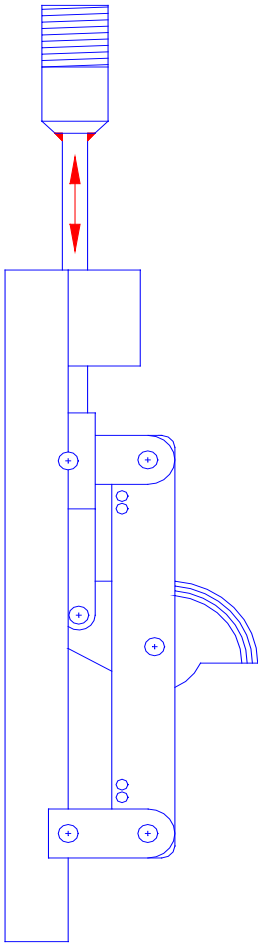
Lugs: Drill Pipe OD _____ Hour Glass _____
Location _____ Dimensions _____

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

Special Requirements: _____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Casing Perforator



The casing perforator (known as a Mills Knife) is used to perforate pipe or casing by punching vertical slots through the casing wall. Built for .300 wall thickness, the knife requires a two-line rig. The main line for the pulling rods or black pipe is used to lower the knife into the hole and trip the perforator knife. The secondary line is a wireline 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.

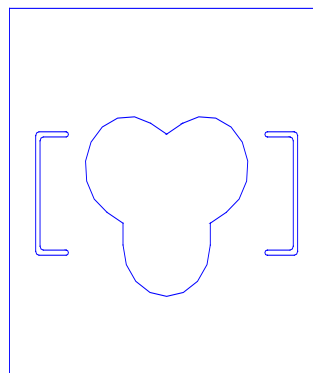
It is recommended that you practice near the surface to see and feel the operation of the knife before going down hole. Pulling too hard or pulling after penetration can split the pipe. After the perforations are made at the lowest level the drilling rod is raised to the next desired level. This prevents 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 to expand the 6 inch perforating knife to 8, 10 inches. A 12 inch perforator that can handle .375 wall is also available along with shoes to expand it to 14 or 16 inches. Other sizes can be quoted upon request.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Rock Bit Breakout Plates

These square, box type rock bit breakout plates can be manufactured to the specific dimensions of your rig drill table. The heavy duty steel plate has two handles for ease of use. Designed to fit a specific rock bit size, the plate may be furnished with or without a triangular catch basket to prevent the bit from falling through the bottom.



Size	NO Basket			WITH Basket		
	Dimensions	Weight Lbs	Weight Kgs	Dimensions	Weight Lbs	Weight Kgs
5 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 are also available.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Drag Bits

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.

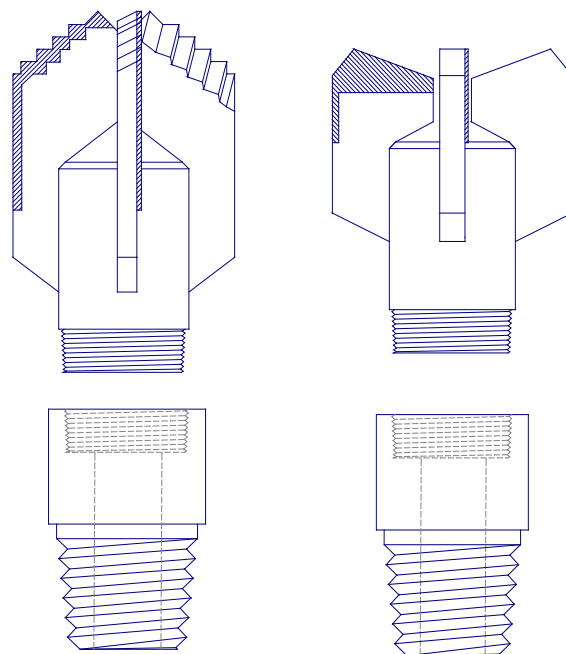
The NW6R System is economical because, it saves you the cost of the alloy heat treated shank each time that you need a new bit and eliminates the reworking process of a one piece bit where the blades would have to be torched off and new ones welded on.

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"

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

0203

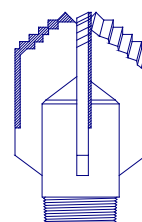
6-1

NW6R Drag Bits - 3 Wing - Standard Duty

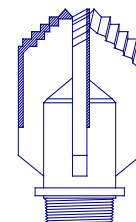
Standard Duty drag bits have 3/4 thick blades and 3/16 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale). The standard design has three blades. We also offer 4, 5, or 6 blades in a multiple of custom shapes and styles.

Head Only

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



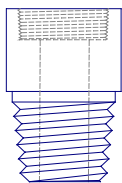
Stopper Ring

Part #	Size Inches (mm)	NW6R Pin Connection	Stabilizer Band	Weight	
				Lbs.	Kgs.
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.

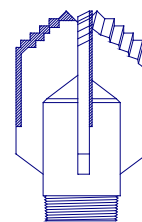
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

NW6R Drag Bits - 4 Wing - Standard Duty

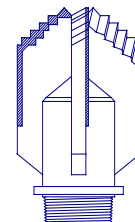
Standard Duty drag bits use 3/4 thick blades and 3/16 thick carbide. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale). The standard design has four blades. We also offer 3, 5 or 6 blades in a multiple of custom shapes and styles.

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



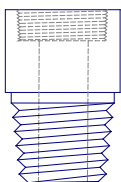
Stopper Ring

Part #	Size		NW6R Pin Connection	Stabilizer Band	Weight	
	Inches	(mm)			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"

"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

0203

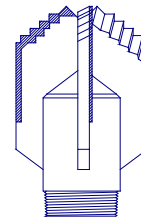
6-3

NW6R Drag Bits - 3 Wing - Heavy Duty

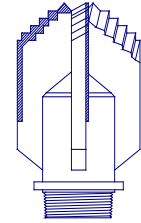
Heavy Duty drag bits use 1 thick blades and 1/4 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale) while the thicker blades and carbide extend the life of the bit. The standard design has three blades but we also offer 4, 5 or 6 blades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



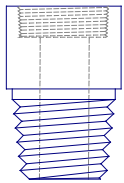
Stopper Ring

Part #	Size		NW6R Pin Connection	Stabilizer Band	Weight	
	Inches	(mm)			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.**

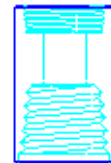
Stopper Ring is standard for 14 3/4 and 17 1/2 sizes.

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.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

0203

6-4

Check our Web site:
www.MillsMachine.com

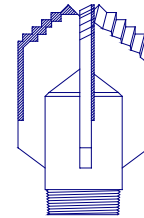
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

NW6R Drag Bits - 4 Wing - Heavy Duty

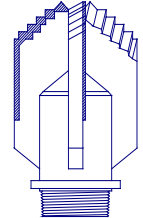
Heavy Duty drag bits use 1 inch thick blades and 1/4 thick carbide inserts. This bit is designed for rapid penetration in soft to medium formations (clay, sand rock or shale) while the thicker blades and carbide extend the life of the bit. The standard design has four blades but we also offer 3, 5 or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



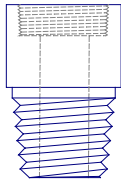
Stopper Ring

Part #	Size		NW6R Pin Connection	Stabilizer Band	Weight	
	Inches	(mm)			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.**

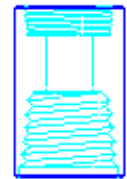
Stopper Ring is standard for 14 3/4 and 17 1/2 sizes.

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

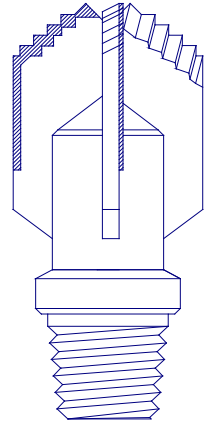
S--Stock item *Other threads available upon request.

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

4 Wing

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs. 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	

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs. 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

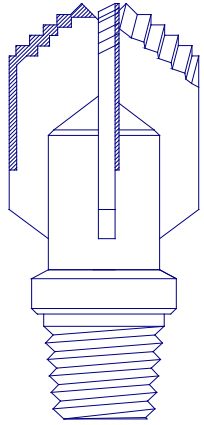
We can supply these bits with the following standard connections. Other pin and box connections are available on request.

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

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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

4 Wing

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs. 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	

Part #	Size Inches	Range (mm)	Stab. Band	Weight Lbs. 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. Other pin and box connections are available on request.

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

"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

0203

6-7

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

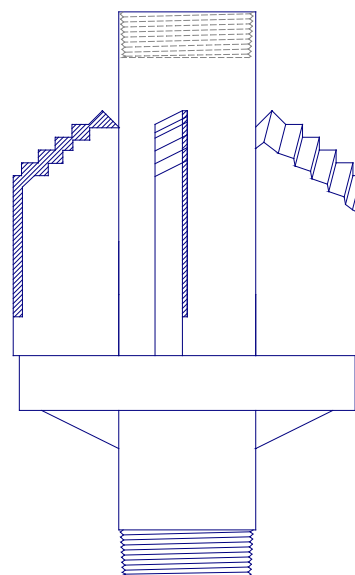
Part #	Inches	(mm)	Box to Pin	Weight	
				Lbs	Kgs
NW6RREAM812-3	8 1/2	(208.3)	3 1/2 NW6R	26	11.8
NW6RREAM834-3	8 3/4	(222.2)	3 1/2 NW6R	26	11.8
NW6RREAM978-3	9 7/8	(250.8)	3 1/2 NW6R	28	12.7
NW6RREAM1058-3	10 5/8	(269.9)	3 1/2 NW6R	34	15.5
NW6RREAM1214-3	12 1/4	(311.1)	3 1/2 NW6R	42	19.1
NW6RREAM1434-3	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.

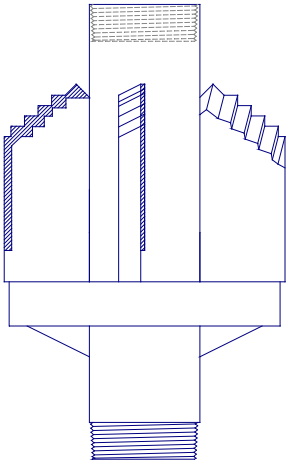


"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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"

Check our Web site:
www.MillsMachine.com

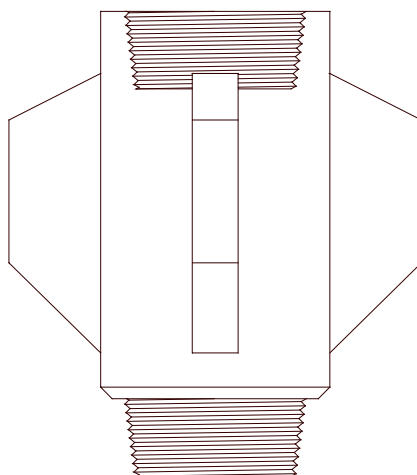
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

0203

6-9

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.	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.

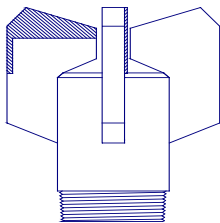
‘PLEASE CALL FOR CUSTOM OTPTIONS AND OTHER ACCESSORIES’

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.

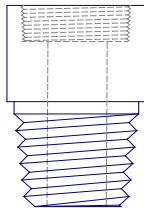


Standard

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
NW6R614C-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.

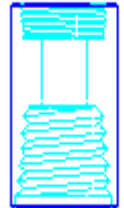
Connector Only



Box to Pin
Connector

	Part #	NW6R Box Connection	Connector
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-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

Weight	
Lbs.	Kgs.
15	6.8
22	10.0
55	24.9
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.

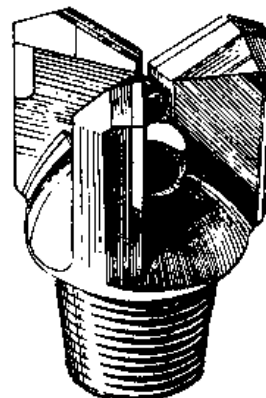
NW6R Connectors are manufactured from 4142 heat treated alloy steel and are offered in any thread you need.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Drag Bits – Forged - Step Type - One Piece

Forged Step Type - 3 Wing - Pin

SIZES				TYPE PIN	WEIGHT	
Inches	(mm)	Inches	(mm)		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

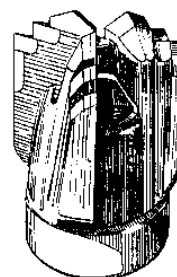


The Drag Bits listed below are STOCK items.

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

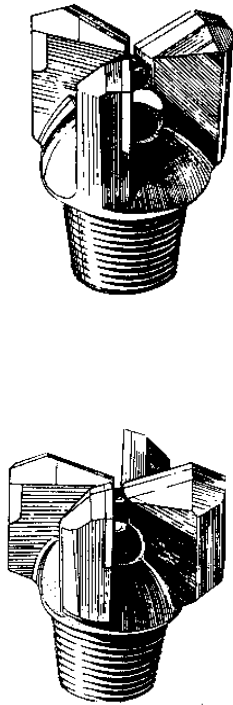
SIZE				TYPE BOX	WEIGHT	
Inches	(mm)	Inches	(mm)		Lbs	Kgs
3 7/8	(98.4)			ACRO, MHJR	5.5	2.5
4 3/4	(120.7)	5 1/4	(133.4)	MHJR, FA, MR, IF	10	4.6
5 1/2	(139.7)	6 3/4	(171.5)	MHJR, FA, MR, IF	12	5.6
6 7/8	(174.6)	7 7/8	(200.0)	MHJR, FA, MR, IF	14	6.5
8	(203.2)	9	(228.6)	MHJR, FA, MR, IF	16	7.4
9 1/4	(235.0)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



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Drag Bits - Forged - Chevron Type - One Piece

Forged Chevron Type - 3 and 4 Wing - Pin



SIZE				TYPE PIN	Three Wing		Four Wing	
					WEIGHT		WEIGHT	
Inches	(mm)	Inches	(mm)		Lbs	Kgs	Lbs	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)	T		3 1/2 Reg Pin	22	10		
7 7/8	(200.0)	h		3 1/2 Reg Pin	23	10.4		
8	(203.2)	e		3 1/2 Reg Pin	24	10.9		

The Drag Bits listed below are STOCK items

Three Wing

PART #	Inches	TYPE PIN	WEIGHT	
			Lbs	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"

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

0203

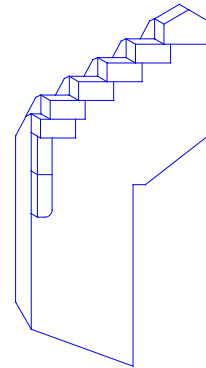
6-13

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.



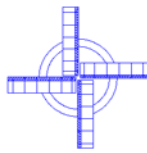
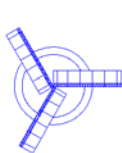
*5½-12¼ fit 3½ O.D. and 14¾ and larger fit 4½ O.D. shank

Heavy Duty 1 Inch Thick

Part #	Size Inches	(mm)	Description	Lbs	Weight 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 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.

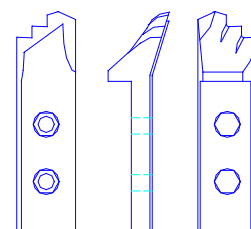
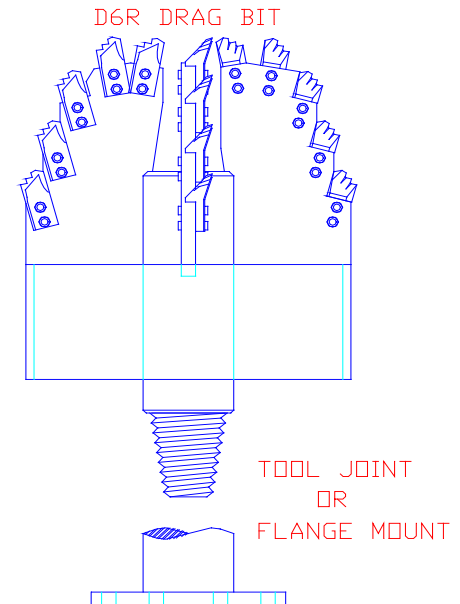
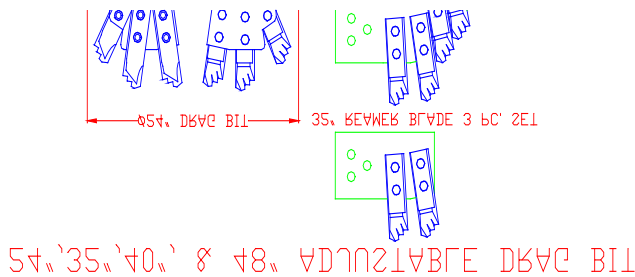


"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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. 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 having additional carbide on the outer edge for gage protection. The teeth are available in straight Chevron (apex) type for medium soft to medium hard formation or Scoop (step) type for soft to medium formation.



Standard Digger Teeth

"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

0203

D6R Drag Bits

Company _____
Address _____
City, State Zip _____

Phone _____
Fax _____
Contact _____

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 _____

Sketch:

****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"

Mills Machine Company first started manufacturing Claw Bits under an agreement with Kennametal, Inc. in 1978, who owned the original patent for the **KENCLAW®** bit. We were able to improve the original design by offering a **one piece heat treated alloy steel body with special hardfaced blocks** that could be reworked many times to extend the overall life of the bit.

The **KENCLAW®** bit is best suited for **soft to medium formations** and especially excels in **unconsolidated formations**, where the driller may encounter alternating layers of very soft clay and then encounter sand rock or hard shale formations that would cause a drag bit to over torque and possibly stall. The bits are available in a **wide range of sizes** that vary from 3 1/2 to 24 diameter and features a variety of options such as; multi-stage stage reamers, holeopeners, circulating pilot bits, and special jet circulation configurations.

After years of custom manufacturing the KENCLAW® bits and after four prototype testing phases we finally perfected an improved version of the KENCLAW® bit which we call the **MILCLAW®** bit. A U.S. Patent protects the MILCLAW® bit and several International Patents; this bit features a **triangular, multi-stage body** design that provides better support for the cutters and enables it to **cut harder formations**. The MILCLAW® bit is available in sizes ranging from 6 1/2 to 24 and is best suited for medium soft to medium hard formations and normally provides better footage from a set of cutters than the KENCLAW® design.

KENCLAW® is a Registered trademark of Kennametal, Inc.
MILCLAW® is a Registered trademark of Mills Machine Company, Inc

Experience and field test reports have indicated that the MILCLAW® bit runs smoother and more efficiently with a ribbed stabilizer.

All of our Claw bit designs offer **rapid penetration**, drill as fast or **faster than a drag bit** while being as **tough as a roller rock bit**. They feature economical, **inexpensive field replaceable cutters**. The conical bullet shaped cutters rotate in their blocks to provide a self-sharpening effect, which extends the life of the bit and reduces torque.

The MILCLAW® and the KENCLAW® bits both have one circulation hole per cutter to provide maximum hole cleaning and are easily repairable because of the one-piece alloy steel body.

The Mills GEOCLAW fills the niche for smaller size bullet bits with more versatile construction and superior performance than small bullet bits previously available. Available in either the heavy duty crossed bit construction or the standard pilot bit form, these bits fill a need in the drilling market.



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

MILLS MILCLAW[®] BITS

	Part #	Description	Pilot Bit	# of Cutters	Weight Lbs.	Kgs.
S	MC0612	6 1/2 (161.5 mm) MILCLAW [®] 3 1/2 Reg Pin	CP18	6	35	15.9
S	MC0634	6 3/4 (171.5 mm) MILCLAW [®] 3 1/2 Reg Pin	CP18	6	35	15.9
S	MC0778	7 7/8 (200.0 mm) MILCLAW [®] 4 1/2 Reg Pin	CP18	7	51	23.1
S	MC0834	8 3/4 (222.3 mm) MILCLAW [®] 4 1/2 Reg Pin	CP18	8	60	27.2
S	MC0900	9 (228.8 mm) MILCLAW [®] 4 1/2 Reg Pin	CP18	9	65	29.5
	MC0978	9 7/8 (250.8 mm) MILCLAW [®] 6 5/8 Reg Pin	CP18	9	88	39.9
S	MC1058	10 5/8 (295.3 mm) MILCLAW [®] 6 5/8 Reg Pin	CP18	14	128	58.1
S	MC1214	12 1/4 (311.1 mm) MILCLAW [®] 6 5/8 Reg Pin	CP18	17	132	59.9
	MC1434	14 3/4 (374.7 mm) MILCLAW [®] Reamer 6 5/8 Reg Pin	6 3/4 Milclaw [®]			
	MC1712	17 1/2 (444.5 mm) MILCLAW [®] Reamer 6 5/8 Reg Pin	6 3/4 Milclaw [®]			
	MC2000	20 (500.0 mm) MILCLAW [®] Reamer 6 5/8 Reg Pin	7 7/8 Milclaw [®]			
	MC2200	22 (558.8 mm) MILCLAW [®] Reamer 7 5/8 Reg Pin	7 7/8 Milclaw [®]			
	MC2400	24 (609.6 mm) MILCLAW [®] Reamer 7 5/8 Reg Pin	7 7/8 Milclaw [®]			

S – Stock Item

***Other sizes available upon request.**

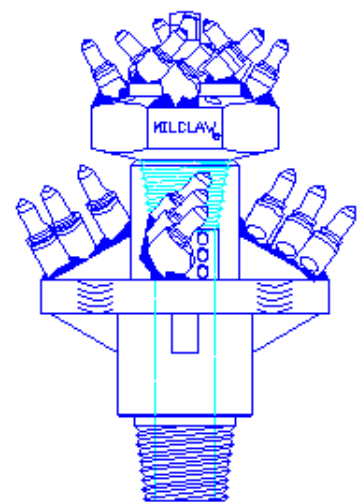


The sizes listed above are what we consider to be standard stock sizes but we can custom manufacture any size that you want! For sizes not shown, use the price of the next larger bit size.

We can furnish the MILCLAW[®] Bit with your choice of any pin or box threads. Other modifications include different pilot bits, breakout flats, circulation holes, reamers, larger sizes, etc. Contact us for more information.

We highly recommend the use of a ribbed stabilizer when drilling with a MILCLAW[®] Bit.

The design for the MILCLAW[®] Bit changes at 14 3/4 and larger to a Heavy Duty Reamer type as shown on the right.



MILCLAW[®] Reamer Design

MILCLAW[®] is a Registered trademark of Mills Machine Co., Inc.
The MILCLAW[®] is patented in the U.S., Canada, Philippines and Australia.

"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

0203

7-3

MILLS KENCLAW® and GEOCLAW BITS

★	Part #	Description	Pilot Bit	Qty. of Cutters	Weight Lbs.Kgs.
GEOCLAW					
S	MG378-238	3 7/8 (98.4 mm) MILLS GEOCLAW 2 3/8 Reg Pin	Crossed Bit	5 C6	8 3.6
S	MG414-238	4 1/4 (104.8 mm) MILLS GEOCLAW 2 3/8 Reg Pin	Crossed Bit	5 C6	9 4.1
S	MG412-238	4 1/2 (108.0 mm) MILLS GEOCLAW 2 3/8 Reg Pin	Crossed Bit	5 C6	10 4.5
S	MG434-238	4 3/4 (120.7 mm) MILLS GEOCLAW 2 3/8 Reg Pin	Crossed Bit	5 C6	10 4.5
S	MG514-278	5 1/4 (133.4 mm) MILLS GEOCLAW 2 7/8 Reg Pin	Crossed Bit	6 C6	14 6.4
KENCLAW					
S	MK0412-238	4 1/2 (108.0 mm) MILLS KENCLAW®, 2 3/8 Reg Pin	CP-12	4 C6	9 4.1
S	MK0434-238	4 3/4 (120.7 mm) MILLS KENCLAW®, 2 3/8 Reg Pin	CP-12	4 C6	12 5.4
S	MK0514-238	5 1/4 (133.4 mm) MILLS KENCLAW®, 2 3/8 Reg Pin	CP-12	4 C6	13 5.9
S	MK0434-278	4 3/4 (120.7 mm) MILLS KENCLAW®, 2 7/8 Reg Pin	CP-12	4 C6	14 6.4
S	MK0514-278	5 1/2 (133.4 mm) MILLS KENCLAW®, 2 7/8 Reg Pin	CP-12	4 C6	17 7.7
S	MK0512-312	5 1/2 (139.7 mm) MILLS KENCLAW®, 3 1/2 Reg Pin	CP-18	4 C-23	19 6.8
S	MK0558-312	5 5/8 (142.9 mm) MILLS KENCLAW®, 3 1/2 Reg Pin	CP-18	4 C-23	20 8.2
S	MK0575-312	5 7/8 (149.2 mm) MILLS KENCLAW®, 3 1/2 Reg Pin	CP-18		
S	MK0600-312	6 (152.4 mm) MILLS KENCLAW®, 3 1/2 Reg Pin	CP-18	5 C-23	21 9.5
S	MK0614-312	6 1/4 (158.8 mm) MILLS KENCLAW®, 3 1/2 Reg Pin	CP-18	5 C-23	21 9.5
S	MK0612-312	6 1/2 (165.1 mm) MILLS KENCLAW®, 3 1/2 Reg Pin	CP-18	5 C-23	21 9.5
S	MK0634-312	6 3/4 (171.5 mm) MILLS KENCLAW®, 3 1/2 Reg Pin	CP-18	5 C-23	22 10.0
S	MK0778-412	7 7/8 (200.0 mm) MILLS KENCLAW®, 4 1/2 Reg Pin	CP-18	8 C-23	34 15.8
S	MK0812-412	8 1/2 (215.9 mm) MILLS KENCLAW®, 4 1/2 Reg Pin	CP-18	8 C-23	36 13.6
S	MK0834-412	8 3/4 (222.3 mm) MILLS KENCLAW®, 4 1/2 Reg Pin	CP-18	8 C-23	40 18.1
S	MK0900-412	9 (228.6 mm) MILLS KENCLAW®, 4 1/2 Reg Pin	CP-18	8 C-23	40 18.1
S	MK0978-658	9 7/8 (250.8 mm) MILLS KENCLAW®, 6 5/8 Reg Pin	CP-18	9 C-23	57 25.9
S	MK1058-658	10 5/8 (269.9 mm) MILLS KENCLAW®, 6 5/8 Reg Pin	CP-18	9 C-23	70 31.8
S	MK1214-658	12 1/4 (311.2 mm) MILLS KENCLAW®, 6 5/8 Reg Pin	CP-18	12 C-23	110 49.9
		14 3/4 See MILCLAW® Reamer design			
		17 1/2 See MILCLAW® Reamer design			
		20 See MILCLAW® Reamer design			
		22 See MILCLAW® Reamer design			
		24 See MILCLAW® Reamer design			

S-Stock Item

*Other sizes available upon request.



The sizes listed above are what we consider to be standard stock sizes but we can custom manufacture any size that you want! For sizes not shown, use the price of the next larger bit size

The GEOCLAW was initially designed for the Geo-thermal industry but it is also suitable for other types of drilling. The GEOCLAW has smaller blocks and cutters and features a crossed bullet cutter design for the pilot bit.



We can furnish the GEOCLAW or KENCLAW® Bits with your choice of any pin or box threads. Other modifications include different pilot bits, breakout flats, circulation holes, larger sizes, etc. Please contact us for more information.

We highly recommend the use of a ribbed stabilizer when drilling with a KENCLAW® Bit.

KENCLAW® is a Registered trademark of Kennametal Inc.

"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

0203

7-3

Claw Bit Components

Replacement Blocks, Bullet Cutters and Pilot Bits for Mills KENCLAW[®], MILCLAW[®] and GEOCLAW Bits

Cutters

Part #	Description	Weight Lbs. Kgs.	
C23	Standard Bullet Bit	.3	.1
C6	Mini-Bullet Cutter	.2	.1

Blocks

C20	Block for Standard Bullet Bit	.7	.3
C6B	Block for C4 Mini-Bullet	.3	.1

Pilot Bits

CP12	Pilot Bit, 7/8 (22.2mm), NC Thread	.7	.3
CP15	Pilot Bit, 7/8 (22.2mm), NC Thread	1.3	.6
CP16	Pilot Bit, 1 (25.4mm), NC Thread	1.5	.7
CP17	Pilot Bit, 3/4 (19.1mm), NC Thread	1.2	.5
CP18	Pilot Bit, 1 1/4 (31.8mm), 5-stub Acme Thread	1.6	.7

Mills Machine has several other sizes and styles of bullet cutters and blocks to meet your specific needs. Please call us for detailed information.

Repairs. The larger sizes of KENCLAW[®] and MILCLAW[®] can be reworked to like new condition at a reasonable cost. We can replace the bullet cutters, blocks and pilot bits with new components and repair any damaged threads. The cost depends on the amount of wear or damage that the bit has incurred. Contact the factory for more information.

KENCLAW[®] is a Registered trademark of Kennametal Inc.
MILCLAW[®] is a Registered trademark of Mills Machine Co., Inc.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Claw Holeopeners

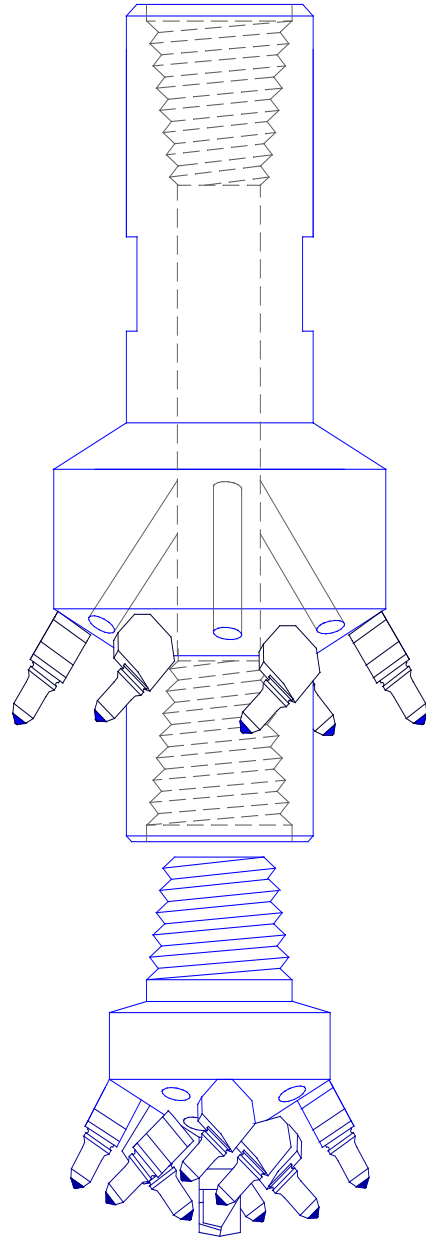
Mills Machine manufactures a full line of rotary claw bits that include many variations of the original design. One of the popular options is the claw reamer or holeopener. Like our KENCLAW® line of bits, these bits will work in clay to medium shale rock (up to 6000 psi rock).

Carbide cutters rotate in their block to promote a self sharpening action and reduce torque on the drill string. These cutters are inexpensive and easily replaced in the field.

These holeopeners will cut as fast as a drag bit while at the same time they are as tough as a soft to medium formation rock bit. They are suitable for either air or fluid drilling.

The claw holeopeners can be used with either rock bits as a pilot or with the Mills KENCLAW® or MILCLAW®. Versatility lies with our ability to manufacture in single, double or multi-stage versions to offer the best product for your individual needs.

These tough, high-quality units are designed for long life. All edges exposed to wear are hard surfaced with tungsten carbide material. The threaded tool joints and bodies are made from 4142 heat treated steel. Each holeopener is individually designed and manufactured for your specific application.



KENCLAW® is a Registered trademark of Kennametal, Inc.
MILCLAW® is a Registered trademarks of Mills Machine Co., Inc.

"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

0103

7-5

Holeopeners

The Mills Machine holeopener is used **to enlarge or ream an existing pilot hole** or can be run above a pilot bit to **simultaneously drill and enlarge a hole**. These rugged tools are built for the toughest drilling applications.

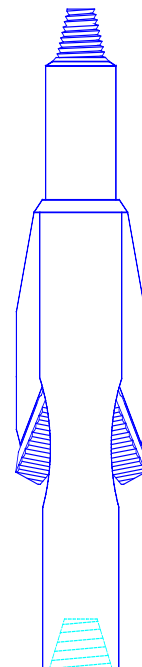
The use of holeopeners has gone from an optional operation to standard practice for most drillers. There are several advantages described on the reverse side of this page. The prime reasons for using holeopeners are **economy, accuracy, speed and flexibility of size**. With **over forty-five years of experience** Mills Machine can design and manufacture the exact tool for your individual requirements.

Fabricated Roller Cone (see Rotary Holeopeners, in this catalog)

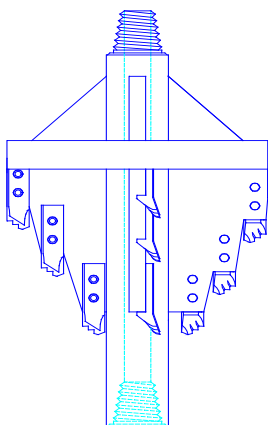
Fixed Arm Roller Cone (see Rotary Holeopeners, in this catalog)

Drag Bit, fixed and replaceable blade (see Rotary Drag Bit in this catalog)

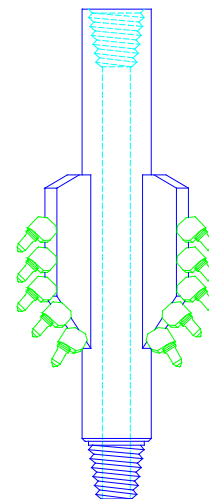
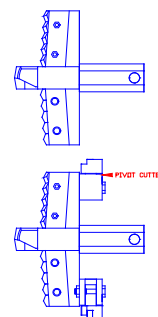
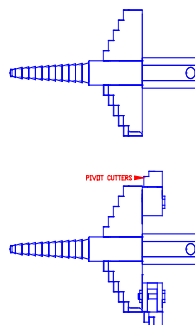
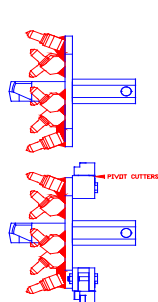
Claw Bit (see Rotary Claw Bit in this catalog)



Holeopeners or **Roller Back Reamers** are available for **Horizontal Road Boring** or **Horizontal Directional Drilling** applications. Configurations include roller cone, drag (blade) type or claw (bullet) type in any size and with any connection. These rugged units are manufactured with a reverse pitch on the cutters for pulling back through the pilot hole.



We also manufacture a line of **Free Bore** and **Casing Push** bits for the Horizontal road Boring market. Configurations include roller cone, drag (blade) type or claw (bullet) type in any size and with any hex connection. The **Roller Cone** type features a special **Positive Cam Lock Design** for pushing casing as you drill. This type of bit is made to cut very **hard rock** formations. **Blade and Bullet** configurations are offered with a flip out cutters for **soft to medium** formations.



"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

0103

8-1

Advantages of Holeopeners

1. Cost and availability of large tricone rock bits.

Large diameter rock bits are expensive and difficult to find compared to the economy of Holeopeners using smaller rock bit segments.

2. Large diameter holes with small rigs.

Large holes can be drilled with smaller rigs by opening the hole up in stages. A smaller hole requires less power.

3. Straighter hole.

Drill a straighter hole by drilling a pilot hole then attaching the pilot bit to the bottom of a holeopener, which will follow the existing hole. A pilot hole will normally be straighter because the smaller the hole the straighter the hole.

4. Cutter replacement.

To extend the initial cost investment of a Holeopener, the cutters on most any design can be replaced. Bolt-on drag bit and claw holeopeners can be replaced in the field. Fixed blade and roller cone holeopeners may require factory replacement.

5. Sizes and formations available.

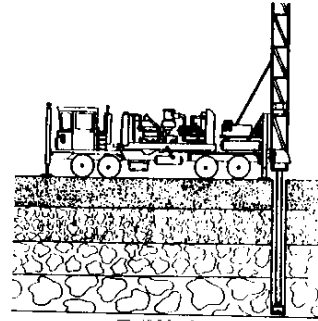
Holeopeners can be manufactured in any size and made to drill any formation from soft clay to hard granite.

6. Surface casing and starter holes.

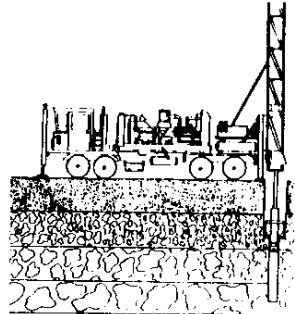
Holeopeners provide a convenient way to drill larger diameter holes for setting surface casing and shallow starter holes.

7. New jobs.

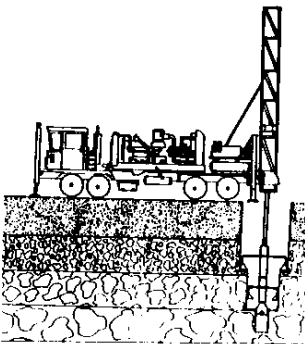
With the capability of drilling larger diameter holes, several job markets could open up. For example: mining air shafts, elevator holes, power line holes, municipal water wells, foundation holes and mouse or rat holes for drill pipe storage.



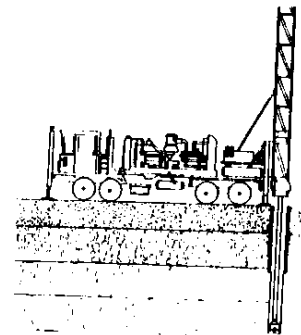
Drill Pilot Hole



Enlarge Hole



Either Enlarge Hole Further

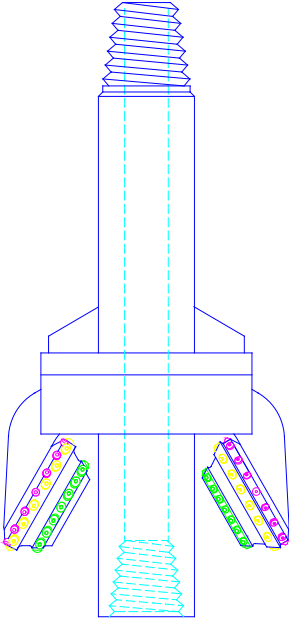


Or Set Casing and Finish Hole

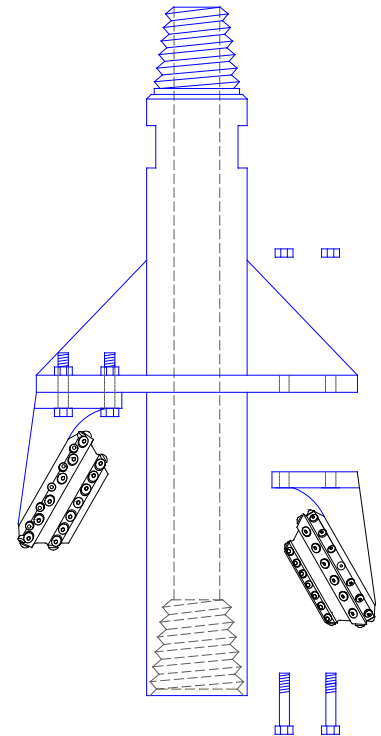
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Fabricated Roller Cone Holeopener

Mills Machine has been manufacturing **Split Bit Type Roller Cone Holeopeners** for over **45 years**. These ruggedly constructed, high-quality units are made from **4142 heat treated alloy steel** and split roller rock bit cutters. Each holeopener is custom manufactured for your specific application.



- Sizes Range from 5 1/2 to 118.
- One, Two or Multiple Stage Designs.
- Regular or Reverse and Air or Fluid Circulation as shown at left
- Any Thread or Flange Size
- Steel Tooth or TCI Button in New, Retip or Rerun Condition
- Soft, Medium or Hard Formation Cutters.
- Extended Top or Bottom Neck with Flats
- Fabricated Fixed Cutter or Bolt on Cutter Design
- Blade and Bullet Cutter Designs are available



Please use the **questionnaire** for the roller cone holeopeners on the next page.

"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

0103

8-3

Application Questionnaire Fabricated Roller Cone Holeopener

Company _____
 Address _____

 City, State Zip _____

Phone _____
 Fax _____
 Contact _____

****Quantity:** _____ ****Hole Size** _____
****Pilot Diameter** _____ **Pilot Bit Type** _____
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:** _____ **Pin** ☐ **Box** ☐
****Bottom Connection:** _____ **Pin** ☐ **Box** ☐

Sketch:

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

Number of Stages _____ Length: S to S _____ OR Overall _____

Is Holeopener Going Inside of Casing? Yes ☐ No ☐

Casing ID _____

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

Bottom Neck Dimensions: OD _____ ID _____ 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 ☐

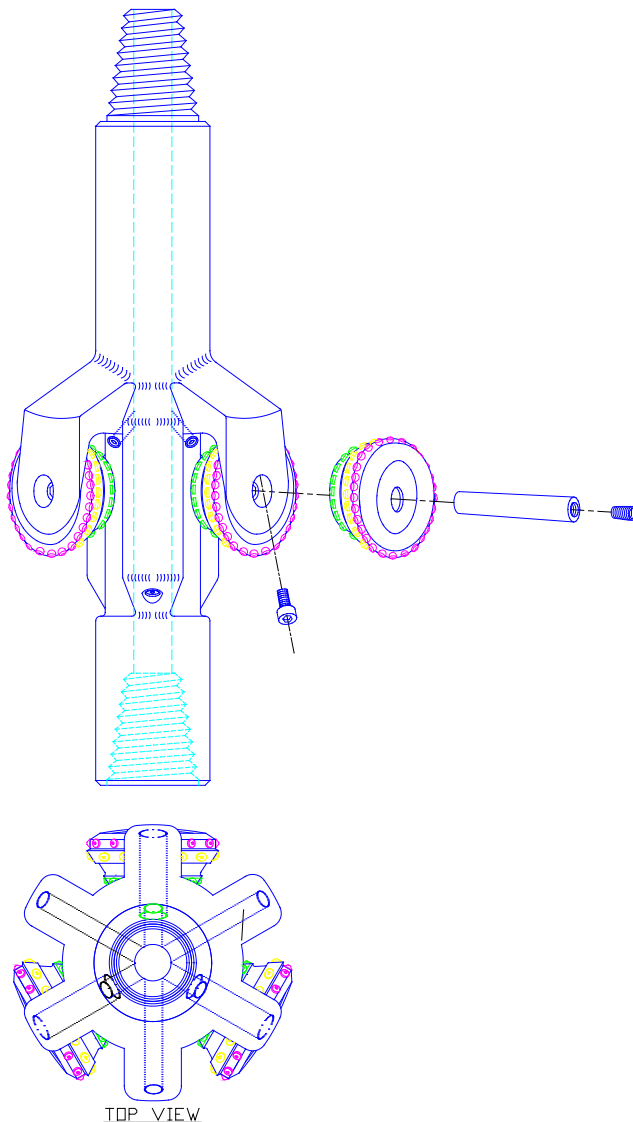
Brand _____ Model & Size _____

Special Requirements: _____

PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES

Fixed Arm Roller Cone Holeopener with Replaceable Cutters

Mills Machine Company has been a manufacturing fabricated cutter (split bit) holeopeners for over **45 years**. In 1994 we started working with some companies in Louisiana to secure prints and specifications to build oil field type holeopeners with demountable roller cones. These Holeopeners are manufactured from a solid piece of 4142 heat-treated alloy steel and the arms are fabricated into the body. The roller cones are held in place by sliding the cutter journal into a cam lock slot and then a load pin is inserted through the journal to hold the cutter in place. These rugged Holeopeners feature cutters that are interchangeable with one of the most popular name brand Oil Field Holeopener Manufacturers.



Fixed Arm roller cone holeopeners range in size from 10 5/8 to 26 diameter. We offer **open or sealed bearing** construction with **Steel Teeth or TCI Buttons** in **soft, medium and hard formations**. The bit is available in a **Single or Double Stage** design depending on the pilot hole and enlarged hole size. The Holeopeners are available with either 3 or 6 jets. We are one of the very few manufacturers that have ever made a Two Stage Holeopener in this design.

The cutters are **field replaceable** and can be disassembled to replace the bearings and seals. Steel tooth cutters can be retipped to **extend the life** of the cutter.

The top connection includes breakout flats or extended fishing neck. The bottom connection will be made to fit your pilot bit. We can also, furnish a bull nose to guide the holeopener.

Please use the **questionnaire** for the fixed arm roller holeopeners with replaceable cutters on the next page.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Application Questionnaire

Fixed Arm Roller Cone Holeopener with Replaceable Cutters

Phone _____
Fax _____
Contact _____

Sketch:

Special Requirements: _____

0103 **Check our Web Site:** **www.MillsMachine.com** MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
8-6 Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

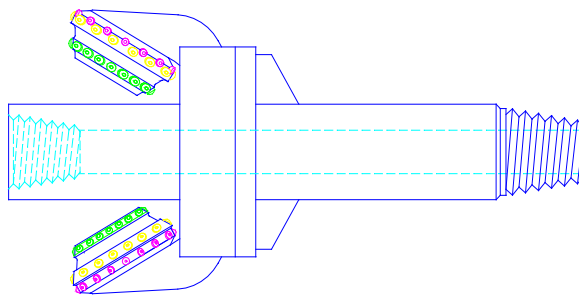
Horizontal Directional Drilling Bits

Roller Cone Horizontal Holeopeners.

Mills Machine has **forty years of experience** behind our full line of horizontal roller holeopeners available in sizes from 6 to 120 (150 mm to 3 Meters) and larger. We manufacture the larger holeopeners to meet your specific design. These ruggedly constructed units are made from **4142 alloy steel** and the rock bit cutters of your choice.

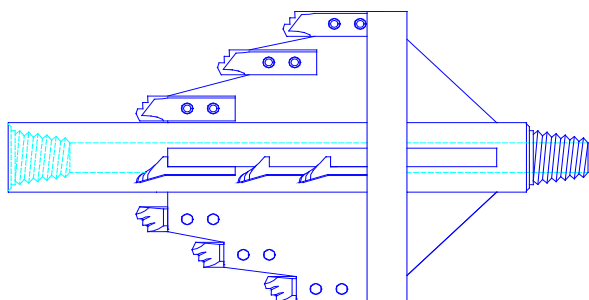
The horizontal holeopeners can be single stage, two stage or multiple stage depending on the pilot hole and the enlarged hole size. The lead and trailing necks can be as long or short as you desire with breakout flats or lugs as needed. Circulation can be standard or reverse for horizontal or raised bore drilling. Circulation can also be fluid or air depending on your rig capabilities.

Roller cone, horizontal holeopeners are made from rock bits designed for the specific formation. Available are steel tooth or TCI button bits in new, retip or rerun condition.



Drag Type Horizontal Holeopeners

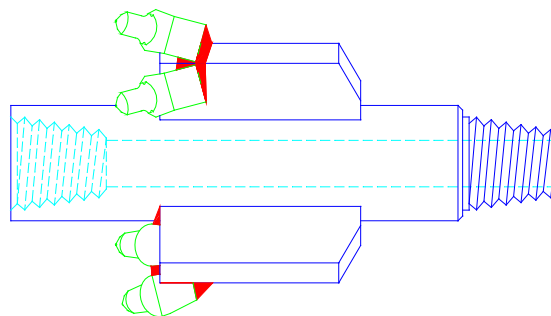
Mills also manufacturers large drag holeopeners for horizontal drilling using step tooth or digger tooth construction or a combination of teeth and bits. Used in soft to medium formations, the sizes start where the standard catalog sizes leave off and are, again, designed for your specific needs. We have manufactured units with drag teeth on the working end and bullet claw bits on the reverse side in case of cave-in.



Bullet Type Horizontal Holeopeners

Replaceable bullet cutters give longer life for the cutter head body and ease of use for the driller. These holeopeners are meant for use in clay or medium shale rock (up to 6000 psi rock) and are available in sizes 6 inches to 10 feet in diameter and their corresponding metric dimensions.

The only limit on our capabilities is your imagination. Working together, we can solve the tough problems.



"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

0103

8-7

Horizontal Directional Drilling

Blank Page

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

0103 **Check our Web site:**

8-8 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

Underreamers

Roller Cone and Drag Type Underreamers are just two more examples of our goal to bring expensive Oil Field technology to other drilling markets at an economical cost. We have been manufacturing both types of Underreamer designs for over twenty years and based on the feedback from our customers out in the field we have been able to offer continual improvements.

The primary use for both of these tools is to open up the bore hole below the casing. Most drillers are trying to straighten up a dog leg down the hole, which may be preventing advancement of the casing.

Other uses include opening up zones down the hole to increase the yield of a well or seal off salt water intrusion from the bottom of the hole.

The construction industry has used underreamers for tie back or anchor holes in any type of dirt, rock or concrete formations.

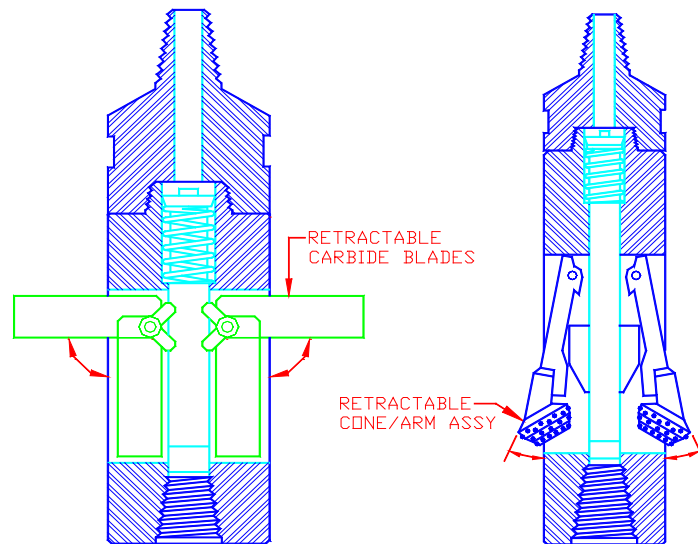
Our Underreamers can be opened up anywhere down the hole and as many times as needed but, **you must have adequate annular space for the blades or rollers to open up.** Most drillers pull the casing up 3 or 4 feet and lower the underreamer below the casing and then open the tool and start drilling. The tools operate with either **air or fluid pressure** and require as little as 60 – 100 lbs. of pressure to force the cutter arms out.

The bodies and cutter arms are manufactured from heat treated steel.

The piston is carburized steel to reduce abrasion and features a replaceable

BLADE TYPE UNDERREAMER

CONE TYPE UNDERREAMER



tungsten carbide jet nozzle to adjust to your individual compressor or mud pump output.

Additional circulation holes have been added into the side of the piston body to keep the cuttings out of the cutter slots.

The simple, rugged design features easily replaced components for long term, trouble free operation. The operation of our Underreamers is very simple. The tool is hydraulically operated by pump pressure which forces a spring loaded actuating piston downward. A cam attached to the lower end of the actuating piston forces the cutter arms out to the desired cutting diameter. When the pump pressure is shut off, a coil spring forces the piston upward causing the cutter arms to retract back into the body.

We can custom manufacture an underreamer to meet your individual 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

0103

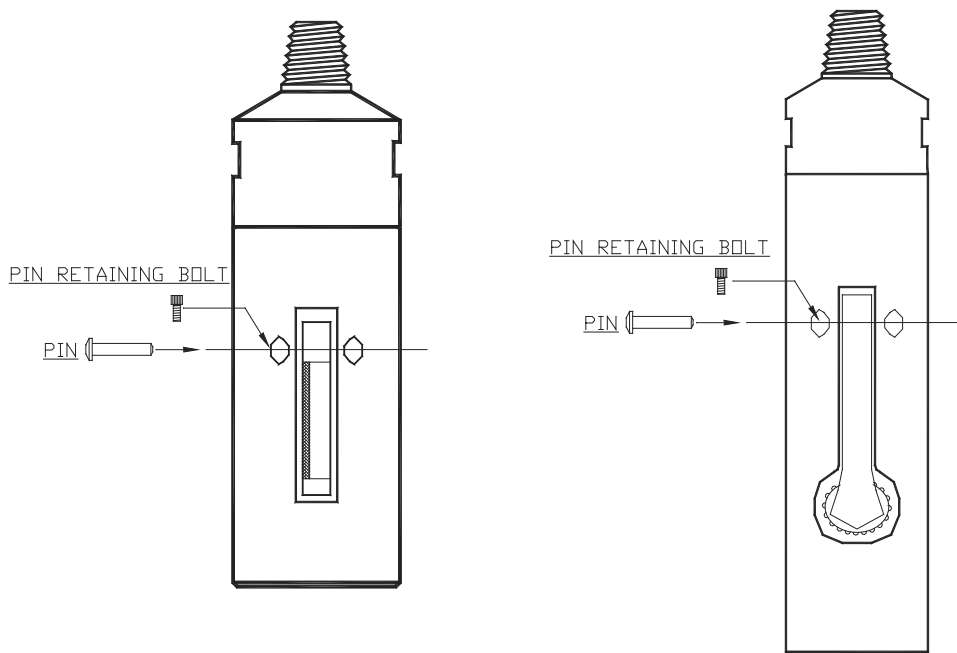
8-9

Underreamer Maintenance

Drag or Roller Cone Underreamers: Clean and lubricate your underreamer after each use and store in a dry area. Periodically disassemble the underreamer and lubricate the piston and check on the condition of the cup seal and compression spring. Insure that there is no dirt in the system that hinders flow of air or fluid. Check the replaceable carbide jet plug (if you have one installed) for abrasive wear. Note you can adjust the fluid flow by changing the jet plug diameter and for your convenience we use a standard tricone rock bit jet. Check the rubber cup seal for edge wear and the actuator spring for strength.

Replacement of the underreamer arm is a simple operation. First remove the pin retaining bolt, and then remove the pin using a punch or round bar. The blade or roller cone arm is then easily removed. To check the piston assembly, remove the top sub and pull the piston assembly out of the body to check the jet plug, cup seal and actuator spring.

Drag Underreamers need the blades replaced, when the Tungsten Carbide coating becomes worn. Roller Cone Underreamers, need the roller cone assembly replaced when the teeth, buttons or bearings become worn. If the underreamer is a custom size we may require the complete assembly to be returned for reworking the roller arms. If you have any technical questions please contact us.



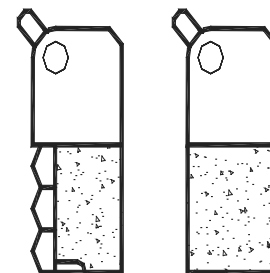
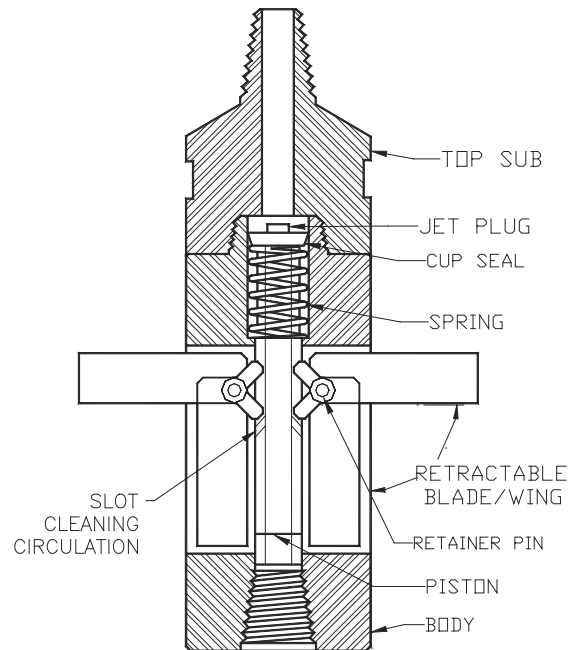
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Drag Type Underreamer

Mills Machine Company has been manufacturing and continually improving the design of its **Drag Type (Blade) Underreamer** for over twenty years. The design is simple, yet rugged enough to provide the most efficient operation for opening up a soft to medium formation hole. Through the use of highly efficient tungsten carbide tipped alloy steel blades, the tool is exceptionally fast in opening up a hole below the casing. The primary uses for this type of tool is to provide clearance for running casing, to obtain adequate annular space for cementing, to enlarge zones for gravel pack completion or tie back anchor holes. Recommended for use in sand, dirt, clay, sand rock, sandstone, and hard shale formations.

The Mills Machine Drag Type (Blade) Underreamer:

- Enlarges the borehole below the casing.
- Produces positive cutter blade opening by direct pump pressure. Several blade designs are available for soft to hard formations.
- Rubber piston cup is designed for fluid or air drilling.
- Features simple, rugged construction with a minimum of parts to ensure trouble-free operation.
- Has adjustable carbide jet orifices to match output from your pump or compressor.
- Features additional circulation holes drilled into the piston body to keep cuttings out of the cutter slots.
- Sizes for 4 casing and larger with tungsten carbide inserts or crushed carbide chips.
- Any thread type, breakout flats, or float valve bore available.



Serrated Carbide

Cutrite Carbide

The Mills Machine Underreamer is hydraulically operated by pump pressure which forces a spring loaded actuating piston downward. A milled opening in the side of the piston forces the cutter blades out to the desired cutting diameter. **Adequate annular space is required to open the blades.** When the pump pressure is shut off, a coil spring forces the piston upward causing the cutter blades to retract back into the body. The tool can be opened up anywhere down enabling you to open up as many zones as you like.

To maintain your Mills underreamer simply clean and lubricate after each use and store in a dry area. Spare parts kits are available with the original purchase of your underreamer and for field repair of your tool.

Please use the **questionnaire** for the drag underreamers on the next page.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

<h2 style="margin: 0;">Drag Underreamer</h2>	<h2 style="margin: 0;">Application Questionnaire</h2>	<h2 style="margin: 0;">Drag Underreamer</h2>
--	---	--

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

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

****Pilot Diameter** _____ *Pilot Bit Type* _____

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

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

Circulation: Air ☐ PSI _____ or Fluid ☐ PSI _____

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

Sketch:

*Cased Hole**:* OD _____ ID _____
 OR *Uncased Hole:* ID _____

Blade: Cutrite Carbide ☐ Serrated Carbide ☐

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

Bottom Neck Dimensions: OD _____ ID _____
 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: _____

Replacement Parts: Cutrite Blades _____, Serrated Blade _____
 Blade Pins _____, Pin Retaining Bolt _____
 Springs _____, Cup Seal _____, Jet Plugs _____

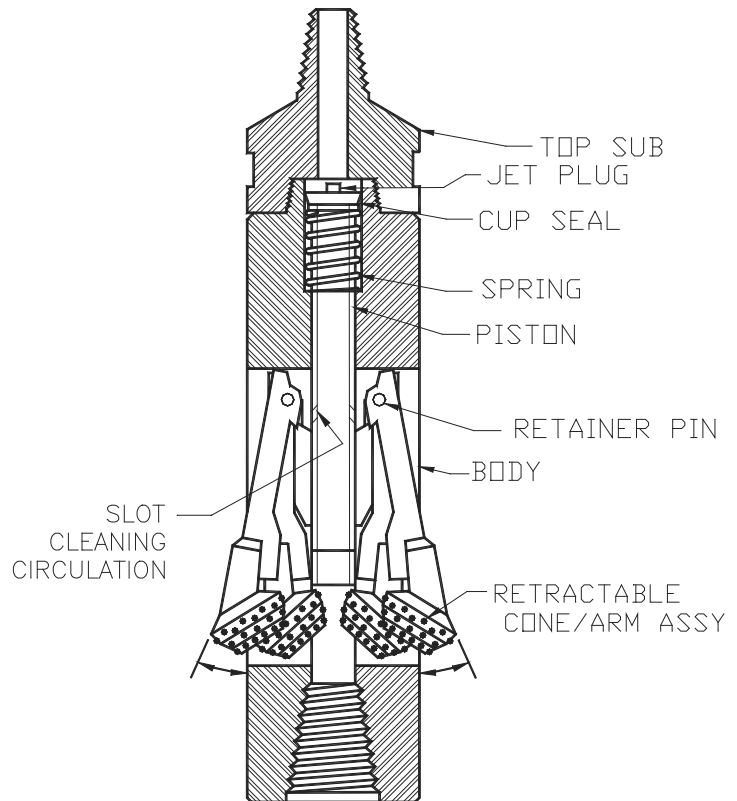
PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES

Roller Cone Type Underreamer

Mills Machine Company has been manufacturing and continually improving the design of its **Roller Cone Underreamer** for over twenty years. The design is simple, yet rugged enough to provide the most efficient operation for opening up a hole. Through the use of highly efficient rock bit cones on the cutting arms, the tool is exceptionally fast in opening up a hole. The primary uses for this type of tool is to provide clearance for running casing, to obtain adequate annular space for cementing, or to enlarge zones for gravel pack completion. Recommended for soft to hard rock formations.

The Mills Machine Roller Cone Underreamer:

- Enlarges the borehole below the casing.
- Produces positive cutter arm opening by direct pump pressure.
- Rubber piston cup is designed for fluid or air drilling.
- Features simple, rugged construction with a minimum of parts to ensure trouble-free operation.
- Has adjustable carbide jet orifices to match output from your pump or compressor.
- Features additional circulation holes drilled into the piston body to keep cuttings out of the cutter slots.
- Sizes for 6 casing and larger with Steel Tooth or TCI Button Cutters.
- Any thread type, breakout flats, or float valve bore available.



The Mills Machine Underreamer is hydraulically operated by pump pressure which forces a spring loaded actuating piston downward. A cam attached to the lower end of the actuating piston forces the cutter arms out to the desired cutting diameter. **Adequate annular space is required to open the blades.** When the pump pressure is shut off, a coil spring forces the piston upward causing the cutter arms to retract back into the body. The tool can be opened up anywhere down enabling you to open up as many zones as you like.

To maintain your Mills underreamer simply clean and lubricate after each use and store in a dry area. Spare parts kits are available with the original purchase of your underreamer and for field repair of your tool.

Please use the **questionnaire** for the roller cone underreamers on the next page.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Application Questionnaire Roller Cone Underreamer	Roller Cone Underreamer
--	--------------------------------

Company _____
 Address _____

 City, State Zip _____

Phone _____
 Fax _____

 Contact _____

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

****Pilot Diameter** _____ *Pilot Bit Type:* _____

Cutters Bearing:** **Conventional**

Steel Tooth:** **New** ☐ **Retip** ☐

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

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

Formation: **1** ☐, **2** ☐, **3** ☐, **4** ☐, **5** ☐,

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

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

Circulation: *Air* ☐ *PSI* _____ *or Fluid* ☐ *PSI* _____

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

Cased Hole: *OD* _____ *ID* _____

OR *Uncased Hole: ID* _____

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

Knurled ☐ *Length* _____

Bottom Neck Dimensions: *OD* _____ *ID* _____

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* _____

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

Special Requirements: _____

Replacement Parts: *Cone Assembly* _____, *Cams* _____, *Cup Seal* _____,

Retainer Pin _____, *Pin Retaining Bolt* _____,

Spring _____, *Jet Plugs* _____.

PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES

Sketch:



Stock Hoist Plugs

These Hoist-Plugs and Kocker Wheels are normally carried in stock. We manufacture them on high-speed production machines and, as a result have lower relative prices on them. All other hoist plugs as listed on the following pages are also available. Please call for pricing.

Hoist Plug		Weight	
		Lbs.	Kgs.
HPMRJPS	MJR Pin Swivel Standard Duty	10	5.0
HPMRJPH	MJR Pin Swivel-Hinged Standard Duty	14	6.4
HPMRJPSK	MJR Pin Swivel Standard Duty with Kocker		
HPMRJPHK	MJR Pin Swivel-Hinged Standard Duty with		
HPMRPS	MR Pin Swivel Standard Duty	14	6.4
HPMRPH	MR Pin Swivel-Hinged Standard Duty	16	7.3
HPMRPSK	MR Pin Swivel Standard Duty with Kocker Wheel		
HPMRPHK	MR Pin Swivel-Hinged Standard Duty with		
HP2381FPS	2 3/8 IF Pin Swivel Standard Duty	11	5.0
HP2381FPH	2 3/8 IF Pin Swivel-Hinged Heavy Duty	15	6.8
HP2381FSK	2 3/8 IF Pin Swivel Heavy Duty with Kocker		
HP2381FHK	2 3/8 IF Pin Swivel-Hinged Heavy Duty with Kocker		
HP2781FPSHD	2 7/8 IF Pin Swivel Heavy Duty	16	7.3
HP2781FPHHD	2 7/8 IF Pin Swivel-Hinged Heavy Duty	<u>18</u>	<u>8.2</u>
HP2781FPSKH	2 7/8 IF Pin Swivel Heavy Duty with Kocker		
HP2781FPHKHD	2 7/8 IF Pin Swivel-Hinged Heavy Duty with Kocker		
HP312RPSHD	3 1/2 Reg. Pin Swivel Heavy Duty	19	8.6
HP312RPHHD	3 1/2 Reg. Pin Swivel-Hinged Heavy Duty	26	11.8
HP312RPSHD	3 1/2 Reg. Pin Swivel Heavy Duty with Kocker		
HP312RPHKHD	3 1/2 Reg. Pin Swivel-Hinged Heavy Duty with		

We also carry 2 3/8 FEDP, Pin, 2 7/8 FEDP Pin and Mayhew Full Hole pin in Stock.

We can build the hoist plugs with any pin or box connection that you require for your system. We carry over 600 thread gages in stock.

Standard Duty – 1 1/8 Shank and 3/4 Bail.

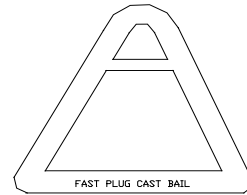
Heavy Duty – 1 1/2 Shank and 1 Bail.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Murphy® Fast Plugs

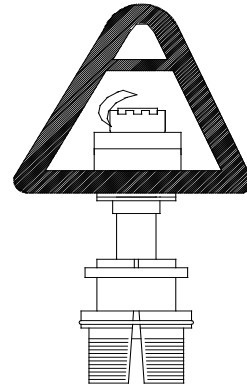
Murphy® Fast Plug - Swivel with Cast Bail

Part #	Connection	Bail Description	Weight	
			Lbs.	Kgs.
MFPNWJPCB	NWJ PIN	SWIVEL CAST BAIL		
MFPMJPCB	MAYHEW JUNIOR PIN	SWIVEL CAST BAIL		
MFPMRPCB	MAYHEW REGULAR PIN	SWIVEL CAST BAIL		
MFP238IFPCB	2 3/8 IF PIN	SWIVEL CAST BAIL		
MFP238FEDPPCB	2 3/8 FEDP PIN	SWIVEL CAST BAIL		



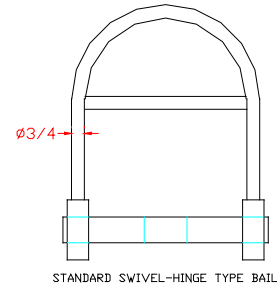
Murphy® Fast Plug - Swivel with Mills Machine Bail

MFPNWJPMB	NWJ PIN	SWIVEL MILLS BAIL		
MFPMJPMB	MAYHEW JUNIOR PIN	SWIVEL MILLS BAIL		
MFPMRPMB	MAYHEW REGULAR PIN	SWIVEL MILLS BAIL		
MFP238IFPMB	2 3/8 IF PIN	SWIVEL MILLS BAIL		
MFP238FEDPPMB	2 3/8 FEDP PIN	SWIVEL MILLS BAIL		
MFP278IFPMB	2 7/8 IF PIN	SWIVEL MILLS BAIL		
MFP278FEDPPMB	2 7/8 FEDP PIN	SWIVEL MILLS BAIL		
MFP350IFPMB	3 1/2 IF PIN	SWIVEL MILLS BAIL		



Murphy® Fast Plug - Swivel Hinged with Mills Machine Bail

MFPNWJPHMB	NWJ PIN	SWIVEL HINGED MILLS BAIL		
MFPMJPHMB	MAYHEW JUNIOR PIN	SWIVEL HINGED MILLS BAIL		
MFPMRPHMB	MAYHEW REGULAR PIN	SWIVEL HINGED MILLS BAIL		
MFP238IFPHMB	2 3/8 IF PIN	SWIVEL HINGED MILLS BAIL		
MFP238FEDPPHMB	2 3/8 FEDP PIN	SWIVEL HINGED MILLS BAIL		
MFP278IFPHMB	2 7/8 IF PIN	SWIVEL HINGED MILLS BAIL		
MFP278FEDPPHMB	2 7/8 FEDP PIN	SWIVEL HINGED MILLS BAIL		
MFP350IFPHMB	3 1/2 IF PIN	SWIVEL HINGED MILLS BAIL		



Murphy® Fast Plug Bodies Only

MFPNWJPB	NWJ PIN	NO BAIL		
MFPMJPB	MAYHEW JUNIOR PIN	NO BAIL		
MFPMRPB	MAYHEW REGULAR PIN	NO BAIL		
MFP238IFPB	2 3/8 IF PIN	NO BAIL		
MFP238FEDPPB	2 3/8 FEDP PIN	NO BAIL		
MFP278IFPB	2 7/8 IF PIN	NO BAIL		
MFP278FEDPPB	2 7/8 FEDP PIN	NO BAIL		
MFP312IFPB	3 1/2 IF PIN	NO BAIL		

We stock the springs (with shoulder washer), O-rings and 1 1/8 stem cast bails for the Murphy® Plugs. Call for pricing.

Murphy® is a Registered trademark of Lee Murphy Equipment Company.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

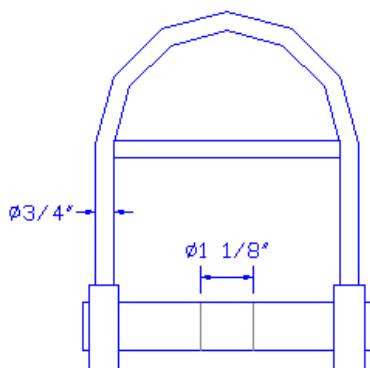
Hoist Plug Components

Standard Duty

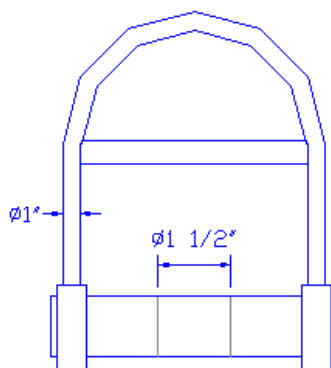
Part #	Description	Weight	
		Lbs.	Kgs.
HPB118S	Hoist Plug Bail - 1 1/8 Swivel	8	4
HPB118H	Hoist Plug Bail - 1 1/8 Swivel Hinged	10	5
HPBT113	Standard Hoist Plug Bearing – 1 1/8 Stem	.4	.2
HPS50125	Standard Hoist Plug Spacer – 1 1/8 Stem	.7	.4
CP143	Hoist Plug Cotter Pin – Standard & Heavy Duty	.1	.1

Heavy Duty

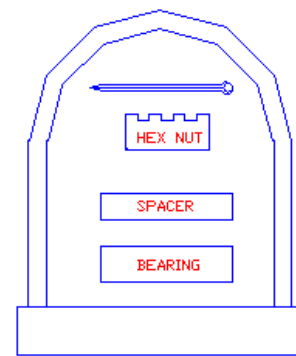
HPB112S	Hoist Plug Bail – 1 1/2 Swivel	10	5
HPB112H	Hoist Plug Bail – 1 1/2 Swivel Hinged	12	6
HPBT151	Standard Hoist Plug Bearing – 1 1/2 Stem	.9	.5
HPS50150	Heavy Duty Hoist Plug Spacer – 1 1/2 Stem	.7	.4



STANDARD SWIVEL-HINGE TYPE BAIL



HEAVY DUTY SWIVEL-HINGE TYPE BAIL



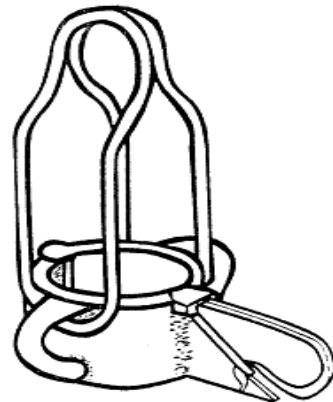
SWIVEL TYPE BAIL

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Pipe Elevators

Steel Pipe Elevators

Part #	Pipe Size		Weight	
	ID of Pipe	OD of Pipe	Lbs.	Kgs.
SPE0100	1	1 5/16	10	4.5
SPE1250	1 1/4	1 5/8	11	5.0
SPE0150	1 1/2	1 7/8	12	5.4
SPE0200	2	2 3/8	16	7.3
SPE0250	2 1/2	2 7/8	17	7.7
SPE0300	3	3 1/2	22	10.0
SPE0350	3 1/2	4	24	10.9
SPE0400	4	4 1/2	24	10.9
SPE0450	4 1/2	5	24	10.9
SPE0500	5	5 9/16	27	12.2
SPE0600	6	6 5/8	38	17.2
SPE0800	8	8 5/8	88	39.9
SPE1000	10	10 3/4	108	49.0
SPE1200	12	12 3/4	130	59.0
SPE1400		14	139	63.1
SPE1600		16		

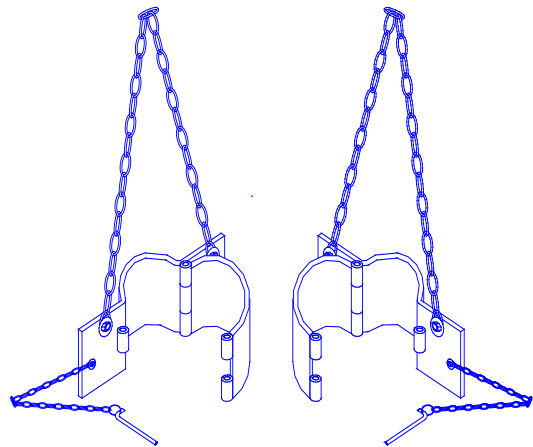


Sold Separately, Not as a Set

Will not work on flush joint pipe.
Size 10 and up have removable bail for ease of handling.

PVC Pipe Elevators

Part #	Pipe Size		Weight	
	Casing Size	Elevator OD	Lbs.	Kgs.
PVCPE200	2	2 3/8	15	6.8
PVCPE300	3	3 1/2	18	8.2
PVCPE400	4	4 1/2	22	10.0
PVCPE412	4 1/2	5	22	10.0
PVCPE500	5	5 1/2	24	10.9
PVCPE600	6	6 5/8	26	11.8
PVCPE614	6 1/4	6.9	26	11.8
PVCPE800	8	8 5/8	32	14.5
PVCPE1034	10	10 3/4	56	25.4
PVCPE1234	12	12 3/4	60	27.2
PVCPE1600	16	16 3/4	60	27.2



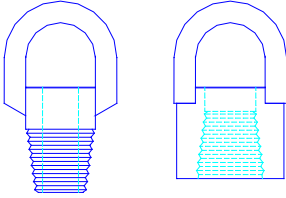
Sold in Sets of Two Pieces.

1/4 Steel Construction.
Safer than Ropes or Loop Chains.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Pipe Handling Tools

Lifting Plugs



Lifting plugs are used to handle heavy equipment such as hammers, stabilizers, holeopeners and underreamers. They are made from 4142 heat-treated material with welded on bails. Lifting plugs are manufactured with box or pin connection of your choice. Please specify the connection for a quotation and rapid delivery.

Pipe Tongs



Pipe tongs are designed for making up and breaking out drill pipe, casing and pneumatic drills on light rigs. Tongs come with chain and heavy-duty bolts that make it easy to quickly change from one diameter pipe to another. Needed are pipe diameter, type of tong (buckup, bull, drill pipe, etc.) and handle length.

Casing Slips



Casing slips are available to meet your specific steel pipe diameter or as an adjustable slip, adjustable 1 1/2 through 8 5/8 OD. All steel welded construction with replaceable alloy dies, the casing slips are used for drill pipe, pump drop pipe or any steel pipe. Please call for quotation and rapid delivery.

PVC Pipe Clamp



Adjustable PVC pipe clamps are available in size ranges from 1/2 to 2, from 2 to 6 and from 8 to 10. They are quick acting and require no inserts. Made with an aluminum alloy base, they are lightweight and portable.

"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

0303

Pipe Handling Tools

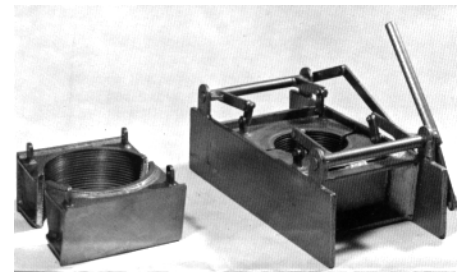
Pipe Alignment Clamp

- Ratchet closure for speed and ease of aligning pipe ends.
- Precision machined to facilitate a close tolerance alignment for welding.
- Heavier and larger crossbars to assure straight alignment between the two joints of pipe.
- Wider stance for the roundabouts or sides of the clamp insure a firmer and more secure hold on the pipe ends.
- Also available with arched cross bars to allow full circle welding without removing the clamps.



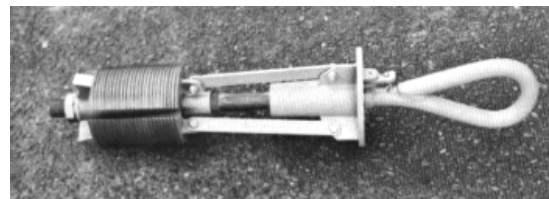
Casing Holder

- Available with mechanical, air or hydraulic slip actuation.
- Inclined wedge holding system.
- Thirty-five ton holding capacity.
- Can be installed above or below drilling table.



Casing Lifter

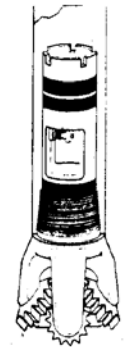
- Quickly elevates horizontal casing from ground or truck.
- Provides perfect vertical alignment for casing coupling or welding.
- Can be installed or released in seconds.
- Holding tension increases as more weight is lifted.
- Positive force locking system prevents accidental release.
- Eliminates the use of clamps and lugs.
- Thirty-five ton holding capacity.



"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Float Valves

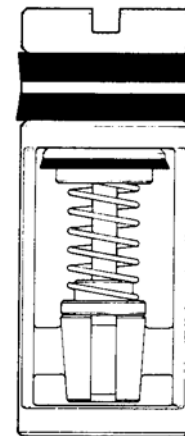
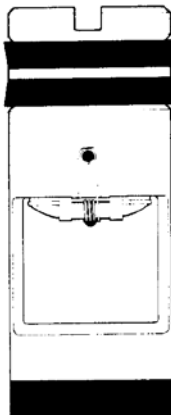
Mills Machine Co. stocks a wide variety of float valves at very competitive prices to sell separately or to install in our subs and stabilizers. We also stock the metal or rubber repair kits. Please contact us if you are not sure which type of float valve to use.



Baker		Demco		Box Tool Joint Size	Valve	Valve
Poppet Style	Flapper Style	Poppet Style				Diameter 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"

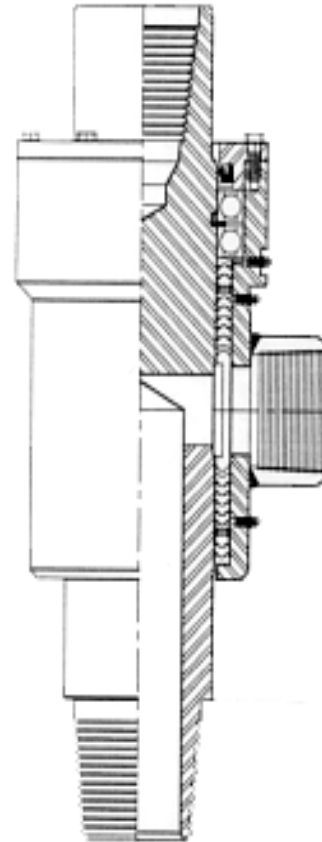
Drilling Accessories

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"

Drilling Accessories

Mud Pump Parts

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

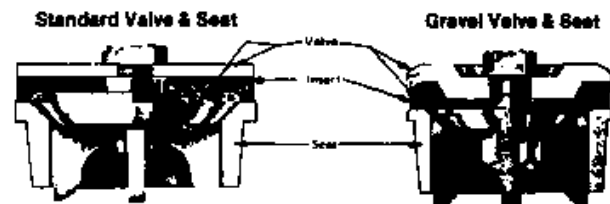
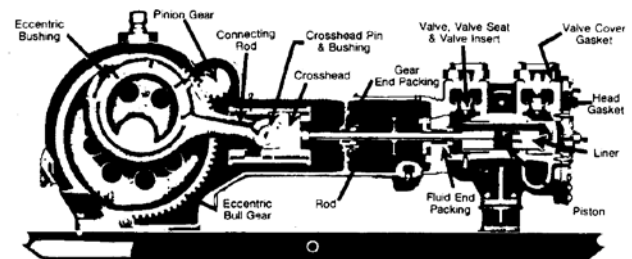
Gardner-Denver	Fluid end and gear end parts
Wheatly	Fluid end parts
Armstrong	Fluid end parts
Failing	Fluid end parts
Gaso	Fluid end parts
Harrisburg	Fluid end parts
L-K Industries	Fluid end parts
Worthington	Fluid end parts

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



"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

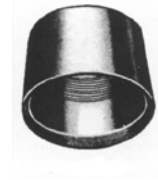
0203

10-3

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 holeopeners, 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.

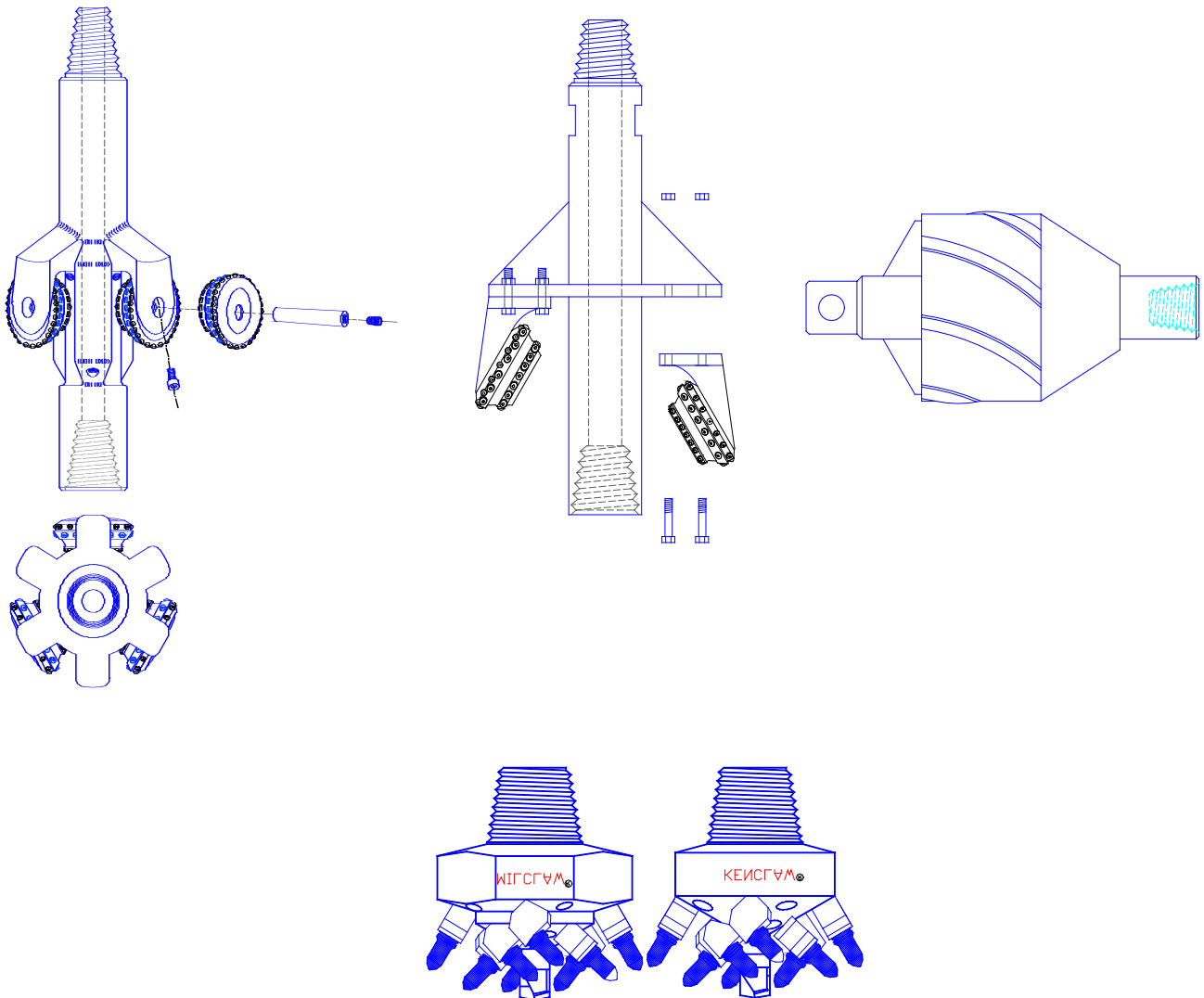
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Horizontal Directional Drilling (HDD)

Horizontal Directional Drilling (HDD) continues to be the most popular method of installing electrical cable, fiber optics, utility conduits and irrigation lines in industrial, commercial and residential applications. This technology eliminates the need for open trenching to install utility lines and surface obstructions can be avoided with minimal environmental disturbance and limited interruptions to traffic or services.

Mills Machine has been manufacturing horizontal drilling bits, holeopeners and horizontal road boring bits for over twenty years. Specific information Regarding these products is found in sections 4, 6, 7, and 8 of our general product catalog. We also, manufacture hollow stem augers and solid core augers that have HDD applications found in sections 1 and 4 of our catalog.

This new catalog section features Claw, Blade or Roller Horizontal Holeopeners and Claw, Blade or Roller Back Reamers.



"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

0103

11-1

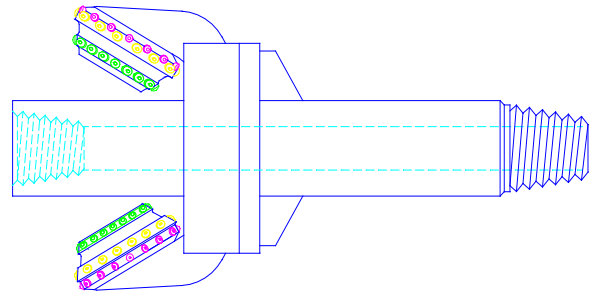
Horizontal Directional Drilling (HDD)

Roller Cone Horizontal Holeopeners.

Mills Machine has over **forty-five years of experience** in manufacturing our custom designed horizontal roller holeopeners, which are, available in sizes from 6 to 120 (150 mm to 3 Meters) and larger. We custom manufacture these Holeopeners to meet your specific requirements. These ruggedly constructed units are made from **4142 alloy steel** and the roller rock bit cutters of your choice.

The horizontal holeopeners are available in single stage, two stages or multiple stage depending on the pilot hole and the finished hole size. The lead and trailing necks can be as long as you desire with breakout flats or lugs as needed. Circulation can be standard or reverse for horizontal or raised bore drilling and circulation can be fluid or air depending on your rig capabilities.

Roller Cone Horizontal Holeopeners are made with tricone roller rock bits and are available in Steel Tooth or TCI Button, in new, retip or rerun condition and with open or sealed journal bearings.

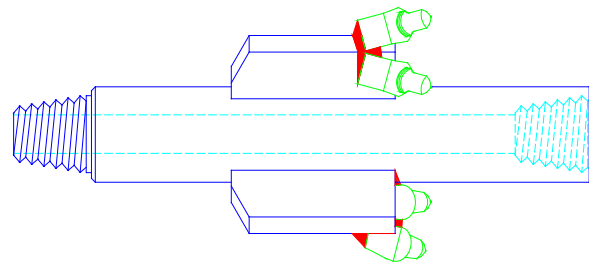


Drag Type Horizontal Holeopeners

Mills also manufactures large drag (blade) Holeopeners for horizontal drilling using replaceable bolt on teeth in a step tooth or chevron apex tooth construction or a combination of teeth and bullet bits. This type of reamer is designed for soft to medium formations and can be made in any size with any thread front or back. Another option to this bit is to put cutters and jets on the back side of the bit if you have to reverse out of the hole.

Bullet Type Horizontal Holeopeners

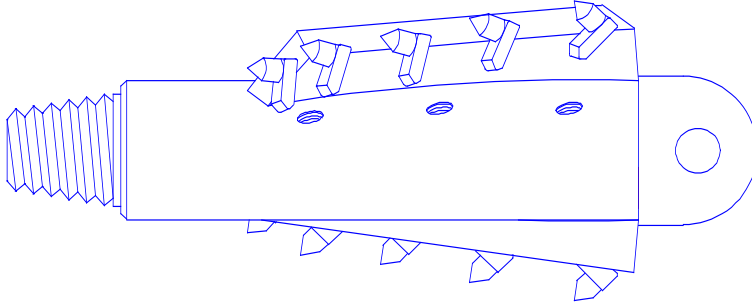
Truly one of the most versatile bits that we manufacture is the Bullet Type Reamer. Designed for hard compacted clay to soft limestone this rugged bit with replaceable carbide cutters offers the most capability and convenience for the money. It is a very aggressive cutting bit that will increase your production while reducing your overhead.



The only limit of our capabilities is your imagination. Working together, we can help solve all of your tough drilling problems.

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Winged Claw Backreamer



Carbide bullet cutters rotate in their block to promote a self-sharpening action and reduce torque on the drill string. The Inexpensive, replaceable cutters are easy to change in the field. This bit works well in unconsolidated formations where layers of soft and hard rock are encountered. Water jets clean the bullet cutters as you drill. We can add the box, pin or connection of your choice.

Available in sizes shown in the table or to meet your specific needs. On the sizes 10 and larger we can build this bit to include the pull swivel to reduce the overall length. Contact us for details.

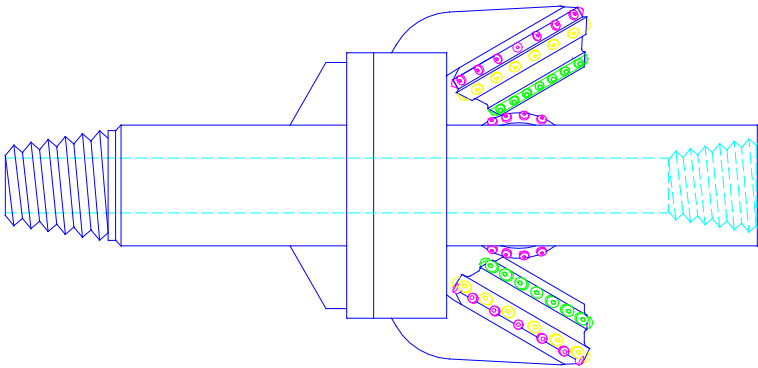
Part #	Description
CBBR6	6 Claw Backreamer, connections TBD
CBBR8	8 Claw Backreamer, connections TBD
CBBR10	10 Claw Backreamer, connections TBD
CBBR12	12 Claw Backreamer, connections TBD
CBBR14	14 Claw Backreamer, connections TBD
CBBR16	16 Claw Backreamer, connections TBD
CBBR18	18 Claw Backreamer, connections TBD
CBBR20	20 Claw Backreamer, connections TBD
CBBR22	22 Claw Backreamer, connections TBD
CBBR24	24 Claw Backreamer, connections TBD

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

HDD Components

Roller Cone Backreamers

Mills Machine has over **forty-five years of experience** in manufacturing our custom designed horizontal roller holeopeners, which are, available in sizes from 6 to 120 (150 mm to 3 Meters) and larger We have transferred that technology to the design of backreamers. These ruggedly constructed units are made from **4142 alloy steel** and the roller rock bit cutters of your choice.



Horizontal backreamers are available in single stage, two stages or multiple stage depending on the pilot hole and the finished hole size. The lead and trailing necks can be as long as you desire with breakout flats or lugs as needed. Circulation can be standard or reverse for horizontal or raised bore drilling and circulation can be fluid or air depending on your rig capabilities.

Roller Cone Horizontal Backreamers are made with tricone roller rock bits and are available in Steel Tooth or TCI Button, in new, retip or rerun condition and with open or sealed journal bearings.

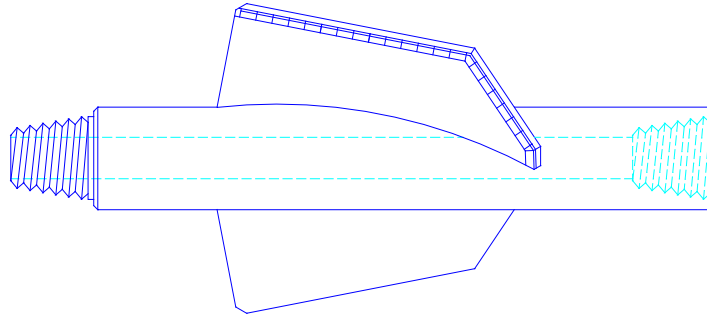
Part #	Description
RCBR6	6 Roller Cone Backreamer, connections TBD
RCBR8	8 Roller Cone Backreamer, connections TBD
RCBR10	10 Roller Cone Backreamer, connections TBD
RCBR12	12 Roller Cone Backreamer, connections TBD
RCBR14	14 Roller Cone Backreamer, connections TBD
RCBR16	16 Roller Cone Backreamer, connections TBD
RCBR18	18 Roller Cone Backreamer, connections TBD
RCBR20	20 Roller Cone Backreamer, connections TBD
RCBR22	22 Roller Cone Backreamer, connections TBD
RCBR24	24 Roller Cone Backreamer, connections TBD

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

HDD Components

Spiral Blade Backreamer

Mills also manufactures spiral blade backreamers for horizontal drilling using carbide tipped drag blades. This type of reamer is designed for soft to medium formations and can be made in any size with any thread or connection on the front or back.



Part #	Description
DBBR6	6 Drag Blade Backreamer, connections TBD
DBBR8	8 Drag Blade Backreamer, connections TBD
DBBR10	10 Drag Blade Backreamer, connections TBD
DBBR12	12 Drag Blade Backreamer, connections TBD
DBBR14	14 Drag Blade Backreamer, connections TBD
DBBR16	16 Drag Blade Backreamer, connections TBD
DBBR18	18 Drag Blade Backreamer, connections TBD
DBBR20	20 Drag Blade Backreamer, connections TBD
DBBR22	22 Drag Blade Backreamer, connections TBD
DBBR24	24 Drag Blade Backreamer, connections TBD

"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

0103
11-5

HDD Components

Blank Page

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

0103

Check our Web site:

11-6

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