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.

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 nitch 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.

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

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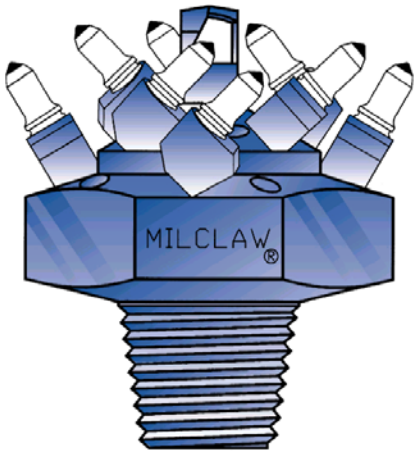
MILLS MILCLAW® BITS

	Part #	Description	Pilot Bit	# of Cutters	Weight Lbs.	Kgs.
S	MC0612-312	6 1/2 (161.5 mm) MILCLAW® 3 1/2 Reg Pin	CP18	6	35	15.9
S	MC0634-312	6 3/4 (171.5 mm) MILCLAW® 3 1/2 Reg Pin	CP18	6	35	15.9
S	MC0778-412	7 7/8 (200.0 mm) MILCLAW® 4 1/2 Reg Pin	CP18	7	51	23.1
S	MC0834-412	8 3/4 (222.3 mm) MILCLAW® 4 1/2 Reg Pin	CP18	8	60	27.2
S	MC0900-412	9 (228.8 mm) MILCLAW® 4 1/2 Reg Pin	CP18	9	65	29.5
S	MC0978-658	9 7/8 (250.8 mm) MILCLAW® 6 5/8 Reg Pin	CP18	9	88	39.9
S	MC1058-658	10 5/8 (295.3 mm) MILCLAW® 6 5/8 Reg Pin	CP18	14	128	58.1
S	MC1214-658	12 1/4 (311.1 mm) MILCLAW® 6 5/8 Reg Pin	CP18	17		
	MC1434-658	14 3/4 (374.7 mm) MILCLAW® Reamer 6 5/8 Reg Pin	MC0634-312			
	MC1712	17 1/2 (444.5 mm) MILCLAW® Reamer 6 5/8 Reg Pin	MC0634-312			
	MC2000	20 (500.0 mm) MILCLAW® Reamer 6 5/8 Reg Pin	MC0778-412			
	MC2200	22 (558.8 mm) MILCLAW® Reamer 7 5/8 Reg Pin	MC0778-412			
	MC2400	24 (609.6 mm) MILCLAW® Reamer 7 5/8 Reg Pin	MC0778-412			

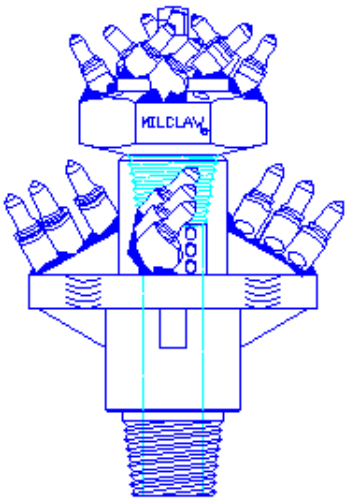
S – Stock Item

***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.



MILCLAW® Reamer Design

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

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Check our Web Site: www.MillsMachine.com

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

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	61/4 (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 6 5/8 Reg Pin	6 3/4 Kenclaw®		
		17 1/ 2 See MILCLAW® Reamer design 6 5/8 Reg Pin	6 3/4 Kenclaw®		
		20 See MILCLAW® Reamer design 7 7/8 Reg Pin	7 7/8 Kenclaw®		
		22 See MILCLAW® Reamer design 7 7/8 Reg Pin	7 7/8 Kenclaw®		
		24 See MILCLAW® Reamer design 7 7/8 Reg Pin	7 7/8 Kenclaw®		

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.

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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.

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

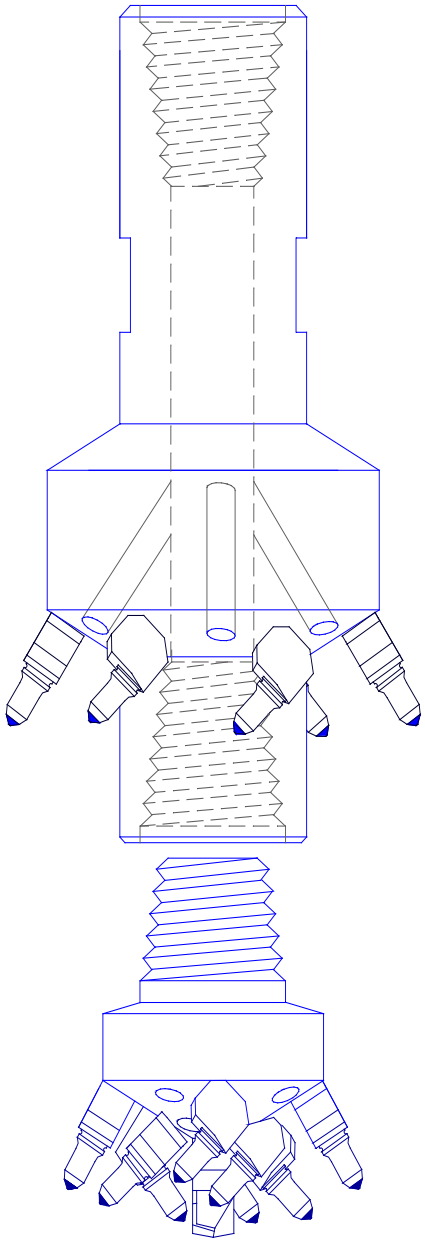
Mills Machine manufactures a full line of rotary claw bits that include many variations of the original design. One of the popular options is the claw reamer or holeopener. Like our KENCLAW® line of bits, these bits will work in clay to medium shale rock (up to 6000 psi rock).

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.



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Application Questionnaire

Claw Holeopener

Claw Holeopener

Company _____ **Phone** _____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact**_____

Sketch:

****Quantity:** _____ ****Hole Size** _____

****Pilot Bit Dia.** _____ Pilot Bit Type_____

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

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

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

Claw Type: Standard, C-23 ☐, Mini Bullet ☐,
Heavy Duty ☐, or Other_____

Number of Stages _____ Length: S to S_____ OR Overall_____

Formation: _____ Description _____

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: _____
_____

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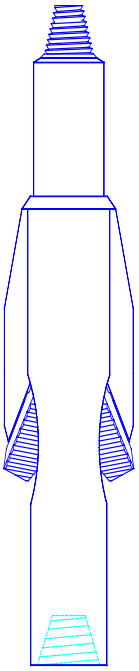
The Mills Machine holeopener is used **to enlarge or ream an existing pilot hole** or can be run above a pilot bit to **simultaneously drill and enlarge a hole**. These rugged tools are built for the toughest drilling applications.



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.

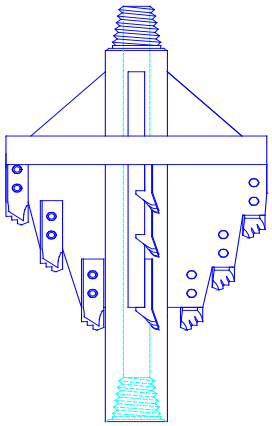
Fabricated Roller Cone (see Rotary Holeopeners, in this catalog)

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

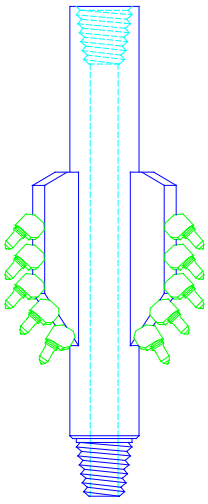
Drag Bit, fixed and replaceable blade (see Rotary Drag Bit in this catalog)

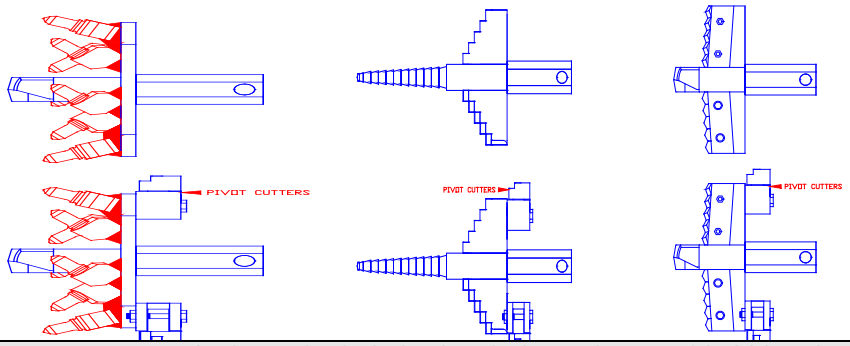
Claw Bit (see Rotary Claw Bit in this catalog)

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.





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Advantages of Hole Openers

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.

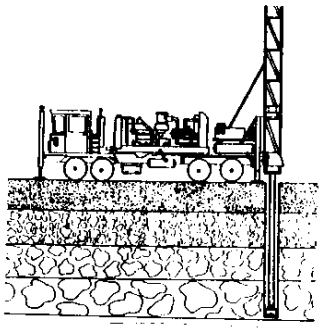
3. Straighter hole.
Drill a straighter hole by drilling a pilot hole then attaching the pilot bit to the bottom of a holeopener, which will follow the existing hole. A pilot hole will normally be straighter because the smaller the hole the straighter the hole.

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.

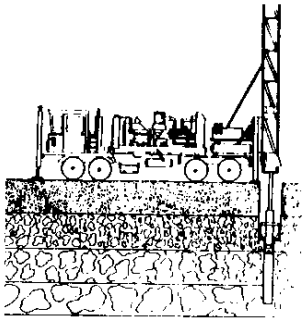
5. Sizes and formations available.
Holeopeners can be manufactured in any size and made to drill any formation from soft clay to hard granite.

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

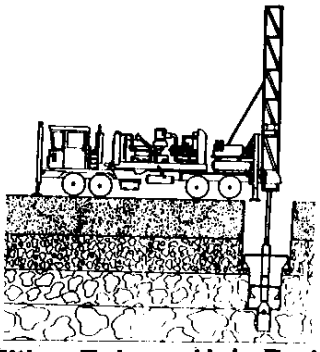
7. New jobs.
With the capability of drilling larger diameter holes, several job markets could open up. For example: mining air shafts, elevator holes, power line holes, municipal water wells, foundation holes and mouse or rat holes for drill pipe storage.



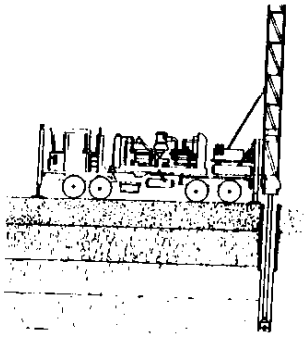
Drill Pilot Hole



Enlarge Hole



Either Enlarge Hole Further



Or Set Casing and Finish Hole

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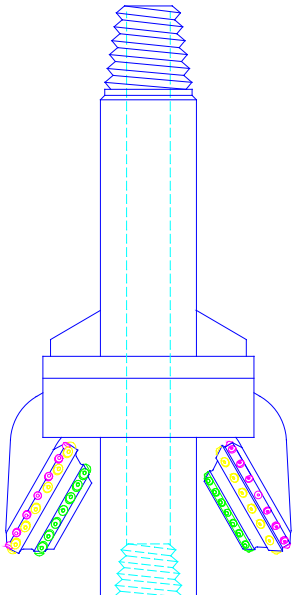
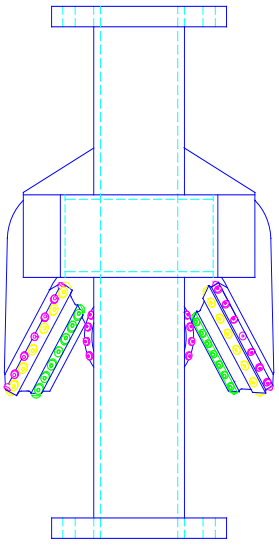
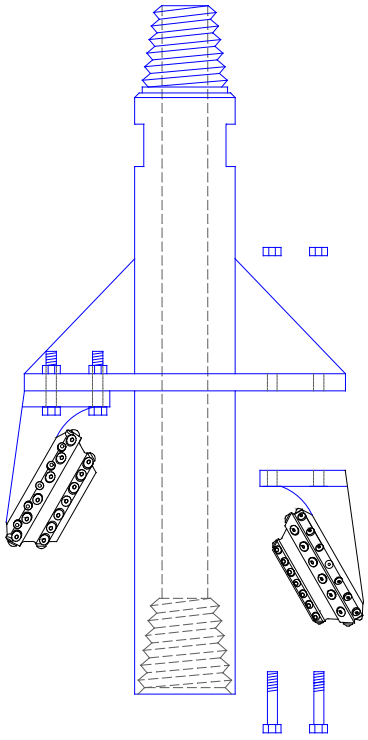
Advantages of Hole Openers

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.

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Fabricated Roller Cone Holeopener

Application Questionnaire
Fabricated Roller Cone Holeopener

Company _____ **Phone** _____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact**_____

Sketch:

****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 ☐**

**** 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: _____

_____

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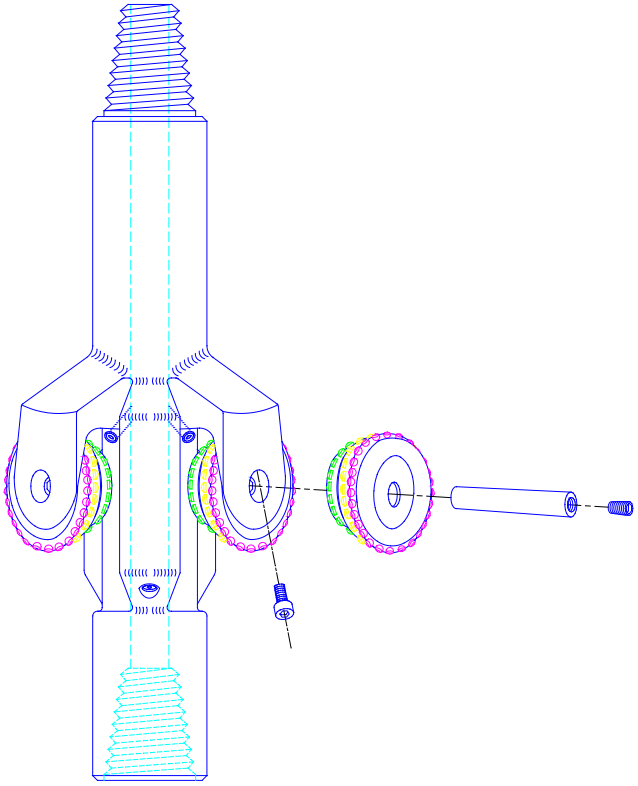
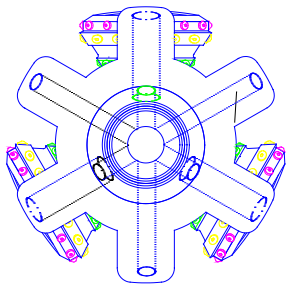
Fixed Arm Roller Cone Holeopener with Replaceable Cutters

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.





TOP VIEW

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

Company _____ **Phone** _____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact**_____

Sketch:

****Quantity:** _____ **Hole Size**_____

****Pilot Diameter** _____Pilot Bit Type_____

Cutters: Bearing: Conventional ☐ Sealed ☐**

****Steel Tooth Cutters ☐**

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

Med. Hard ☐, Hard ☐

OR **TCI Button Bit Cutters ∇

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

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

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

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

Is Holeopener Going Inside of Casing? Yes ☐ No ☐

Casing ID _____

Number of Stages _____ Length: S to S_____ OR Overall_____

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: _____

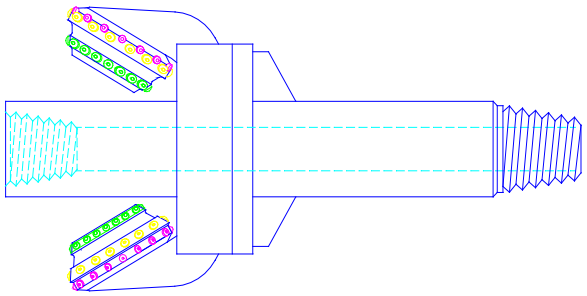
_____

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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

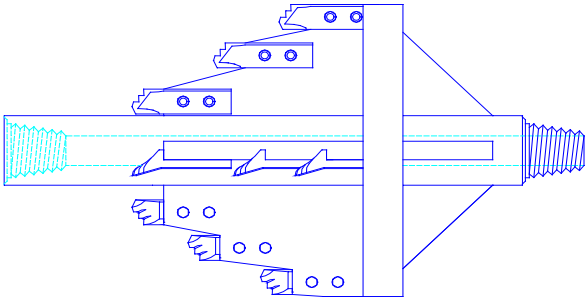
Roller Cone Horizontal Holeopeners.



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.



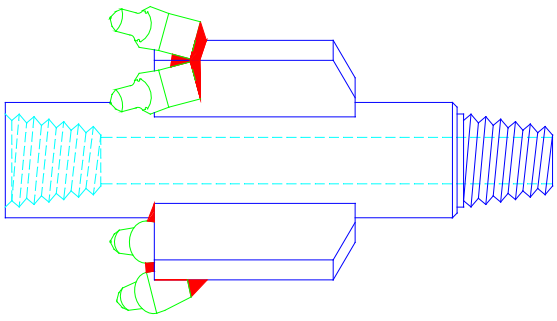
Drag Type Horizontal Holeopeners

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.



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MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
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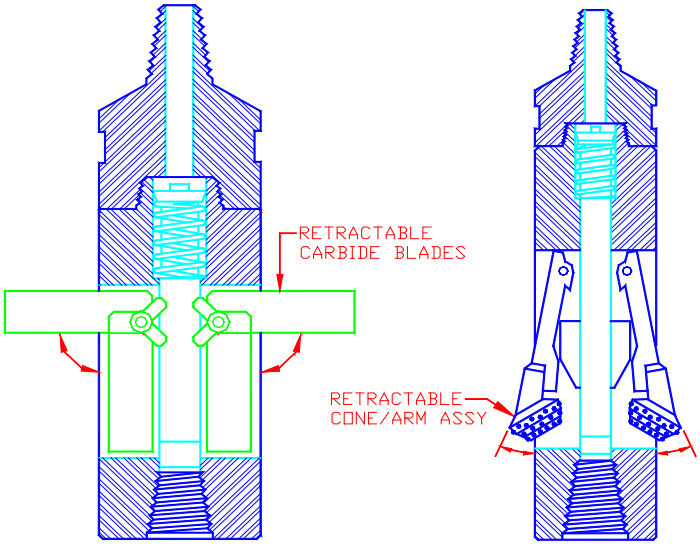
Roller Cone and Drag Type Underreamers are just two more examples of our goal to bring expensive Oil Field technology to other drilling markets at an economical cost. We have been manufacturing both types of Underreamer designs for over twenty years and based on the feedback from our customers out in 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.

BLADE TYPE UNDERREAMER

CONE TYPE UNDERREAMER



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 carbonized steel to reduce abrasion and features a replaceable 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.

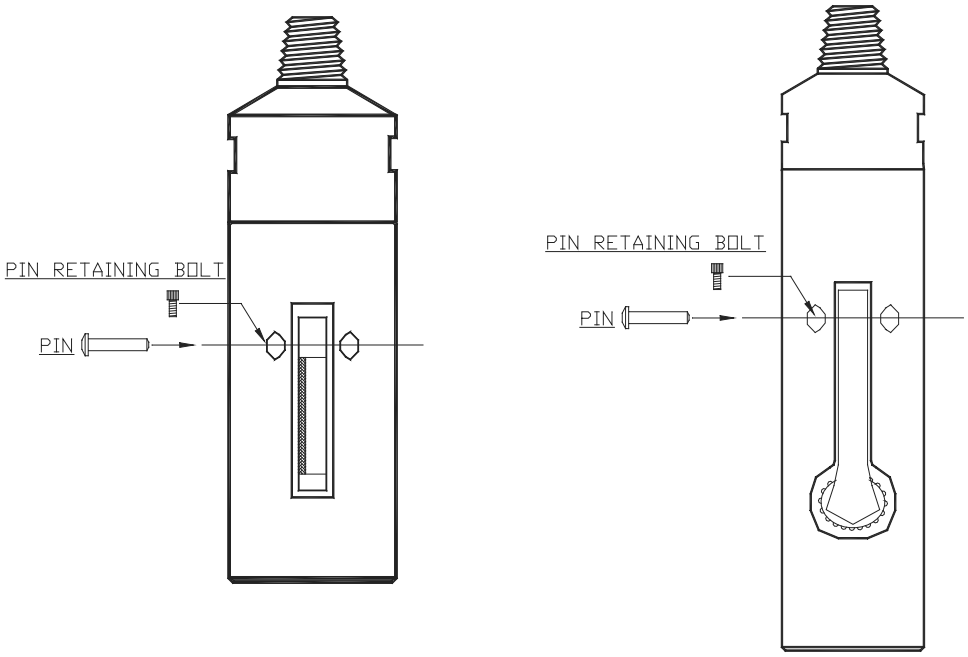
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

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.

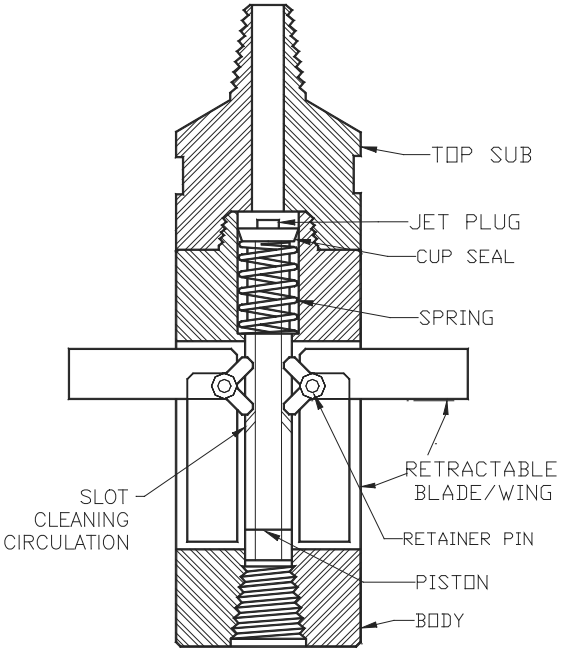


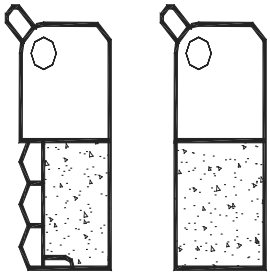
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

Mills Machine Company has been manufacturing 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.

Application Questionnaire

Drag Underreamer

Drag Underreamer

Company _____ **Phone** _____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact**_____

Sketch:

****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.**

*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

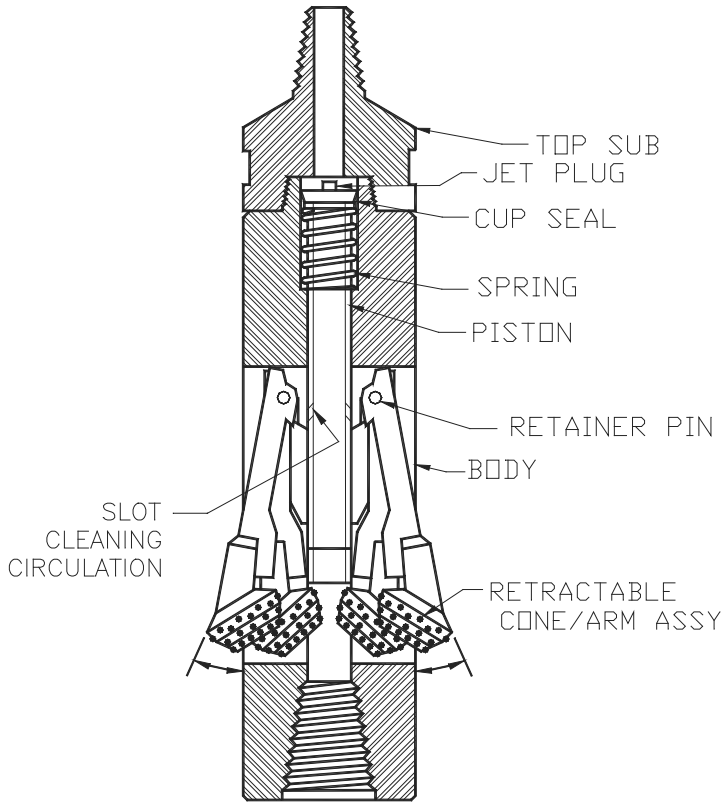
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802

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

Mills Machine Company has been manufacturing 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 _____ **Phone** _____

Address _____ **Fax** _____

_____

City, State Zip _____ **Contact** _____

Sketch:

****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

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

The Hoist Plugs listed below are what we consider to be standard stock sizes but we can custom manufacture any pin or box thread.

Our Hoist Plugs are manufactured from 4142 Heat Treated Alloy Steel and can be customized to meet your individual requirements. Please contact us for pricing information.

		Weight	
	Hoist Plug	**Lbs.**	**Kgs.**
HPMRJPS	MJR Pin Swivel Standard Duty	20	9
HPMRJPH	MJR Pin Swivel Hinged Standard Duty	22	10
HPMRJPSK	MJR Pin Swivel Standard Duty with Knocker Wheel	23	11
HPMRJPHK	MJR Pin Swivel Hinged Standard Duty with Knocker Wheel	25	12
HPMRPS	MR Pin Swivel Standard Duty	21	10
HPMRPH	MR Pin Swivel Hinged Standard Duty	23	11
HPMRPSK	MR Pin Swivel Standard Duty with Knocker Wheel	24	11
HPMPRHK	MR Pin Swivel Hinged Standard Duty with Knocker Wheel	26	12
HP2381FPS	2 3/8 IF Pin Swivel Standard Duty	28	13
HP238IFPH	2 3/8 IF Pin Swivel Hinged Heavy Duty	30	14
HP238IFSK	2 3/8 IF Pin Swivel Heavy Duty with Knocker Wheel	34	16
HP238IFHK	2 3/8 IF Pin Swivel Hinged Heavy Duty with Knocker Wheel	35	16
HP278IFPSHD	2 7/8 IF Pin Swivel Heavy Duty	32	15
HP278IFPHHD	2 7/8 IF Pin Swivel Hinged Heavy Duty	33	15
HP278IFPSKHD	2 7/8 IF Pin Swivel Heavy Duty with Knocker Wheel	36	17
HP278IFPHKHD	2 7/8 IF Pin Swivel Hinged Heavy Duty with Knocker Wheel	38	18

We also stock 2 3/8 FEDP Pin, 2 7/8 FEDP Pin and Mayhew Full Hole Pin but they are manufactured in smaller quantities which results in a little higher cost than those listed in the table above.

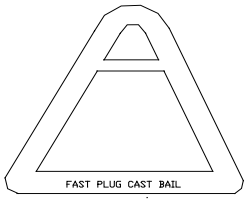
Standard Hoist Plugs have a 1 1/8 stem and 3/4 bail and Heavy Duty have a 1 1/2 stem with 1 inch bail.

We can manufacture hoist plugs with any pin or box connection that you require for your system. We have over 600 different thread gages in stock.

Murphy® Fast Plugs

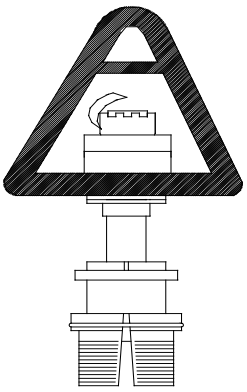
Murphy® Fast Plug - Swivel with Cast Bail

Part #	Connection	Bail Description	Weight Lbs.	Weight 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		



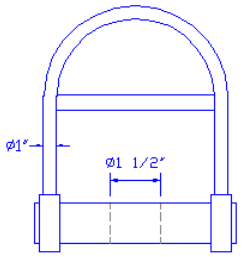
Murphy® Fast Plug - Swivel with Mills Machine Bail

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

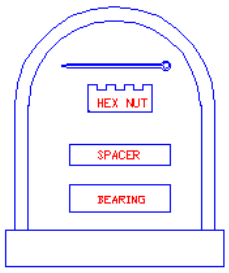
MFPNWJPHMB	NWJ PIN	SWIVEL HINGED MILLS BAIL		
MFPMJPHMB	MAYHEW JUNIOR PIN	SWIVEL HINGED MILLS BAIL		
MFPMRPHMB	MAYHEW REGULAR PIN	SWIVEL HINGED MILLS BAIL		
MFP238IFPHMB	2 3/8 IF PIN	SWIVEL HINGED MILLS BAIL		
MFP238FEDPPHMB	2 3/8 FEDP PIN	SWIVEL HINGED MILLS BAIL		
MFP278IFPHMB	2 7/8 IF PIN	SWIVEL HINGED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



HEAVY DUTY SWIVEL-HINGE TYPE 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		



SWIVEL TYPE 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"

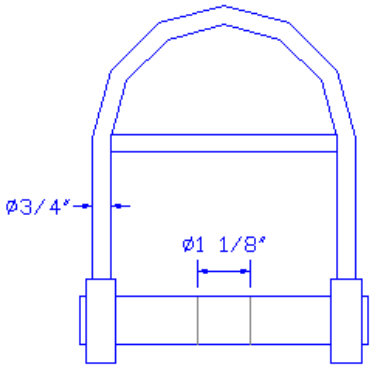
MILLS MACHINE CO. INC., P O BOX 1514, SHAWNEE, OK, 74802
Phone: 800-654-2703 or 405-273-4900 Fax: 405-273-4956

Standard Duty

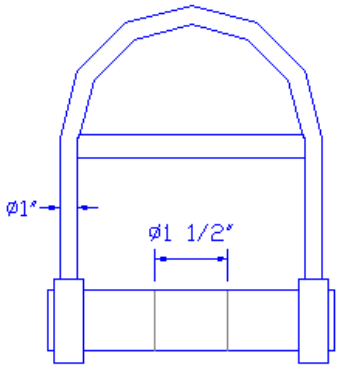
Part #	Description	Weight Lbs.	Kgs.
HPB118S	Hoist Plug Bail - 1 1/8 Swivel	8	4
HPB118H	Hoist Plug Bail - 1 1/8 Swivel Hinged	10	5
HPBT113	Standard Hoist Plug Bearing – 1 1/8 Stem	.4	.2
HPS50125	Standard Hoist Plug Spacer – 1 1/8 Stem	.7	.4
CP143	Hoist Plug Cotter Pin – Standard & Heavy Duty	.1	.1

Heavy Duty

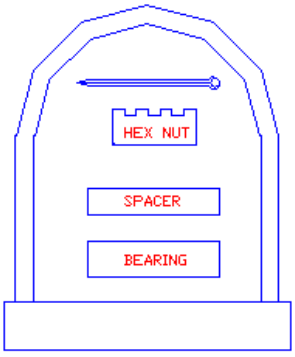
HPB112S	Hoist Plug Bail – 1 1/2 Swivel	10	5
HPB112H	Hoist Plug Bail – 1 1/2 Swivel Hinged	12	6
HPBT151	Standard Hoist Plug Bearing – 1 1/2 Stem	.9	.5
HPS50150	Heavy Duty Hoist Plug Spacer – 1 1/2 Stem	.7	.4



STANDARD SWIVEL-HINGE TYPE BAIL



HEAVY DUTY SWIVEL-HINGE TYPE BAIL



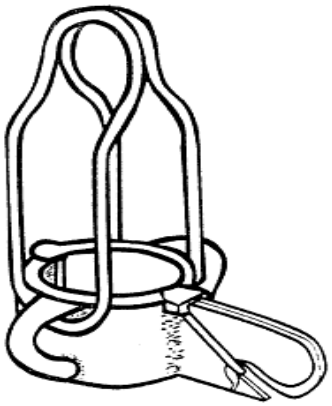
SWIVEL TYPE BAIL

"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Pipe Elevators

Steel Pipe Elevators

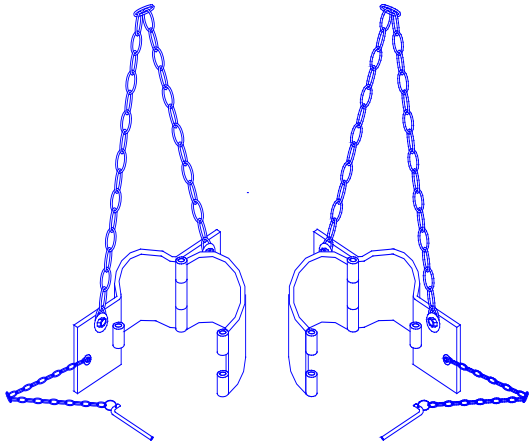
Part #	Pipe Size		Weight	
	ID of Pipe	OD of Pipe	Lbs.	Kgs.
SPE0100	1”	1 5/16”	10	4.5
SPE1250	1 1/4"	1 5/8”	11	5.0
SPE0150	1 1/2"	1 7/8”	12	5.4
SPE0200	2”	2 3/8”	16	7.3
SPE0250	2 1/2"	2 7/8”	17	7.7
SPE0300	3”	3 1/2"	22	10.0
SPE0350	3 1/2"	4”	24	10.9
SPE0400	4”	4 1/2"	24	10.9
SPE0450	4 1/2"	5”	24	10.9
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 7/8”	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



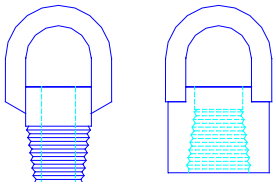
Sold in Sets of Two Pieces.
1/4 Steel Construction.
Safer than Ropes or Loop Chains.

You must provide Outside and Inside Diameter of pipe!

“PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES”

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

Lifting Plugs



Lifting plugs (non swivel) are used to handle heavy equipment such as hammers, rock bits, stabilizers, and hole openers. They are made from 4142 heat-treated alloy steel with heavy duty fabricated bails. The lifting plugs are available with any pin or box thread.

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. Required formation: pipe diameter, type of tong (buck-up, bull or drill pipe, etc.) and handle length.

Casing Slips

Casing slips are available to meet your specific steel pipe diameter or as an adjustable slip. The adjustable type handles 1 1/2 through 8 5/8 OD. These slips feature a fabricated steel construction with replaceable alloy dies, the casing slips are used to hold drill pipe, pump drop pipe or any steel pipe or casing.

PVC Pipe Clamp

Adjustable PVC pipe clamps are available in three size ranges: 1/2 to 2, 2 to 6 and 8 to 10. These clamps are easy to use and require no inserts. Made with an alloy aluminum base, they are lightweight and portable.

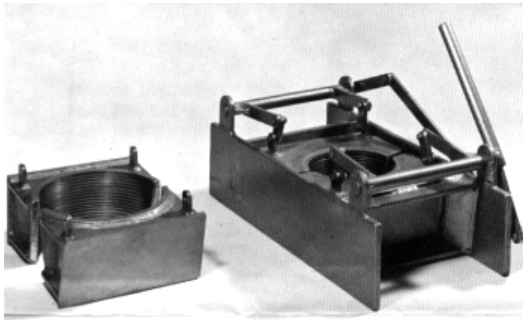
Pipe Alignment Clamp

- 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.

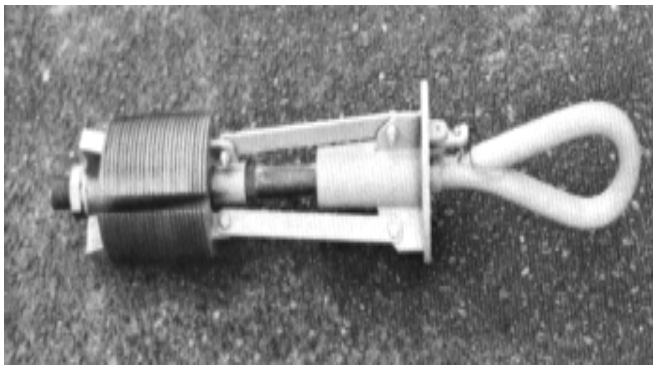
"PLEASE CALL FOR CUSTOM OPTIONS AND OTHER ACCESSORIES"

Steel Casing Holder

- Available with mechanical, air or hydraulic slip actuation.
- Inclined wedge holding system, no shoulder required.
- 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 cap.

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