



JUNK MILLING

Junk Milling - Description and Usage

The Junk Mill, dressed with Tungsten Carbide chews its way through the toughest drilling materials. It is often said to be the true workhorse of down hole milling operations.

When drill pipe is cemented inside and out, a Junk Mill is the only tool will do the work. However, if the drill collars or drill pipe are not collapsed and the I.D. is open, a Pilot Mill can sometimes be used to better advantage. Often you can get better results with a Pilot Mill on wash pipe as well.

When casing has been milled with a Pilot Mill to the point where it begins to rotate, it can often be pounded down and milled using a Junk Mill made up on the end of a length of slightly eccentric or bent drill pipe.

Packers, testers, and bridge plugs can usually be milled in a few hours using a Junk Mill.

Use Junk Mills to mill almost anything in the hole, including:

Bailer	Cement	Packers	Subs
Bit Cones	Drill Collars	Reamers (shot length)	Testers
Bits	Drill Pipe	Setting Tools	Washpipe
Calipers	Hangers	Slips	Whipstocks
Casing (collapsed)	Jars	String shots	

General Guidelines For Using a Junk Mill

When milling loose junk, operations can be improved by frequent spudding. This action will pound the junk onto the bottom, positioning it for more effective milling.

Never permit a sliver of junk to lodge next to the mill. Force it down by spudding the mill. A noticeable increase in torque will indicate that junk is alongside the mill.

Picking up the mill and lowering it periodically will decrease the possibility of a deep-wear pattern developing the face of the mill. Instead it forces a new wear pattern to develop, thus evening the wear on the mill face.

When milling cast-iron bridge plugs, the mill O.D. should be approximately 1/8" under the size of the bridge plug - this will prevent "skinning" the casing.

Step by Step Junk Milling Procedures

1. Feel for the bottom, spud the junk, "kick in the pumps"; the same as for normal drilling conditions.
2. Begin rotation at 60-80 RPM.
3. Begin weight at 4,000 lbs.
4. If there is an indication junk may be turning, spud two or three times.
5. After milling one or two feet, pick up the Kelly fifteen to twenty feet off the bottom and reduce pump pressure or shut off pumps (depending on hole conditions). This action will let the loose junk settle to the bottom.
6. Once again feel for the bottom and spud. Begin rotation at 80-100 RPM using normal pump pressure. Begin weight at 4,000-6,000 lbs.
7. Repeat steps 3 and 4 every few feet Procedures from here on will be governed by feel.

NOTE: In hard formation it will take fewer feet of hole to mill up the junk than in softer formation. This difference is due to junk more readily penetrating the softer formation.

Recommendations for Milling Junk

Loose Junk in Open Hole

- Use a junk mill with an O.D. of 1/8" less than hole diameter.
- Use at least 10,000 lbs. of drill collars.
- Run a junk sub directly above the mill. (Please note: junk subs for 4-3/4" and smaller drill collars are not strong enough for repeated spudding.)



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- Frequent spudding improves milling efficiency on loose junk. To spud the junk and force it down, proceed as follows:
 - 1) Determine the neutral or zero point. Mark the kelly at the top of the kelly bushing.
 - 2) Pick up the kelly four to six feet (four feet in deeper holes, six feet in shallower holes.)
 - 3) Drop the kelly and catch it (not slow down, but catch it) with the brake about eighteen to twenty inches above the zero mark. (Example: Pick up 10' and drop it 8-1/2'). This action causes the drill string to stretch & spud the junk on bottom with great force while the string is still in a state of tension. This prevents damage to the string which might be expected if the string is in Compression at the moment of impact.
 - 4) Spud the junk three or four times, turning the mill a quarter-turn each time between drops.

Stationary Junk in Open Hole

- Use a Junk mill with a diameter about 1/8" less than the hole diameter.
- Mill with 4,000 to 10,000 lbs. of weight, depending upon the strength of the fish being milled.
- After each three to five feet of junk milled, pick up the mill ten to fifteen feet and ream hole down to the fish.
- After reaming the hole down, always set down on the fish while turning and bring the weight up to milling weight without delay. Never apply weight first and then start rotating.
- Never set down on the fish with a light weight and spin. If you wish to stop milling for any reason, always pick up the mill. Spinning in one spot on the fish can cause the steel to work-harden to such an extent that it will be difficult to restart milling.

Loose and Stationary Junk Inside the Casing

Procedures for running a Junk Mill inside the casing are the same except for the following:

- Run a stabilizer directly above the mill which has the same O.D. as the mill.
- The mill head O.D. should be the same as the drift diameter of the casing.

Wear pads having the same O.D. as the diameter of the mill head are provided on the Junk Mill. These will eliminate possible damage to the casing.

INSTRUCTION FOR APPLYING SINTERED TUNGSTON CARBIDE ROD

APPLICATION:

The bonding temperature of Sintered Tungsten Carbide Rod is 1680 degrees to 1800 degrees Fahrenheit. ***It is important not to overheat.*** Use a full neutral flame during entire application, never allowing the cone of the flame to touch the base metal or the metal being applied. (This is to prevent oxidizing)

Thoroughly clean and brighten base metal. Pre-tin with Special Tinning Alloy, (It is not necessary to pre-tin any of the Mesh Sizes). When pre-tinning is completed, heat the base metal until the applied tinning alloy begins to melt or until the base metal comes to a dull cherry red. Sintered Tungsten Carbide Rod should then be applied, concentrating the carbides as closely as possible to insure the maximum cutting or wearing action, depending upon the size carbides used. It is helpful to apply the flame to the back side or round portion of the Sintered Tungsten Carbide Rod. This keeps the sharp cutting edges from receiving too much heat.

AFTER APPLICATION:

Slow cool material to which Sintered Tungsten Rod Carbide has been applied.

A carbon rod may be used to place the carbides in the desired positions to best utilize their cutting edges.

To re-surface a tool where Sintered Tungsten carbide Rod has been previously applied, it is helpful to use a carbon rod to apply brazing flux to the previously applied metal. This flux cleans out dirt, oil, grease, etc. And gives a better surface for bonding the new Sintered Tungsten Carbide Rod material.