



AMERICAN
HOLLOW BORING CO.
YOUR MACHINING EXPERTS

TREPANNING

Efficient, Precise Deep Hole Drilling

WHITE PAPER BY AMERICAN HOLLOW BORING

WHAT IS TREPANNING?



Trepan tool in the opener

Trepanning is a drilling process that leaves a core. Trepanning is a deep hole drilling process that has broad application over many industries. In many cases, trepanning is meant to be a roughing operation to be honed for finish, or machined further. In other cases, the trepanned hole is fit for use 'as-drilled'. The common factors for choosing trepanning are a long design, through bore, and within size ranges of 4.1" to 15.75".

TREPANNING CAN BE UTILIZED IN:

- » Machinery and Heavy Equipment
- » Manufacturing and Rebuild
- » Oil and Gas
- » Aerospace and Defense
- » Metals Production and Distribution
- » Forging

TREPANNING CAN BE UTILIZED WHEN HOLES MAY BE REQUIRED IN:

- » Finished Parts for Weight Reduction
- » Clearance
- » Fluid Flow
- » Working Cavities
- » Machining Blanks
- » Piston and Cylinder Features
- » Seals

TREPANNING OFFERS

- » FASTER PENETRATION
- » LOWER POWER USED
- » MATERIAL SAVINGS

THE PROCESS AND BENEFITS



Trepanned bars

Trepanning is most often applied in conjunction with the single tube system to work most efficiently. Let's examine a deep hole drilling machine and the drilling process. The process starts with a part loaded in the machine well-aligned. A pressure head seals to the end of the part and holds a starter bushing at the part's face. The tool is then supported by the starter bushing. With the face sealed, oil begins

to flow and builds pressure at the tip of the tool. The rotation begins and the tool is fed at the required rate. As the tool begins to cut, chips are directed to the inside of the bar and are caught in a basket. Coolant is filtered and returned to the reservoir. Now inside the workpiece, the tool is supported by the as-cut bore. As the tool continues through the workpiece, the core remains uncut and eventually drops when the cutter breaks through. The process depends on adequate clearance between the core and the inside of the bar. When the machine is stopped and the cutter is withdrawn, the workpiece can be removed and the core and chips may be recycled or returned to the customer as sometimes arranged.

The trepanning process is efficient because chips are managed to provide a continuous cut with no pecking and high federates due to the rigid bar. Additionally, the process requires less power because not all material is made into chips. There can also be significant project cost savings when valuable cores can be recovered.

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DIFFERENT TREPANNING SERVICES



Trepan operations can be applied to efficiently meet needs of customers. The most basic service provided is a rough hole through a bar's entire length. In some cases, it is desirable to drill from both ends. It is possible to create a stepped bore by drilling a different sized hole from the opposite end. If a hole does not go through, it is a blind hole. For blind holes, other drilling processes must be used. In bars, most holes are drilled on centerline by rotating the workpiece. Holes can also be drilled by rotating the bar with a clamped workpiece or by running the bar and workpiece with counter-rotation. If a workpiece is rotating, it may have to be smooth enough to run on a steady rest. If it is not, spots can be cut on the OD if allowed. Otherwise, fixtures may be used to rotate parts that could not otherwise be rotated including rectangular parts.



Solid boring tools

DEFINITIONS OF DIFFERENT TYPES OF BORING

- » **DEEP HOLE DRILLING:**
Drilling metals beyond 5 x diameter to 200x diameter with acceptable straightness.
- » **TREPANNING:**
Drilling process that leaves a core.
- » **SOLID BORING:**
Drilling process that leaves no core.

DIFFERENT TREPANNING SERVICES (CONTINUED)



It is possible to apply trepanning in holes over a great range of sizes, but with few exceptions trepanning is generally applied in a range of 4.1" to 15.75". Below that range, solid drilling with BTA single tube system is optimum from 1". The smallest holes generally require gundrilling. Above 15.75", rough and finish boring operations are available often reaming from a smaller

to a larger size. Other deep drilling operations include spade drilling, ejector drilling, and pull boring. Terminology is often applied loosely such that someone asking for trepanning is simply asking for a deep hole and doesn't care how the hole is generated. Once you find the company to meet your requirements, that company can manage the details of which processes to use.

DEFINITIONS OF DIFFERENT TYPES OF BORING

- » **EJECTOR DRILLING:**
One of several deep hole drilling methods which use two tubes and are depth and diameter limited.
- » **SINGLE TUBE SYSTEM:**
Of broadest range and reach. Best system for trepanning deep holes.
- » **PULL BORING:**
A reaming process where the tool is pulled through the workpiece.
- » **GUNDRILLING:**
One of several deep hole drilling methods that ranges from 1/64" (micro) to 2" (large) diameters.

CONSIDERATIONS BEFORE UTILIZING TREPANNING MACHINING SERVICES

It's important to consider the following when requesting a trepanning quote:

- » What type of part is being provided?
- » Is material customer supplied, or is it to be supplied by the driller?
- » What material and heat treatment is given?
- » Are the parts supplied as bar, a forging, or a cast product?
- » Is a good drawing available to detail the part requirements?
- » How much stock is provided to finish size?
- » Is allowance made for expected straightness of incoming material?
- » What is required and allowed to make the trepan hole?
- » Provide size tolerance (in case parts must be spot and faced)
 - » Length minimum,
 - » Minimum turned diameter.
- » Is there any finish requirement or concentricity requirement?
- » Buyers should communicate all needs and provide as much pertinent information as possible.

TREPANNING ORDER EXAMPLE

- » We will supply 10 bars 4140 heat treated to 36 HRC rough turned to 9" diameter x 100" random lengths. You are to drill 7.375" +/- 1/8" through the entire length and return cores with the drilled bars.

SUMMARY

When manufacturing long hollow parts, buyers start by searching for trepanning services. Trepanning is a proven and efficient method for drilling large deep holes in metal parts. In the trepanning process, a hole is drilled to the size desired without drilling the core. This article explains the basics of trepanning and considerations for buying trepanning services. American Hollow Boring Company is the premier deep hole drilling company in North America equipped for a broad range of trepanning machining services.



CONTACT US

» AMERICAN HOLLOW
BORING CO:
P.O. Box 338
Erie, PA 16512

TOLL-FREE 800.673.2458

FAX 814.456.3978

SALES@AMHOLLOW.COM

WWW.AMHOLLOW.COM