STEVE VICK INTERNATIONAL

SOLUTIONS FOR THE REPAIR RENOVATION AND DECOMMISSIONING OF PIPELINES

N450 Keel Cutter

Operating Instructions

Steve Vick International Ltd

Treenwood Industrial Estate, Bradford on Avon, Wiltshire, BA15 2AU, UK

CE

CONTENTS

1. INTRODUCTION

Since its foundation in 1981, Steve Vick International has been at the leading edge of trenchless techniques for the repair and renovation of underground **gas** distribution pipes.

In the UK, we are a major supplier to the gas distribution networks and many of our techniques have become accepted practice in the industry. We constantly seek to provide our customers with renewal methods which will minimise their costs and maximise their production.

The company has been supplying pipe handler equipment to the **water** utilities and their contractors for over 20 years. More recently we have entered the market with pipe cutting equipment and our sealant technology has been successfully adapted for use in the waste water sector.

In 2014 the company relocated and can be found at:

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2. SPECIFICATION

2.1 N450 Keel Cutter

Machine Model	Keel Cutter N450, Hydraulic version
Type of pipe:	Ductile iron, cast iron, cement, plastic and steel (Tungsten carbide tipped (TCT) blades must be used for steel)
Nominal diameter of pipe:	200mm to 750mm outside diameter-range can be extended to 900mm with extra chain extension
Max. depth of cut:	125mm (5inch) blade—20mm 150mm (6inch) blade—32mm
Circumferential cutting speed:	Approx. 80mm to 140mm per minute depending on material and its thickness
Gear box oil:	Any gear oil of EP140 rating
V-belt type:	Cogged, 17mm wide x 10mm deep x 610mm long
Machine dimensions:	Height 190mm x Width 350mm x Length 300mm
Weight of machine:	20kgs
Weight of starter kit. See full contents on page 4.	50kgs
Hydraulic power requirement :	N.B. Steve Vick International Ltd would be pleased to quote for the supply of a suitable hydraulic power pack
Flow/pressure:	Max. flow rate—20litres/min Max. pressure—140bar
Spray unit:	10 litre capacity, maximum working pressure 6 bar, complete with hose and nozzle for attachment to blade guard. Shell Dromus Oil “B” for use with cutting steel can be supplied by Steve Vick International Ltd.

2. SPECIFICATION (CONTINUED)

2.2 POWER PACK

	20lt Power pack	30lt Power pack
Fuel Type	Petrol CE	Petrol CE
Engine Type	Honda GX270	Honda GX390
Power (hp/kw)	9 / 6.6	13 / 9.6
Hydraulic Flow (I/min/ gallon)	20 / 5	30 / 8
Pressure (Bar)	140	140
Weight (KG)	60	72
Weight (LBS)	132	158
Power of demand	Yes	Yes
Noise level dB(A) / LWA	104	104
Dimensions LxWxH (mm)	750 x 530 x 570	780 x 540 x 615
Dimensions LxWxH (in)	23 x 18 x 18	31 x 22 x 25

The N450 Keel Cutter starter kit includes the following:

N450 Keel Cutter including hydraulic motor, pulley assembly, 2 x V-Belts, 2 x extension chains, 1 x spray unit, 5 x steel wedges, 1 x ratchet, 2 x allen key, 1 x spanner, 1 x 12” rule, 1 x copper/hide hammer & 1 x bush.

3. SETTING UP MACHINE TO CUT

Before placing the machine on the pipe, make sure that you have the correct blade fitted for the pipe you intend to cut. i.e. a diamond blade for cast iron, ductile, and cement or a TCT blade for steel and plastics (see section: Fitting Blades).

If you are to cut steel, you will also need an oil mixture in the water spray, for example “Shell Dromus Oil B” in ratio of 50:1 water to oil.

You will also need to connect the Flow Control Valve to slow the cutting speed to approx. 250rpm.

3.1 IMPORTANT - Please read separate section on cutting steel

Place the machine on the pipe with the blade above the point you wish to cut. You should have already made sure that there is enough clearance around and under the pipe for the machine to make a complete rotation, this would normally be approximately 210mm in height and 420mm width. The machine must “sit” on the pipe with a solid base. This should be checked by holding the machine by the drive shaft and a comfortable point on the other side of the cutter (see fig. 1), and moving the machine on its four contact wheels backwards and forwards gently, checking that all 4 wheels move together and the Keel is sitting solidly on the pipe.

4. SAFETY AND PRECAUTIONS

4.1 The following PPE must be worn at all times:

A. Safety goggles
B. Hard hat
C. High visibility jacket
D. Gloves
E. Steel toe cap footwear

4.2 Ensure a banks man is employed to assist with lowering the cutter into the trench and is able to shut off the hydraulic power in an emergency.

4.3 Inspect the Power Pack and Keel Cutter for any oil leaks.

4.4 Inspect all hydraulic hoses for any damage.

4.5 Ensure the blade guard is fully functional.

4.6 Ensure you have selected the correct blade for the material being cut.

4.7 Ensure the hydraulic isolation valve works.

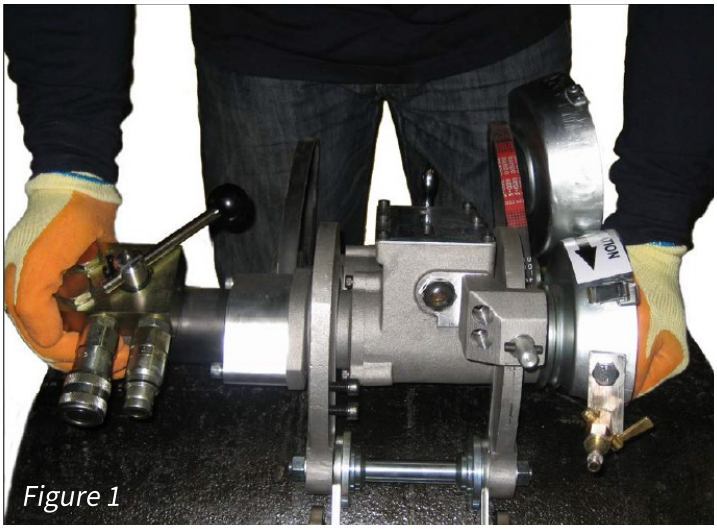


Figure 1

4.8 Next, the pulley assembly must be attached onto the drive belts (see Fig 2), trying not to move the cutter from its secure position.


Figure 2

4. SAFETY AND PRECAUTIONS CONTINUED

4.9 Then join the chain to the few links of chain already attached to the machine (see Fig. 3) before wrapping it around the pipe and connecting it to the pulley assembly with the long tension adjusting screw at its maximum length (see Fig. 4). You should make sure the chain is as tight as you can reasonably pull it before you make your final connection for cutting.

Figure 3

Figure 4

4.10 Using a straight edge, for example, a steel rule or a small spirit level, line up the outside edge of the drive wheel with the outside edge of the pulley wheel as shown in Fig. 5.

Figure 5

DO NOT try to line up the pulley on the blade side of the machine, only do so on the motor side.
When you are satisfied that the machine is secure and the pulley assembly is in line, tighten the pulley assembly with the ratchet provided (Fig. 5). There needs to be quite a firm tension on the drive belts, but it is possible to over-tighten, so try to apply a normal fan belt type tension.

When this is completed, check again that the drive wheel and the pulley assembly are in line, you are now ready to attach the hydraulic hoses.

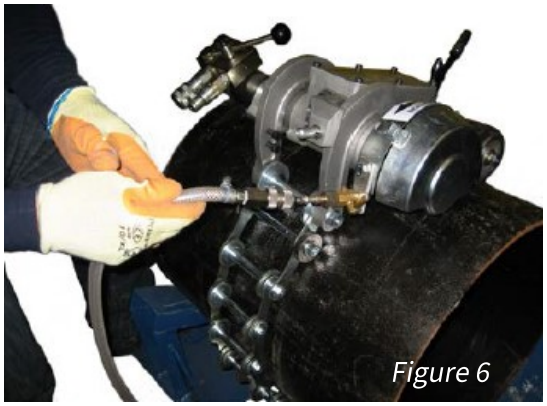


Figure 6

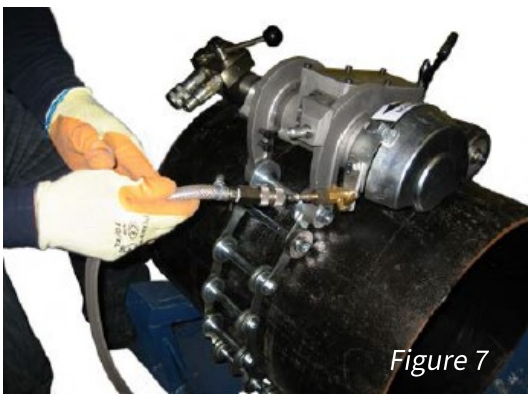


Figure 7

4.11 Connect the hoses to the **Keel** motor before starting the power pack (Fig. 6), then attach the spray hose and tap to the cutter guard (Fig. 7).

4. SAFETY AND PRECAUTIONS CONTINUED

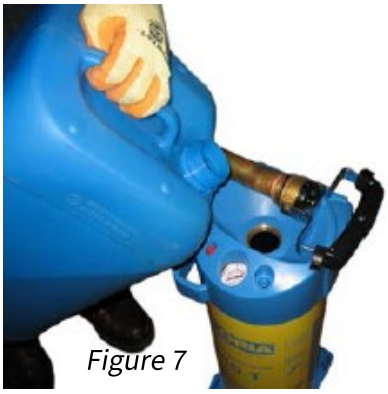


Figure 7


Figure 8

Pressure release valve

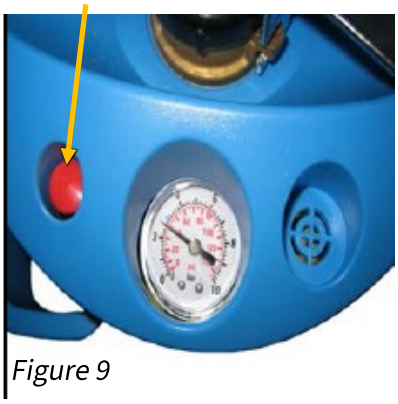


Figure 9

4.12 The spray unit should be filled with water and pumped up to a pressure between 3-4bar, register on the built-in pressure gauge (see Figs. 7 through 9). This will ensure an adequately powered water jet will be produced and will last through the time needed for average cut. Make sure that the jet lands on the blade.

If the water jet stops during a cut, simply increase the tank pressure back up to 3-4bar and/or re-fill the spray tank.

NB Any residual pressure in the tank can be vented using the release valve on the top of the tank before opening for re-filling.

5. OPERATING INSTRUCTIONS

5.1 Before starting the power pack, the machine must be in neutral and not drive (see Fig. 10a). With the drive in neutral, turn on the power pack and start the hydraulic flow (Fig. 10b).

Neutral

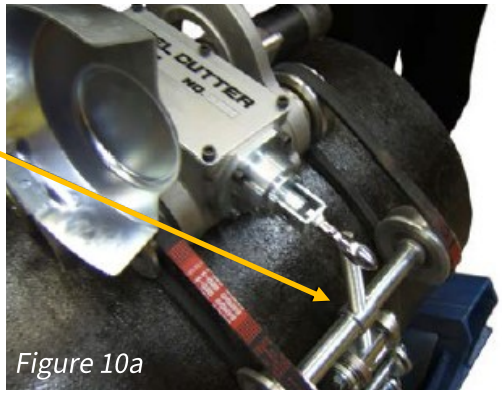


Figure 10a

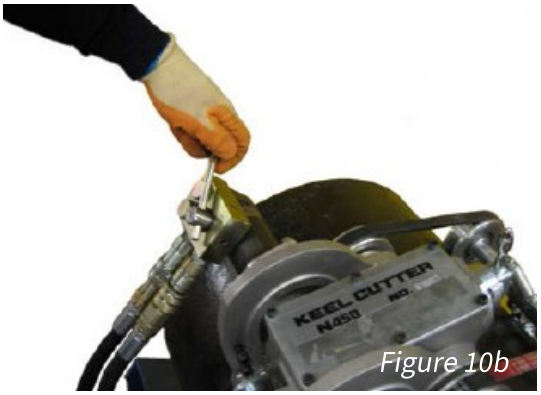


Figure 10b

5.2 Ensure safety guard is closed before commencing the cut (Fig. 11).


Figure 11

5.3 Lower the blade into the pipe; do not force the blade down, as this could cause the blade to buckle.

5. OPERATING INSTRUCTIONS (CONTINUED)

5.4 Feed the blade in gently, you will have one of two types of feeds, it will either be a hand feed (Fig 12a) or the more controllable screw feed (see Fig. 12b). Whichever you have, be gentle!

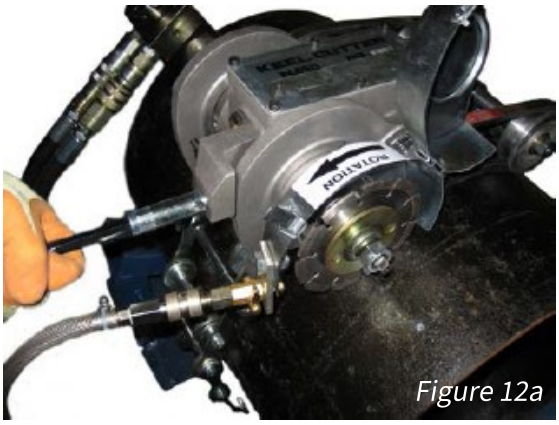


Figure 12a

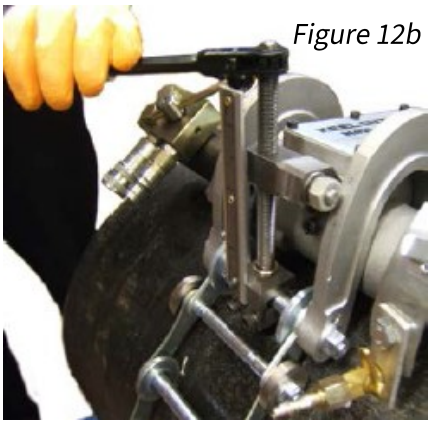


Figure 12b

5.5 When you are sure the cut is through the pipe wall, check the drive wheel is in line with the pulley and start the drive by pushing the feed valve handle down (see Fig. 13).

The **Keel** will drive itself around the pipe but you will need to keep checking the pulley is in line. If it requires realignment use the hide hammer by tapping the pulley on the side nut, not the wheel, until the pulley is in line.

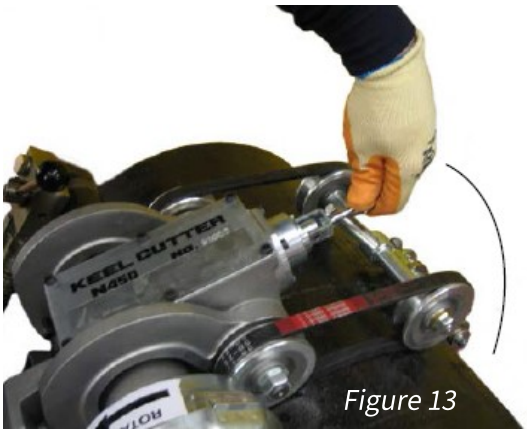


Figure 13

You **must** also put the steel wedges in the cut at regular intervals around the pipe, such as, 2 o'clock, 4 o'clock, 8 o'clock and 10 o'clock. This will make sure that an even gap is kept around the pipe, thus reducing the pressure on the blade.

When the machine has rotated a full circumference, and the blade has met with or just gone past the original cut, stop the drive. Do not turn off the blade rotation until you have removed the blade from the pipe. You may now turn off the power. To remove the machine from the pipe undo the pulley assembly by loosening the threaded bar using the ratchet provided. When there is sufficient slack you can unhook the chains and remove the machine from the pipe.

6. THINGS TO KNOW WHEN CUTTING STEEL PIPE WITH N450

6.1 When cutting cast iron or ductile pipe the motor speed is approximately 600-800rpm which is acceptable for the diamond blade BUT when cutting steel TCT blade must be used and the maximum speed for this blade is 250rpm. This reduction is achieved by fitting a control valve (Fig. 14) in the hose line before motor.

If you do not have the control valve, please contact Steve Vick International or your supplier who will be pleased to supply one.

6. THINGS TO KNOW WHEN CUTTING STEEL PIPE WITH N450 (CONTINUED)

6.2 Set up N450 as per manual until connection of hoses.

6.3 Connect the flexible hoses on the control valve onto quick release couplings on the motor and the hoses from the power pack onto back of valve block.

6.4 Set control on mark 5, this should be the correct setting for cutting.

6.5 With the drive lever in neutral, (straight out, not up or down) start up power pack and switch on flow.

6.6 Ensure the water hose is connected and suitable soluble oil mixed with the water to enable easier cutting of steel. Suitable oil would be Shell Dromus oil mixed in ration 50:1 water to oil.

6.7 Start the cut by lowering the blade with the feed screw (a must with cutting steel) gently, not too fast, until cut is through but if the machine seems to be struggling with the cut, set up to mark 6.

6.8 Place the drive lever in the downward position, the cutter will now rotate.

6.9 Place make sure the belts are tight and the pullet's are kept lined up.

Set control valve on setting 5

Figure 14

7. FITTING BLADES

7.1 To fit a diamond blade: Remove drive place from shaft place blade onto cutter holder, ensure that the 2 holder pins are clean through the holes on the blade, and the correct side of the blade is facing out. blades are marked with a direction of rotation arrow on one face (Fig.15).

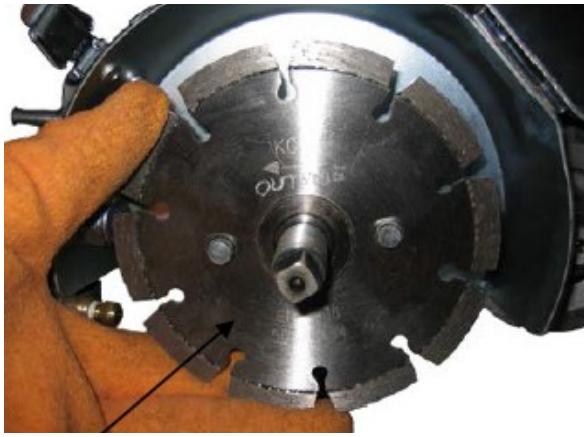


Figure 15

Figure 16

Direction of rotation: Anti-clockwise

7. FITTING BLADES (CONTINUED)

7.1 (CONTINUED) It is important that blades are fitting with this rotation arrow facing in the same direction as the arrow on the safety guard.

If in doubt, rub your finger along the cutting edge of the blade. You should be able to feel a smooth direction and a rougher direction. Place the blade on the cutter holder ensuring that the rough edge is running with the arrow on the cutter guard. Replace the drive plate, making sure the plate is flat against the blade, secure plate using nut and washers with a firm torque (see Fig. 16 & 17).

7.2 To fit a Tungsten Carbide Tipped (TCT) blade:

Follow instructions as per diamond blade. The TCT blade must have cutting edge following directional arrow on cutter guard (see Fig. 18). Again blades are engraved with directions of rotation arrows.

Figure 17

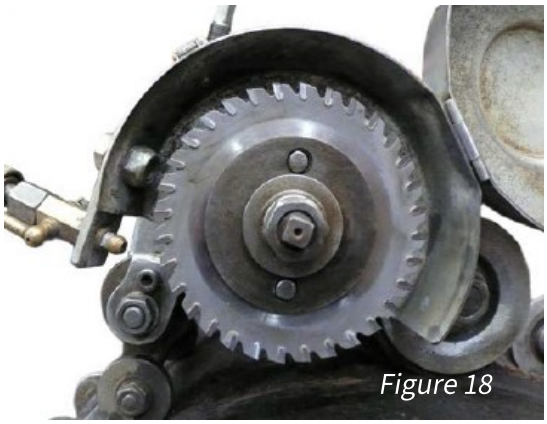


Figure 18

8. FITTING DRIVE BELTS

8.1 The drive belts must be inspected at regular intervals, to ensure that the belts have not perished in anyway or that the belts have not stretched and gone below the edge of the drive wheel. This is essential because, if the belts for any reason are faulty, the cut of the machine may start to spiral. This, and operator error, are the main reasons for any "run out" of a cut. If you think the belts need to be replaced, **both belts** must be changed at the same time to ensure even wear.

When fitting, follow instructions for removal of blade, then remove the cutter guard by taking out the 2 securing cup screws, this will free the old drive belt (See Figs. 19 - 22). Simply replace belt and reverse process. The other drive belt should just fit onto the drive wheel and should not be restricted from removal by any other object.

Figure 19

Figure 20

8. FITTING DRIVE BELTS (CONTINUED)

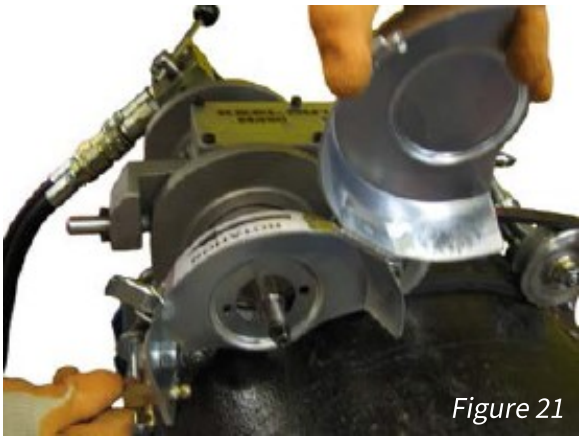


Figure 21

Figure 22

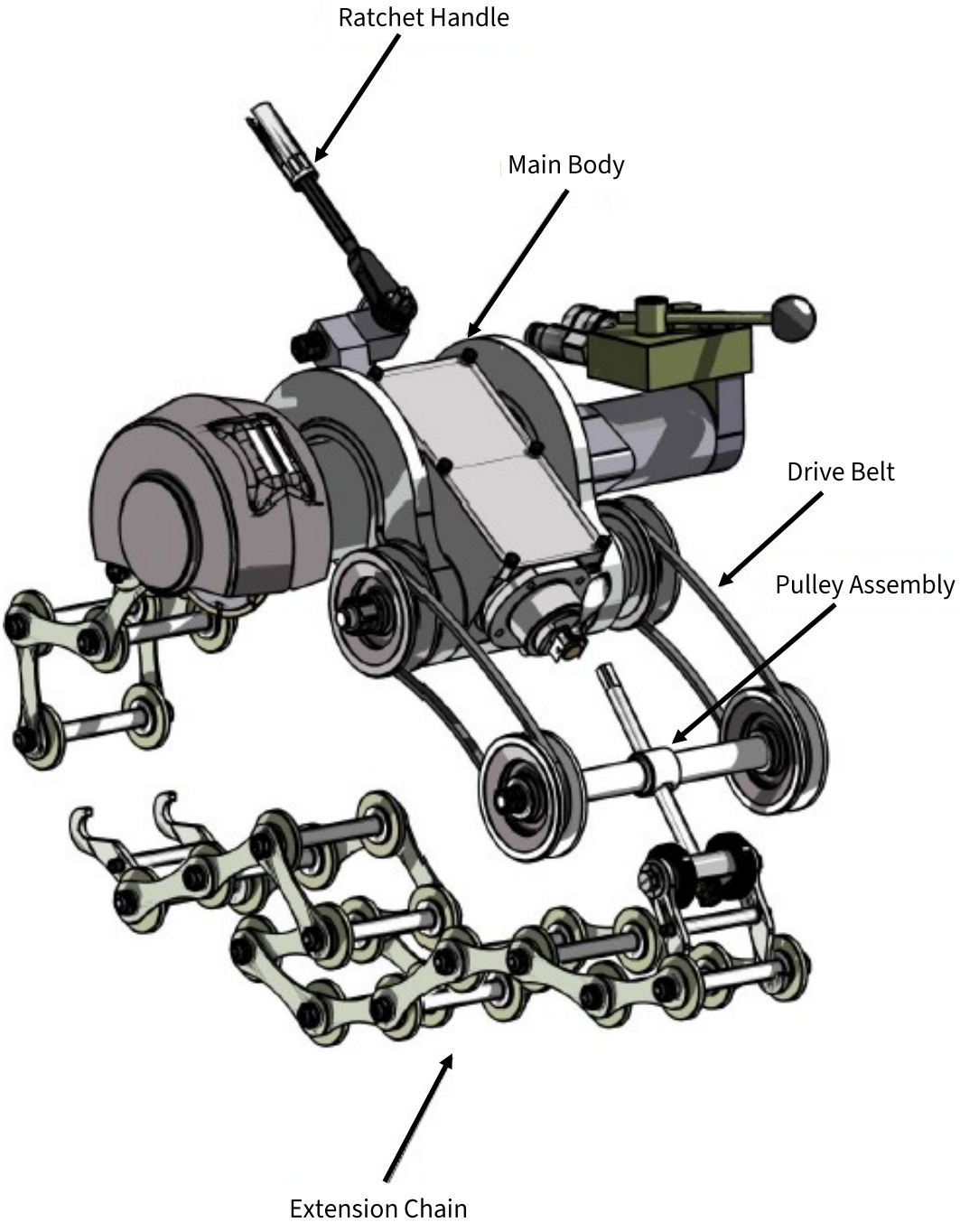
8.2 Rotational direction of the blade

Please make sure that when the blade is rotating, it moves in the direction of the arrow on the cutter guard (anti-clockwise, see Fig. 15). If it does not, this can be corrected by removing the quick release couplings from the motor and switching their positions. If this does not correct the fault, please contact Steve Vick International or your supplier.

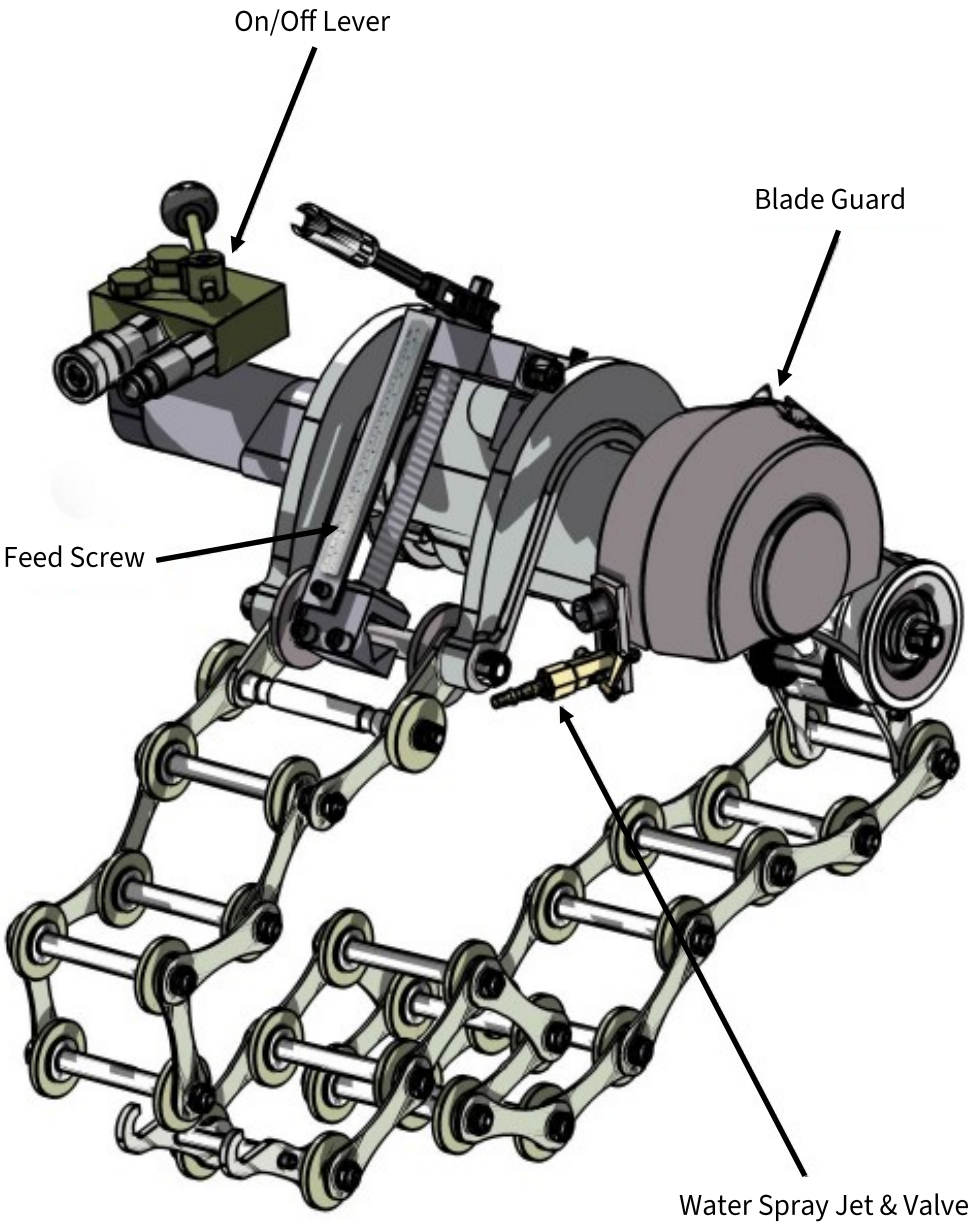
8.3 Key points to remember

- Make sure you are using the correct blade for the pipe you are cutting.
- When you put the **Keel** on the pipe, ensure it “Sits solid”.
- A constant flow of water/coolant is essential on the blade at all times.
- Wedges must be placed in the cut at regular intervals around the pipe.
- Do not stop the rotation of the blade until it is out of the pipe.
- Keep checking the alignment of the drive wheel and the pulley.
- Ensure you are wearing the appropriate PPE-goggles, gloves, dust mask, overalls and protective boots.

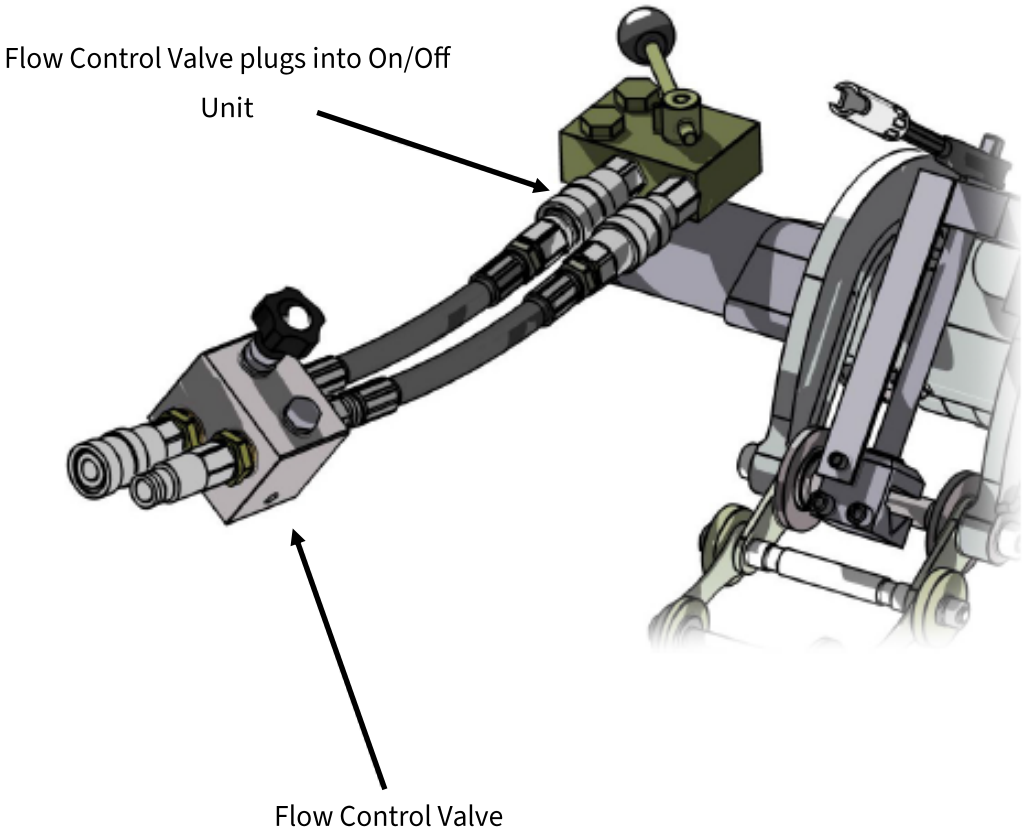
9. ASSEMBLY DIAGRAMS



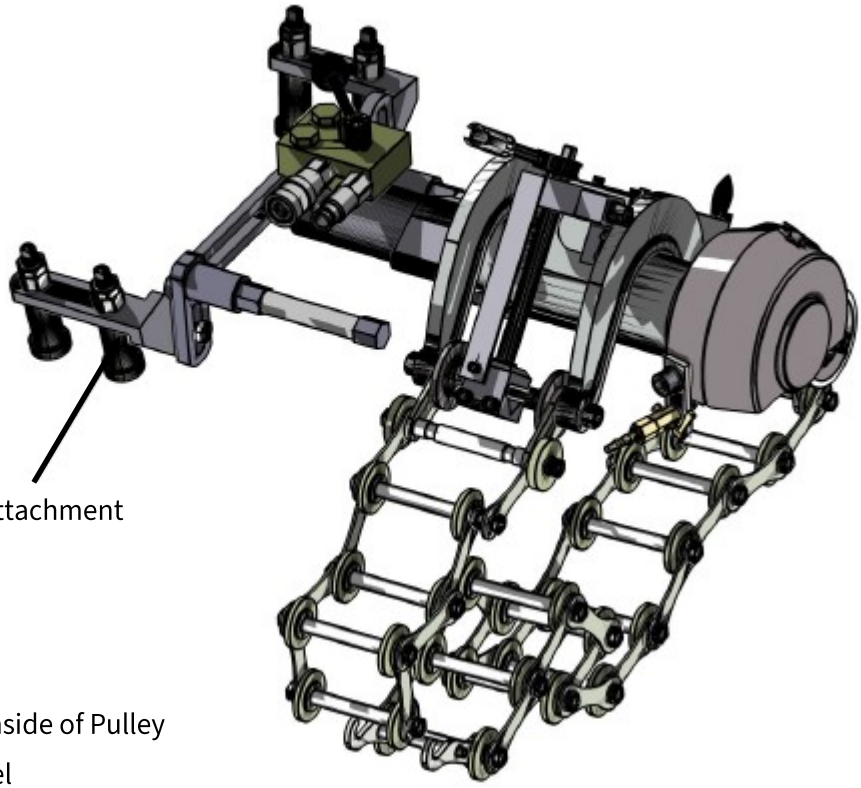
9. ASSEMBLY DIAGRAMS (CONTINUED)



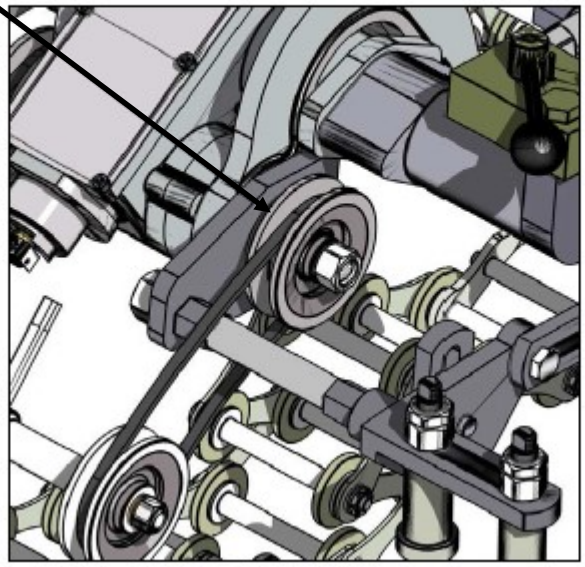
9.1 Assembly for use with TCT blade



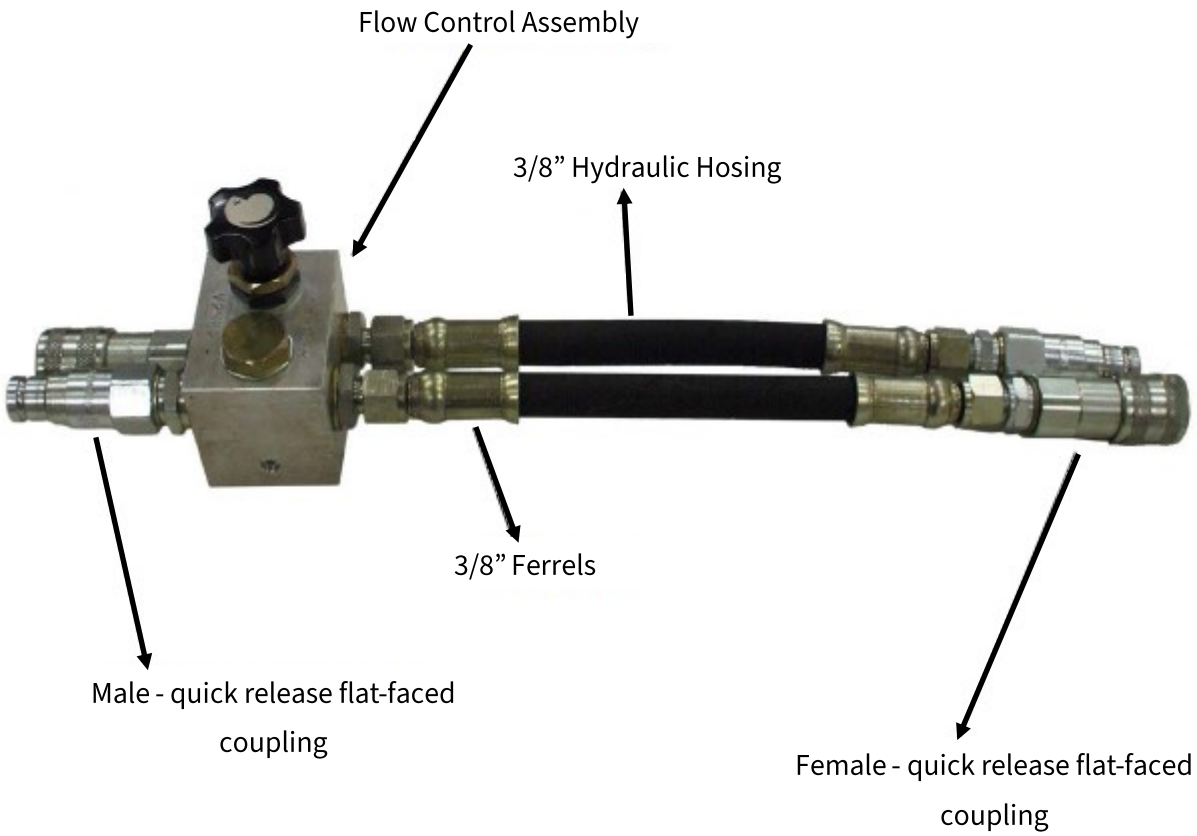
9.2 Assembly with guide ring attachment



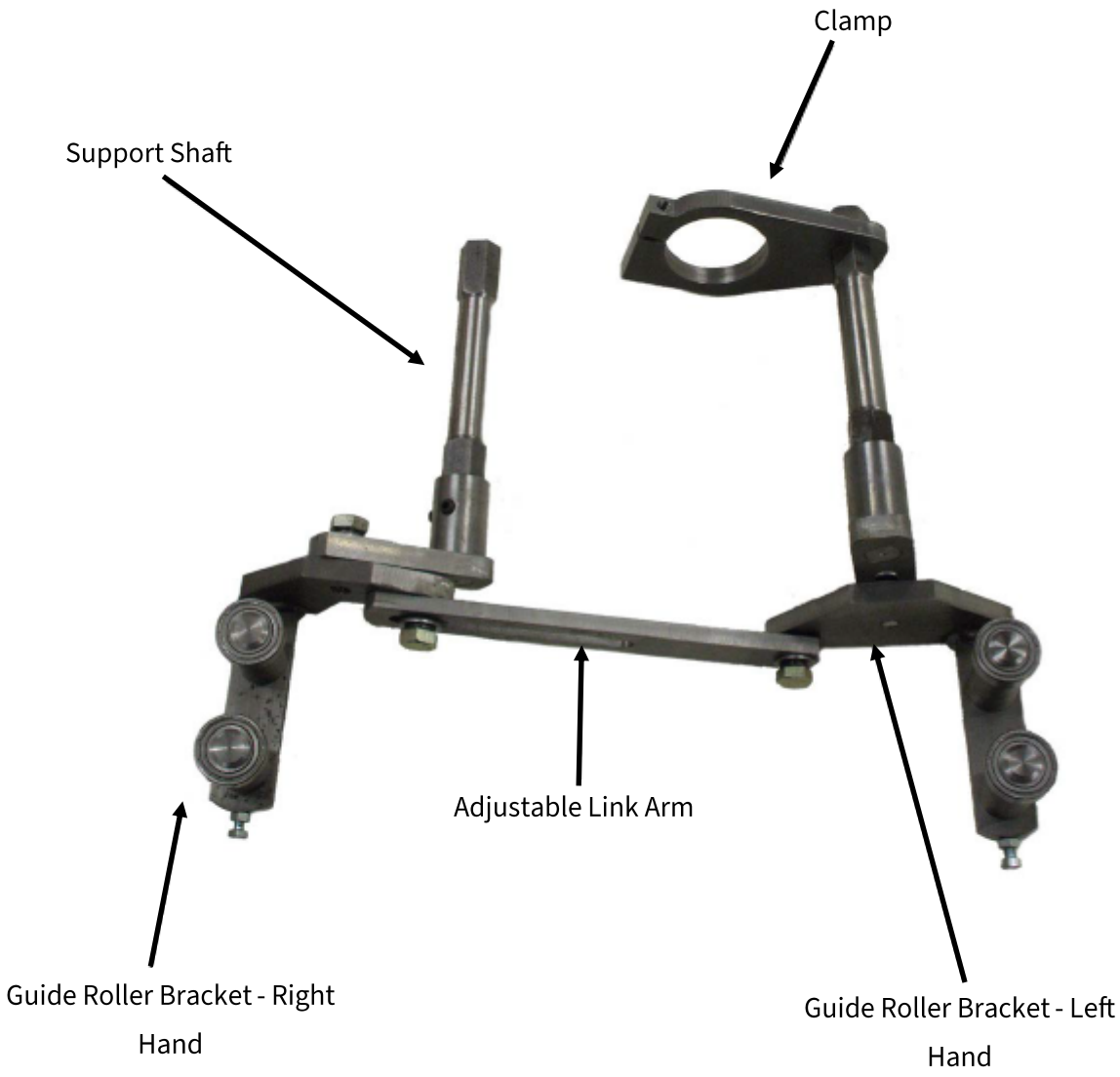
Clamp attaches inside of Pulley Wheel



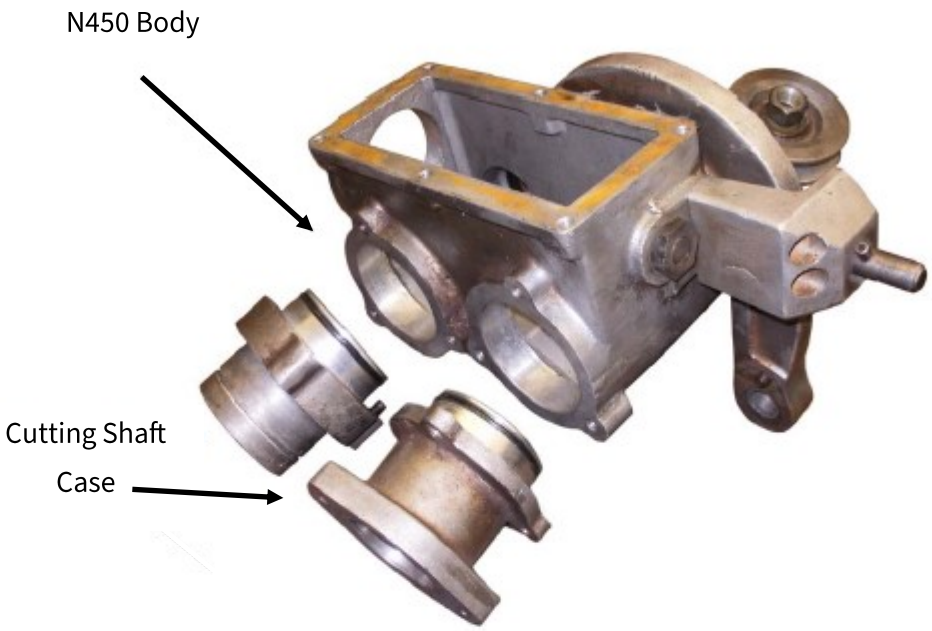
9.3 Flow Control Unit

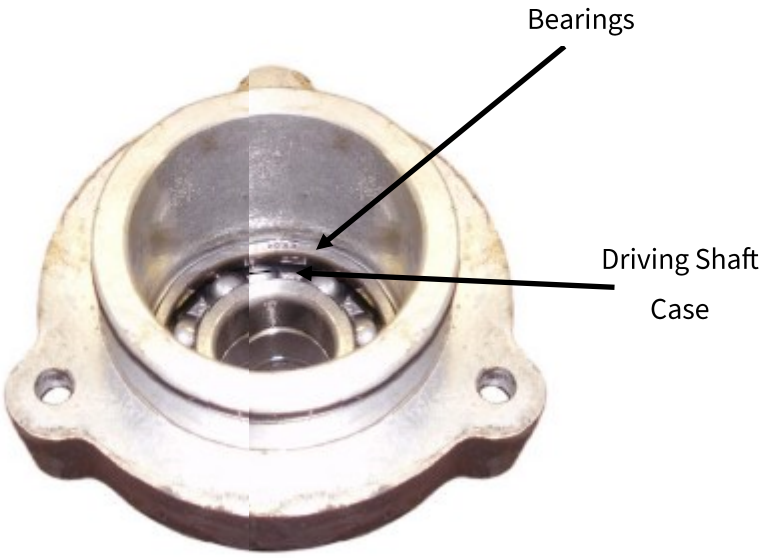


9.4 Guide Ring Attachment

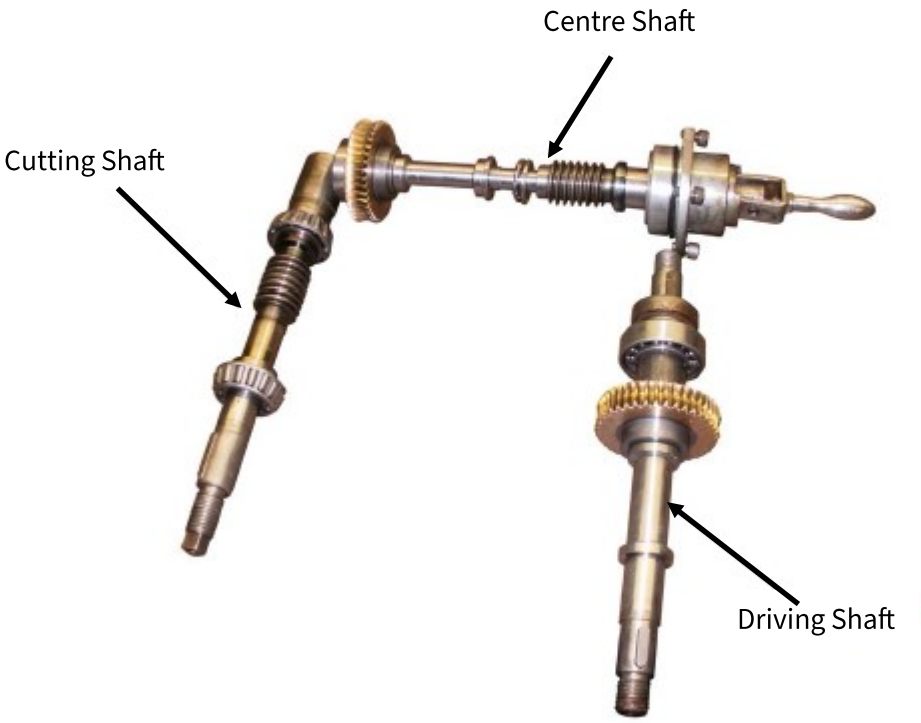


9.5 Internal Components

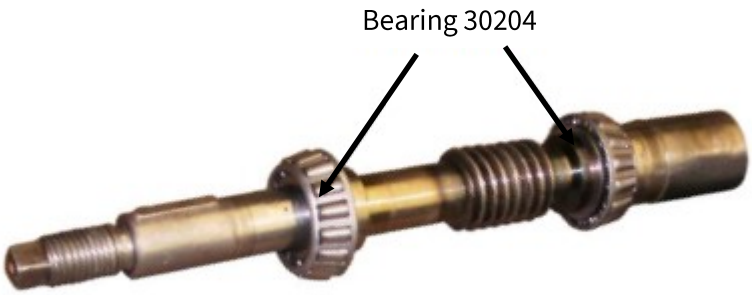




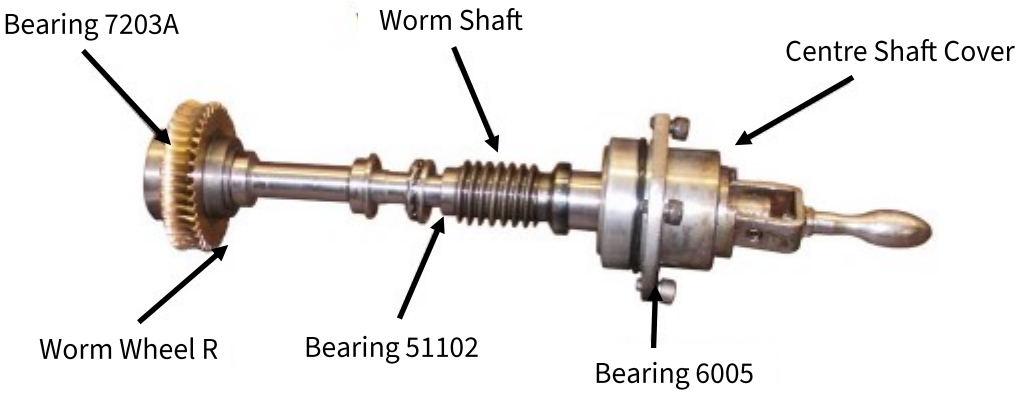
9.6 Gear & Shafts



9.7 Cutting Shaft



9.8 Centre Shaft



9.9 Driving Shaft