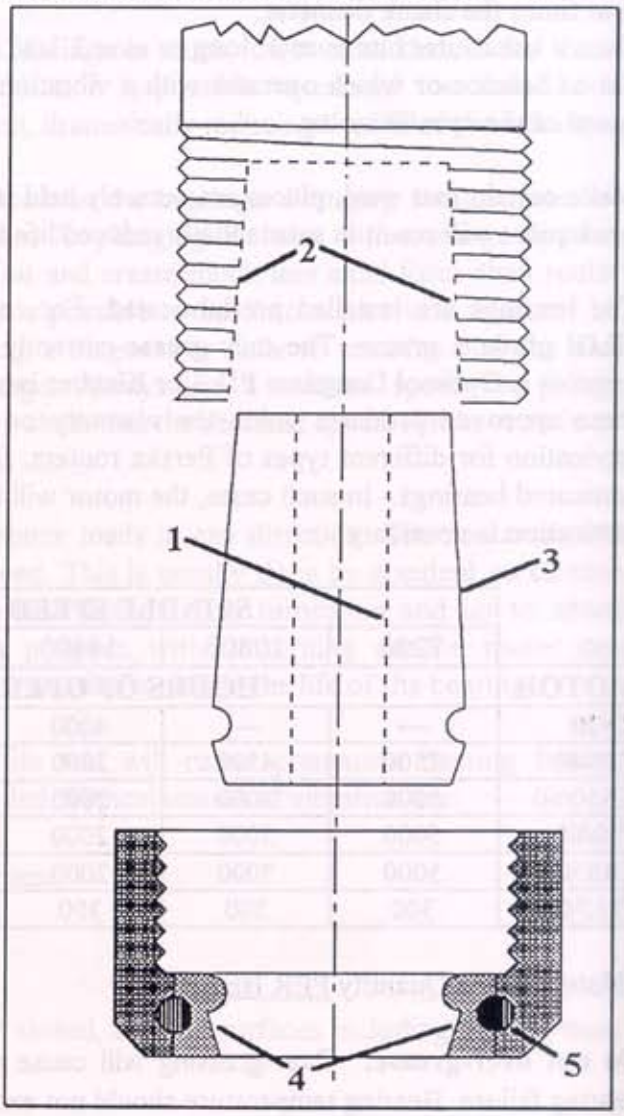
Prior to lubricating the bearings, clean the grease nipples carefully to prevent dust or dirt from entering the bearing during greasing. Contamination with dust or dirt will cause bearing failure.

Should the operating characteristics (temperature rise, noise level, vibration etc.) change, shut down the motor immediately to avoid damage.

5.0510 Collet Maintenance

Poor or inadequate collet maintenance is one of the most common causes of inadequate tool life and tool breakage. There are four, sometimes five, elements to the collet tool holding system. Inadequate maintenance on any of these elements can be the cause of tooling problems. The small amount of time required to regularly inspect and clean the collet system will be more than offset by the productivity increases and reduced overall costs.



Referring to the collet drawing, the following maintenance items should be addressed.

1. This is the inside of the collet which is the surface which holds the tool shank. A brown resin build up often accumulates on the inside end of the collet. Resin migrates up through the slits in the collet resulting in deposits inside the collet. This resin build up, if not removed, causes the collet to grip improperly on the tool shank. It prevents the collet from applying equal pressure throughout the entire range of the collet. This causes pressure points at the end of the collet which allow the tool to resonate inside, and allow the tool to slip within the collet. Slippage then causes what is commonly known as "collet burn", a condition where resins are deposited on the shank of the tool in the form of brown or black markings. Resin buildup can be easily removed from the collet interior with a brass tube-type brush. These brushes do not damage the collet internal clamping

surfaces yet they adequately remove the resins that solvents and high pressure air guns cannot.

2. The inside taper of the spindle is also a critical surface which accumulates resin build up and should be cleaned periodically.

3. The outside taper of the collet, both large and small, require regular inspection and should be cleaned of all deposits each time the tool is changed.

4. The inside taper of the nut should be clean and free from burrs. Burrs on this surface can not only skew a collet but can ruin a new collet. It is possible that a new collet can be damaged to the point it is unusable the first time it is used because of a collet nut in poor condition.

5. Some collet nuts have an internal thrust bearing connected to the inside taper. This bearing serves to reduce friction wear between the collet and nut as the nut is tightened. It is important that the bearings be free and turn smoothly. If the bearing motion is rough or if the bearing is frozen, it will cause runout of the tool and an out of tolerance condition.

The above components are critical to proper operation and should be properly maintained. In addition, collets should be replaced on a regular basis. At each tool change the collet should be inspected for metallic damage such as bell mouthing and burrs. If metallic damage is visible, the collet should be discarded and replaced.

Collets should be replaced on a regular basis even though no physical damage can be seen. Heat is transferred from the tool directly to the collet. The resulting heating/cooling cycles over time will remove the original tempering of the steel. Collets are made from tempered steel providing a certain amount of elasticity to grip the tool. As the heat cycle is repeated this elasticity diminished. When this occurs, the collet will require increased tightening to properly hold the tool. Over tightening distorts the collet creating eccentricities in the tool holder. Therefore, instead of over tightening older collets and creating other, potentially higher cost problems, they should be replaced.

Proper positioning of the tool in the collet is also important for proper operation and life. In order for the collet to properly function, the tool must be properly positioned in the collet. As more solid carbide tools have entered the marketplace, over-colleting the tool has become more commonplace. The area of a solid carbide tool between the cutting edge and the end of the flute fade-out area should not be inside the collet. The tool should always be colleted at the end of this fade-out area whether it is High Speed Steel, carbide tipped, solid carbide, or diamond. Over colleting the tool actually allows the collet to grip unevenly, often resulting in tool breakage.