

CUTTING HEAD MAINTENANCE GUIDE

Cutting Head

The abrasive moving through the cutting head is the culprit behind the component's wear and tear. The abrasive slowly wears away at the inner diameters of the **focus tube**; the orifice grows by approximately 0.001 inch per hour of cutting. This wear pattern is not always even, so one side of the focus tube may wear faster than the other.

Symptoms that alert the operator that it's time to change the focus tube are inside cuts that become larger and outside cuts that become smaller than intended. Also, operators may see poor cut quality in one or more directions.

Repair time takes 5 minutes to 10 minutes to switch out the **focus tube**.

The best way to avoid poor-quality cuts related to worn **focus tubes** is to:

- Track hours on the focus tube and begin to monitor cut quality and tolerance as hours mount.
- Adjust kerf compensation as required to remain within tolerance limits.

Older focus tubes don't necessarily have to be tossed in the garbage. Save them for less critical work.

Clogging of the abrasive focus tube also can cause problems. Clogs can occur from too much abrasive or an abrasive mesh size that is too large for a particular orifice diameter, large contaminants in the abrasive, or the focus tube tip contacting the workpiece during piercing or cutting.

A clog is easy to detect, the waterjet stops. Water may back up into the abrasive feed tube all the way back to the hopper until the machine is stopped. This entire feed line and the hopper must then be emptied and dried out entirely.

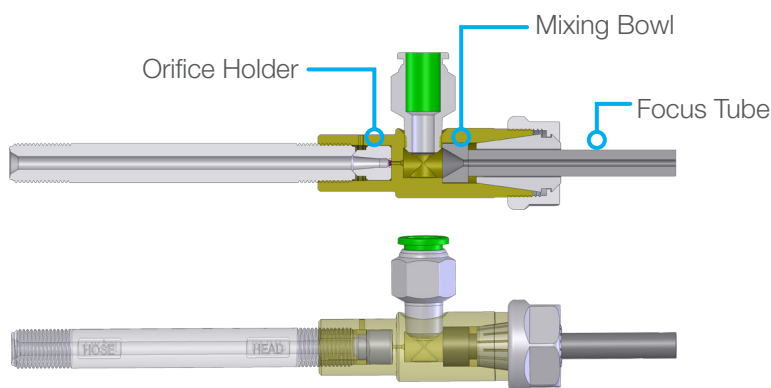
Sometimes people have success at clearing clogged focus tubes by turning them upside down and turning on the water at lower pressure. The time necessary to repair or replace components related to clogging can be anywhere from 5 minutes to 15 minutes.

The best way to avoid clogging is to:

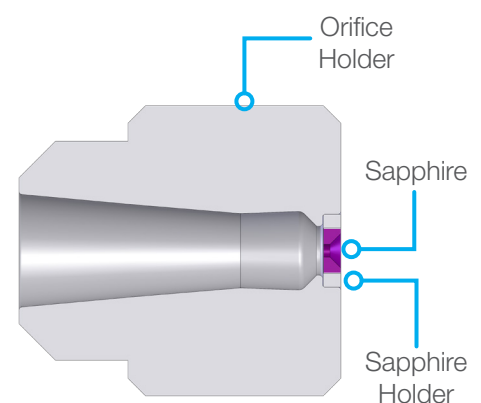
- Use the proper mesh size and quantity of abrasive for the focus tube being used. A grit around 50 will provide longer parts life while still providing a fast cut.
- Ensure that the abrasive hopper has a screening device to filter out most contaminants from the abrasive.
- Adjust the flow of the abrasive so there is a smooth consistent flow to the **cutting head assembly**.
- Use a clean knife to cut open abrasive bags to avoid getting paper from the bag into the abrasive.

Occasionally an abrasive nozzle may break. The tungsten carbide material the **focus tubes** are made from is very hard, but very brittle as well. Breaking usually occurs when the focus tube drags on the material surface, collides with a tipped-up part, collides with the edge of the sheet material, or simply is dropped during regular maintenance.

CUTTING HEAD ASSEMBLY SECTION



ORIFICE HOLDER SECTION



Check the Mixing Bowl

- The **mixing bowl** is where the abrasive is sucked into the waterjet stream. The abrasive particles are accelerated up to approximately 2.5 times the speed of sound.
- The **mixing bowl** is susceptible to normal wear and can have a 500-hour lifespan.
- Premature replacement of the **mixing bowl** may be needed if the **mixing bowl** and the water nozzle are misaligned caused by wear of the seat for the **orifice assembly**. This will cause the waterjet stream to cut into the mixing chamber.
- Clogging can occur in the **mixing bowl** as well if the abrasive is not screened properly or the abrasive flow is not properly adjusted.

Check the Orifice

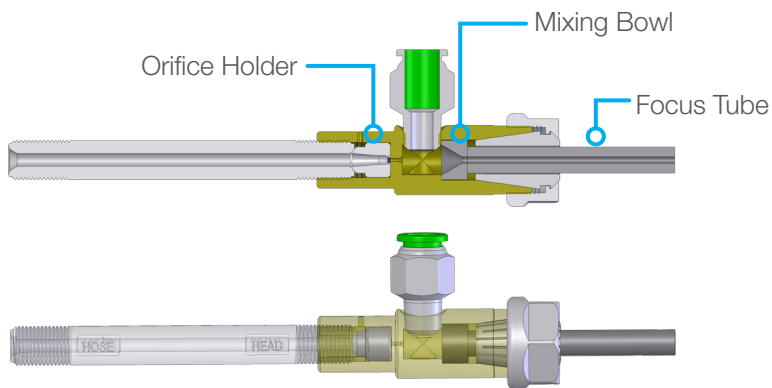
The **orifice** is where the water pumped in at 40,000 PSI is sped up to a waterjet stream traveling at 2,500 feet per second (FPS). Jewels—sapphires, rubies, or diamonds—are used to create the waterjet stream.

Sapphires have a life of 40 hours to 80 hours. The best way to avoid contaminating the jewels is to:

- Use a 1 micron filter at the pump and flushing the filter housing before replacing.
- Thoroughly flush all hoses.
- Start high pressure water before turning on the abrasive flow.
- Turning off garnet flow to flush the cutting head before turning off the high pressure water.

An indication of a worn jewel is poor edge quality. It takes 5 minutes to 15 minutes to switch out the worn parts.

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