

7 – SEAT-TUBE MILLING

ABOUT THIS CHAPTER

This chapter is about two procedures that might be done separately, or together, to improve the fit of a seat post in the frame. One procedure is honing, which removes corrosion and minor irregularities from the inside of the seat tube. The other procedure is reaming, which restores roundness and removes large irregularities from the inside of the seat tube.

GENERAL INFORMATION

TERMINOLOGY

Seat tube: The portion of the frame that the seat post inserts into.

Seat post: The post that connects the seat to the frame (seat tube).

Seat lug: The joint in the frame where the seat tube and top tube join; usually the seat stays join at this point as well.

Compression slot: The slot that allows the top of the seat tube to close down around the seat post when the seat post binder mechanism is tightened.

Hone: The name of a tool (and the process of using it) that polishes the inside of a cylinder, such as a seat tube.

Ream: Cutting material from the inside of a tube. The tool used to do this is a reamer.

Expansion reamer: A reamer that has an adjustable diameter.

PREREQUISITES

The only prerequisites for seat-tube honing or reaming are the ability to remove and install a seat post and the ability to determine whether a seat post is the correct size for the seat tube.

INDICATIONS

Symptoms indicating need of honing

Rust or corrosion on the seat post definitely indicates the need for honing.

Difficult removal or installation of the seat post is a definite indicator that the seat tube needs honing, and perhaps reaming as well. If not caused by rust or corrosion, this symptom is caused by imperfections inside the seat tube. Although the tube probably started out smooth and round inside, the process of welding or brazing tubes together can deform a seat tube by making it out-of-round, or by introducing bulges of material inside the tube on the backside of each weld; these bulges are called weld penetrations.

Symptoms indicating need of reaming

If after honing a seat tube it is still difficult to install the correct size of seat post, then it needs reaming.

TOOL CHOICES

The size of the stem or seat tube to be honed or reamed determines the size of hone or reamer required. All sizes are common, and all tools in the below list are recommended.

SEAT-TUBE HONE AND REAMER TOOLS (table 7-1)

Tool	Fits and considerations
Flex Hone BC20	13/16"–7/8" (BMX), fits common fork columns also
Flex Hone BC22	7/8"–15/16" (BMX), fits larger fork columns also
Flex Hone BC25.4	25.0–27.4mm seat tubes
Flex Hone AL25.4	25.0–27.4mm aluminum seat tubes
Flex Hone BC27	26.4mm–28.0mm seat tubes
Flex Hone BC29	Oversize seat tubes up to 31.6mm
Chadwick & Trefethen 26	20.64–22.23mm seat-tube reamer
Chadwick & Trefethen 28	25.4–28.5mm seat-tube reamer
Chadwick & Trefethen 29	28.5–31.7mm seat-tube reamer

7 – SEAT TUBE MILLING

TIME AND DIFFICULTY

Honing a seat tube is a 2–3 minute job of little difficulty. Reaming a seat tube is a moderately difficult job that can take 5–20 minutes, depending on the amount of material that needs to be removed.

COMPLICATIONS

Aluminum

There are no problems with reaming aluminum seat tubes, but there is with the honing process. The grit material for honing aluminum is completely different than the material used for steel. The Flex Hone AL25.4 is available for aluminum seat tubes of conventional size, but there is currently no hone available for under- or over-size seat tubes.

Titanium

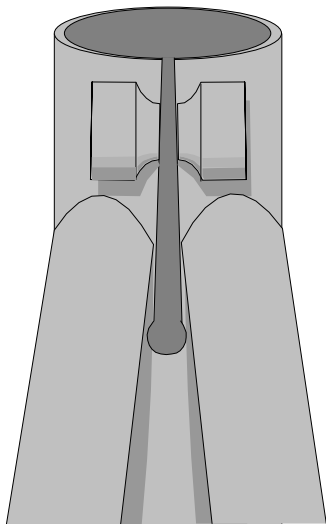
Hones or reamers suitable for use on titanium seat tubes currently do not exist.

Carbon fiber/composites

Carbon fiber or composite seat tubes are unsuited to being honed or reamed. If there is an aluminum insert in the seat tube, then it may be honed.

Deformed seat-lug/seat-tube top

If an under-sized seat post has been installed in the frame then the top of the seat tube may be deformed. This is easy to check and correct. The compression-slot width should be uniform. If it is more narrow at the top than the bottom, then insert a broad slotted screwdriver in the compression slot and lever it open, before beginning honing or reaming.



7.1 If the seat-tube compression slot is narrower at the top like the one in this drawing, the slot should be expanded before attempting honing or reaming.

Wrong size seat post

Reaming is not used to enlarge a seat tube to fit a seat post larger than the one designed for that particular frame. On the other hand, just because a seat post is difficult to install does not necessarily mean that the seat post is too large. Obstructions in the seat tube will make a correctly sized seat post seem as though it is too large.

If reaming were used to fit a seat post that is too large, the job would take an unbelievably long time to complete, and there would be a stress riser in the seat tube at the lowest edge of where the reaming was done.

SEAT-TUBE HONING AND REAMING PROCEDURE

1. [] **Measure seat post to determine correct size of hone to use.**

To keep messy cutting oil and metal fragments from collecting in the bottom bracket or at the bottom of the seat tube, position the frame so that it is uphill to the bottom bracket from the top of the seat tube.

2. [] **Position frame so top end of seat tube is lower than bottom end of seat tube.**
3. [] **Install hone in drill and coat hone with cutting oil or honing oil.**

In the next step the hone is inserted in the frame fully before starting the drill. Oil will be slung everywhere if the drill is started while the hone is outside the seat tube.

4. [] **Insert hone fully into seat tube, then start drill (moderate speed).**

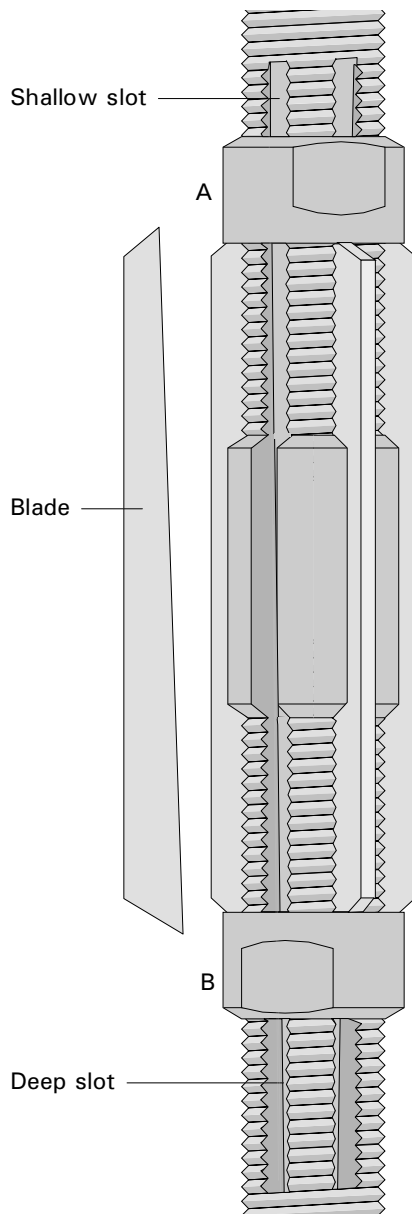
A hone will polish away roughness, but will not cut away lumps of excess metal or restore a non-round seat tube to round. What polishing it can do can always be accomplished in 20–30 seconds. Any more time spent honing is a waste of time. Most of the help needed is in the top two to three inches of seat tube, so spend the time there and just make a quick pass to the full depth of the hone.

5. [] **Hone for 20–30 seconds in seat lug and joint of top-tube and seat-tube area.**
6. [] **Insert spinning hone to its limit and pull back up to top of seat tube.**
7. [] **Stop drill and remove hone from seat tube.**

In the next step progress is checked by inserting the seat post. Corrosion should be cleaned out first.

8. [] **Insert seat post to check for resistance to insertion.**
9. [] **If excessive resistance remains after honing, select appropriately sized expansion reamer.**

10. [] Adjust expansion-reamer blades up or down until reamer inserts easily but does not jiggle inside seat tube.



7.2 An expansion reamer with a blade removed to show the sloped slot that is shallower at the top end of the tool. Adjust A up, then B up to enlarge the reamer.

11. [] Squirt cutting oil into seat tube.
 12. [] Rotate expansion reamer clockwise until it is effortless to turn.
 13. [] Test fit seat post.

Expansion reamers can only cut a very small amount of material at a time. If the expansion adjustment is too much (more than a 1/4 turn of the collars) the tool will not fit in the seat tube or will jam when rotated. It is likely that many small adjustments will be needed to get the job finished.

14. [] If seat post was too difficult to install, adjust upper expansion-reamer collar 1/4 turn up, then lower expansion-reamer collar 1/4 turn up.
 15. [] Coat blades with cutting oil and insert expansion reamer into seat tube.
 16. [] Rotate expansion reamer clockwise until it is effortless to turn.
 17. [] Remove expansion reamer.
 18. [] Repeat steps 13–17 as many times as necessary until seat post is a satisfactory fit.

After completing the reaming, it is advisable to use the hone one more time to smooth the inside surface of the seat tube to prevent any further galling.

19. [] Repeat steps 4–7.
 20. [] Stuff a rag or a wind-instrument swab inside seat tube to clean out oil and cuttings.

7 – SEAT TUBE MILLING