This document covers how the HSK spindle clamping unit works and the basic maintenance that it requires.

**Introduction**

Haas Automation is now offering two new tool holding options: HSK-A63 and HSK-F63.

The HSK-A63 option has been integrated into our previous 40T 15k inline spindle design, and this will be built on our production floor. The HSK-A63 utilizes clamping unit style B by OTT-JAKOB. The HSK-63A spindle option is currently available on the UMC-1000/SS, the VM-2, VM-3, and VM-6 with optional max speeds of 12,000 or 15,000 RPM.

The HSK-F63 option will be purchased as a complete spindle from HSD Mechatronics. It will have a max speed of 25,000 RPM. The HSK-F63 option will only be available on future machines, the GR-712 5-axis, and the GM-2-5ax which are not yet available. This information is accurate as of 6/26/2019 and will be updated as more options become available.

The HSK type toolholders are unlike other toolholding solutions we use in that they are hollow, shorter, and have a steeper shank. The acronym HSK is translated from German as hollow taper shank for that reason. Since they are hollow and shorter, they are lighter and have the ability to perform faster tool changes. They clamp the toolholder radially and axially, contacting the toolholder with the spindle face. HSK toolholders are in general more rigid and thus reduce any noise from resonant frequencies generated within the system. This leads to reduced chatter and an overall exemplary toolholding system.
The HSK unit clamps the tool holder from the inside using gripper segments [6] that hook onto a ramp within the toolholder [10]. They press outward and thus clamp force increases from centripetal force as the spindle increases in speed. You never want to run an HSK spindle without a toolholder for that reason, you will damage the gripper segments. The TRP (tool release piston) now has an additional switch that will sense if a tool is installed to the spindle or not. It should not allow the spindle to run without a tool. It senses an extra groove that is installed to the guide release of the spindle.

The clamping cone [4] screws onto the drawbar. When the drawbar unclamps the gripper segments [6] will slide back along the ramp of the clamping cone and allow a tool to be removed or inserted. They will then slide forward and expand when the drawbar clamps. The spacer unit [8] applies a pre-load to the segments that keeps them securely installed to the spindle shaft bore they sit in. Push-out is set by tightening or loosening the clamping cone; the locking screw [5] then locks the clamping cone into place once push-out is set. The bronze bushing [2] secures in the clamping cone via a snap ring [1]. The bushing and lip seal [3] mate with a coolant tube, if there is one, inside of the tool holder. The other seals consist of two O-rings [7] and [9]. All of these components must be sufficiently greased or clamp force could be lost and the system will wear prematurely.
**WEEKLY:**

- Check the packing ring (lip seal) for wear
- Check the gripper for damage, dirt, and for sufficient grease
- Re-grease all edges of the clamping cone and gripper segments that contact each other
- **Note:** Do not mix grease (the spindle was assembled using METAFLUX grease: Metaflux paste 70-8508 or Metaflux spray 70.82 are acceptable)
  - If the unit is very dirty
    - REMOVE THE CLAMPING UNIT and clean thoroughly
  - Do not spray compressed air into the spindle clamping unit - it will blow out all the grease
  - Always leave a protective HSK-63A toolholder in the spindle that does not have through-holes to prevent contamination of the clamping unit

**6 MONTHS OR 200,000 TOOL CHANGES:**

- **MEASURE THE PUSH-OUT IN THE UNCLAMPED POSITION** (10.5 mm +/- 0.1 mm; 0.41 in +/- .004 in)
  - Re-torque the locking screw through a clamped tool if you needed to adjust the push-out
- Test clamp force (pull force):
  - HSK-A63: 2,835 - 4,050 lbs
  - HSK-F63: 1,730 - 2,472 lbs
  - If clamp force is not met you may need to re-grease the clamping unit, replace broken gripper segments, or replace a worn drawbar. Troubleshoot accordingly.

**YEARLY OR 500,000 TOOL CHANGES:**

- Replace the packing ring (lip seal)
  - It's not necessary to remove the bronze bushing to replace the seal, use pliers to grip the
HSK tool loading

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Push tool release.

Insert the tool holder into the spindle and if the face of the tool holder does not mate flush with spindle face the tool is not oriented properly.

Remove the tool holder and rotate it 180 degrees.

Reinsert the tool holder and confirm the faces mate.

⚠️ WARNING: If a tool is inserted 180 degrees out the spindle will not rotate, however a tool change can be commanded which could cause a tool change failure or the tool to be dropped.
All of the following tools need to be purchased in order to properly maintain and service our new HSK spindles. These tools can be purchased off-the-shelf. You can acquire these tools from anywhere you like, links are provided to give an example of the less common tools. TAC Rockford and Advanced Machine Engineering Co. have good options for HSK tooling, and they also sell sturdy cases with different kit options to keep all of the tools together and protected. All tools need to be purchased in 63A and F versions or with adapters for each. Keep tools calibrated and clean.

- **T-0118 HSK-A63 O-RING MANDREL TOOL W/ PACKING** (Purchase only available through Haas Automation)
- **CLAMP FORCE (PULL FORCE) MEASUREMENT TOOL** to check drawbar and clamping unit clamp force
- **HSK-63A/F TEST BAR (ARBOR/MANDREL)** to check taper accuracy
- **HSK-63A/F ER 32 COLLET** for the ball bar test
- **HSK-63A/F BALANCED TOOL HOLDER (PLUG)** for running vibration tests
- **HSK-63A/F TOOL CHANGER ALIGNMENT TOOL** (split tool) to align the spindle to the double arm
- 5mm metric hex socket bit to torque the locking screw when adjusting pushout - you want this to be long enough to put through a tool holder - see the **HSK-A63 REPLACEMENT PROCEDURE FOR DETAILS**
- **M5 T-handle hex wrench** for the locking screw
- **24mm wrench** for grabbing the flats on the clamping cone
- **HSK SPINDLE TAPER WIPER** for cleaning the spindle taper
- **HSK SPINDLE TOOL TAPER WIPER** for cleaning tool holders
- **METAFLUX paste 70-8508 only**

**Warning:** NEVER MIX GREASE TYPES
- Dedicated re-greasing brush or METAFLUX spray can. Keep clean and allow absolutely no contamination.
- **Hooked pick** for removing o-rings
- **Pliers** for removing the lip seal and
Resources

Product information including ceiling speed, transferrable torque, and replacement part numbers can be found in the following documentation and on the ADVANCED MACHINE & ENGINEERING CO. WEBSITE:

- OTT-JAKOB HSK-B CLAMPING UNIT MANUAL
- OTT-JAKOB GRIPPERS AND ACCESSORIES GUIDE