

**DAVENPORT**  
**MACHINE**

Frequently Asked Questions

# HP HEAD



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## Q1: What is the HP Head?

**A:** The HP Head is the next generation revolving head assembly for the Davenport 5-spindle machine. It is a High Precision system consisting of all new designs of the Head (spindle carrier), spindle bearings, outer and inner spindles, and spindle gear components, as well as a new spindle lubrication system.

## Q2: How reliable is this innovative technology?

**A:** As of April 2019, there are over 210 HP Heads in use around the world, with a total of nearly 1600 years of service between them. That's roughly 3 million hours of runtime, and 80% of them have never required any repairs. On average, repair costs have run roughly \$0.07/hr.



## Q3: What increases the rigidity of an HP Head, and how is it different from a Standard Davenport 8-SA Revolving Head?

**A:** The main difference is in the spindle design. The Outer Spindles of an HP Head are directly supported by 5 Super Precision Angular Contact Ball Bearings. The bearings, in an arrangement similar to what you find on most of today's single spindle CNC Lathes, are rigidly mounted directly into the Revolving Head, not in bolt-on housings. These heavy pre-load bearings have ZERO play, compared to the .0015-.0020 clearance in the bronze bushing of a new 8-SA head. As a result, part accuracy and repeatability are more similar to a CNC Lathe than a traditional Davenport Multi Spindle. An additional benefit is that 50% wider forms tools can be used and surface finishes are generally improved 30%. Many parts that previously could only be run on 6 and 8 spindle machines can now run on 5 spindles with substantially shorter cycle times.

## Q4: Are the collets the same?

**A:** Yes, the HP Head uses the same collets as an 8-SA Head, however the collet on an HP Head draws back during chucking rather than the spindle pushing forward.

## Q5: What are the main benefits of the new HP Head design?

- A. Accuracy
- B. Thermal Stability
- C. Rigidity
- D. Long Lasting
- E. Lower Maintenance / Operational Costs

## Q6: How accurate is the new HP Head?

**A:** Much like a traditional head, the tolerances that can be held on an HP Head still depend largely on the part material, design, and tooling used. When comparing the performance of a machine equipped with an HP Head versus one running an 8-SA Head, a good rule of thumb is as follows: running duplicate layouts of the same part on both machines, the HP Head will hold tolerances 30% to 50% tighter than a brand new 8-SA Head. As the 8-SA Head's bronze bearings and spindles wear through their roughly 1-year service life, the difference will be even more pronounced.



## Q7: How does the HP Head's better thermal stability help users?

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**A:** The HP Head will only produce 1/3 of the temperature rise from room temperature at any given spindle speed. For a machine with an 8-SA running at 135°F, you can expect a similar machine with an HP Head to run at about 92°F. For most parts, this means no tooling adjustments need to be made as the machine “warms up” or “cools down” during morning start-ups and stock-ups. Most parts run on an HP Head have almost no size changes due to temperature. Lubricant temperatures stay lower, which means that tools will be more effectively cooled, and lube life will be extended. The lower running temperatures also help keep the shop floor temperatures more stable and comfortable, reducing summer air conditioning costs.

## Q8: What allows the HP Head to run for years without extensive maintenance or replacement parts?

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- A.** First, the Angular Contact Ball Bearings of the HP spindles are rated to last 16\* or more years in a typical application. These bearings will maintain almost new accuracy for 95% of their service life, up until they ultimately lose their pre-load and need replacement.
- B.** Second, all 5 spindles are constantly lubricated by an advanced air-oil lube system that pressurizes each bearing cavity, maintaining a flow of clean, cool, lubricated air through each bearing. This is achieved while providing back-pressure to each bearing seal to keep chips and contaminants out.
- C.** Third, the OD of the HP Head is treated with a low-friction, micro-textured hard coating that significantly reduces wear not only on the Head OD, but also on the mating bore of the machine bed. After 15 years of service, the first four machines equipped with HP Heads have seen no measurable wear on the Head OD or machine bed bore. Uncoated heads would typically see the head gap wear open .001 to .003 larger than the “new” condition during that time frame, and may require expensive machine re-builds to continue making high quality parts.

## Q9: Why do HP Heads have lower maintenance / operational costs?

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- A.** The higher accuracy and thermal stability leads to better production efficiencies. With a conservative 5%\* increase in productivity, the HP Head can put out an estimated additional 100\* hours or \$5,000 of production per year, based on a \$50.00/hr machine cost.
- B.** The HP spindle ball bearings last roughly 16\* times longer than the 8-SA's bronze boxes and thrust bearings. The average cost of annual maintenance of an 8-SA Head, including parts, labor, and lost production hours is approximately \$2250. HP Heads have an estimated 16 year maintenance interval, with an annual amortized cost of just \$344.
- C.** Machines equipped with HP Heads use approximately 40% less lube oil. On a machine running 2000 hrs per year, that's approximately 22 gallons less per year, or an annualized savings of around \$112.00\*.

## Q10: Can the HP Head be serviced in the field by regular maintenance personnel?

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**A:** Yes. Should you desire to replace your own bearings, Davenport has a toolkit with every specialty tool required for field-servicing of the head.

## Q11: Can the bearings be replaced inside the machine, or do I need to remove the headcap and pull the head out?

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**A:** Bearings can be replaced inside the machine with the removal of the 4th position tool spindle. If all 5 spindles need to be serviced, we recommend pulling the entire head out of the machine.

## Q12: Can I put an HP Head in any machine?

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**A:** An HP Head can be installed in almost any pan base Davenport 5-spindle machine, including Model-B's, Servos, and in Regular, as well as Extended Bed configurations. Some older Model-B's may require an upgrade to the electronics box to accommodate the new lubrication system. Upgrades to HP Heads are available on any new machine, and retrofits can be performed on machines being rebuilt at Davenport.

### Q13: How many types of HP Heads are available?

**A:** There are 8 varieties of HP Heads. They are available in either Regular or Oversize capacities, with either Aligning Gears or Spindle Stopping Clutches, and for Regular or Extended Beds.

### Q14: Can the HP Head run as fast as my current revolving head and spindles?

**A:** Yes. Spindle RPM is generally limited by other machine components or application-specific tooling.

### Q15: When I upgrade to an HP Head, what am I getting?

**A:** The HP Head assembly is a complete, pre-built revolving head from the left-end bracket support ring, right down to the center drive shaft. It is ready to drop into your machine bores. It includes the head, index blocks, all outer and inner spindles, bearings, spindle gears, ring gear, indexing gear, left-slide bracket, tool post stop, and left end center drive.

### Q16: Will the spindle braking attachment hurt my spindle bearings?

**A:** HP Heads with Spindle Stopping Clutches do not need to use the external spindle braking attachment. The spindle stopping clutch has an integral brake that is automatically applied when the gear is disengaged, and has 200% of the holding power of the old external spindle brake, without placing any side-load on the bearings.

### Q17: Can I run my standard lube oil through my HP lube system?

**A:** The HP lube system is certified and calibrated to run Mobil Vactra 2 oil. It has been extensively tested to ensure compatibility with all the lube system components, and provide proper lubrication to the bearings. Users that have tried to run other oils, or "reclaimed" oil through the system, have had mixed results, and the practice is not recommended.

### Q18: What kinds of materials can I run on an HP Head?

**A:** The HP Head will run any type of material you can run on a standard head, plus it can effectively run difficult to machine materials. Users have run parts made from 52100 bearing steels, various tool steels, and high-temp materials for aerospace fasteners.

**\*NOTE:** All cost savings and hourly calculations are based on 2,000 machine production hrs/yr, at \$50.00/hr rates.

9c – Lube calculations based on the following:

22 gal x \$6.62/gal = \$145.64 savings/yr in standard machine oil

2 gal x \$16.76/gal = \$33.52/yr cost for HP Head lube

\$145.64 - \$33.52 = \$112.12 net savings per year



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