Collet to Collet Precision

Overview

Precision and productivity have always been key ingredients for the success of manufactured lenses, both contact lenses and IOLs. Ultra precision IOL manufacturing has 3 discrete mechanical steps: first side machining, blocking and second side machining. Significant precision is lost as the part moves from collet to collet. Benz R&D has the technology to address two components of collet precision: run-out and position. Collet run-out occurs because the collet's center of rotation does not match the lathe spindle's center rotation. In the Benz type of spindle the mismatch of the collet to its spindle is eliminated by precision lapping the collet cone into the spindle shaft until reaching the desired collet/spindle run-out. A portion of the entering exhaust air from the spindle is also redirected through the collet to prevent swarf from altering the tolerances of the cone and collet. The second component of collet-to-collet precision is repeatability of position. We have solved this by designing:

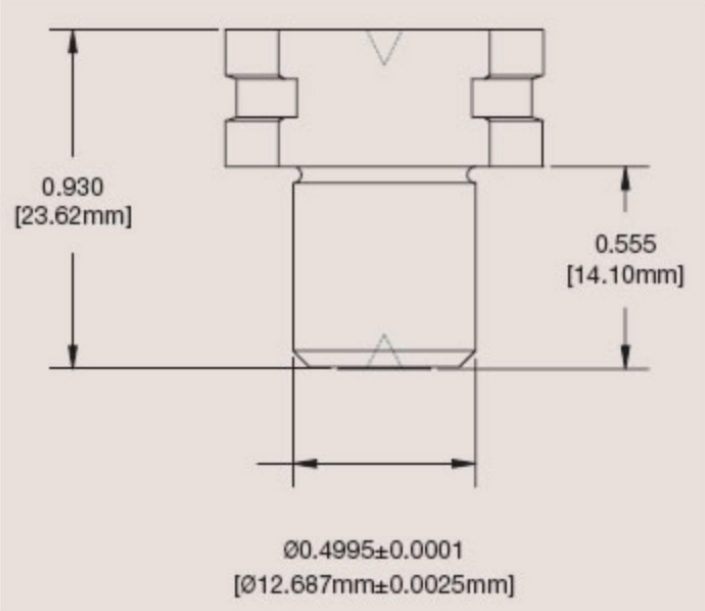
- a precision dead-length collet and
- a precision steel mandrel

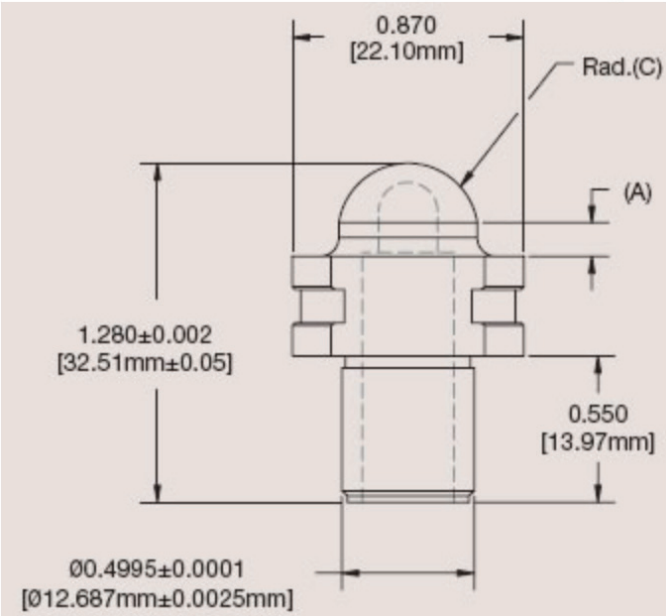
Using this precision position dead-length system and precision dimension blanks, it is no longer necessary to measure the position of the surface before beginning the first lathe pass. This saves time on every lathe machining cycle. The Benz spindle with precision lapped dead-length collet, precision mandrels and blank mounting centering rings are all available as technology products from Benz R&D.

Precision Mandrel

A drawing of the Benz mandrel with a precut blank attached and the same mandrel with the centering ring used for wax mounting the blank into the mandrel is shown below.

Dimension of a Benz Precision Steel mandrel.





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Technical

The Repeatability of Total Indicated Run-out (TIR) of a Benz precision Steel mandrel during 10 repeated collet loads on a 4-Axis Lathe, using the Benz collet/spindle assembly is show in the table below.

Reading #	Total Indicated Run (mm)
1	0.0036
2	0.0038
3	0.0039
4	0.0036
5	0.0036
6	0.0041
7	0.0034
8	0.0025
9	0.0036
10	0.0029
Average	0.0035
STDEV	0.0005