

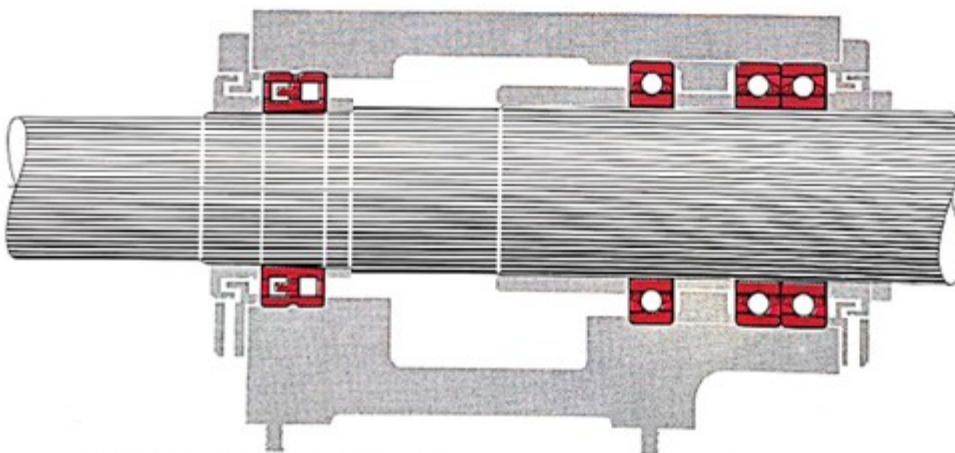
**Standard arrangement No. I.**

Spindle nose: One double row cylindrical roller bearing, series NN 30 K, and one double direction angular contact thrust ball bearing, series 2344(00) B.

Rear: One double row cylindrical roller bearing, series NN 30 K.

*Gives high radial and axial stiffness.*

1



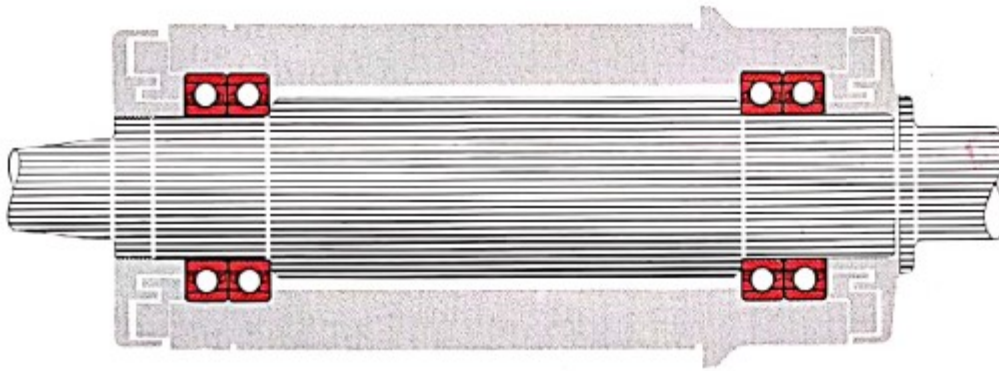
**Standard arrangement No. II.**

Spindle nose: Matched set of three single row angular contact ball bearings, series 70 C, arranged as a pair in tandem and the third bearing back-to-back; light preload. (Greater stiffness is obtained by using bearings of series 70 AC and medium or heavy preload.)

Rear: One double row cylindrical roller bearing, series NN 30 K.

*Suitable for higher speeds than I.*

2

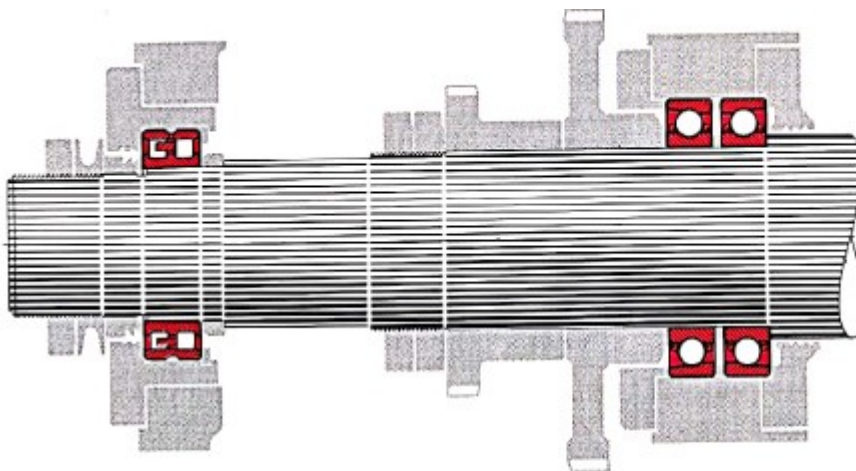


Standard arrangement No. III.

Spindle nose and rear: Two matched single row angular contact ball bearings, series 70 C, arranged back-to-back; light preload.

*Suitable for higher speeds than I and II.*

3

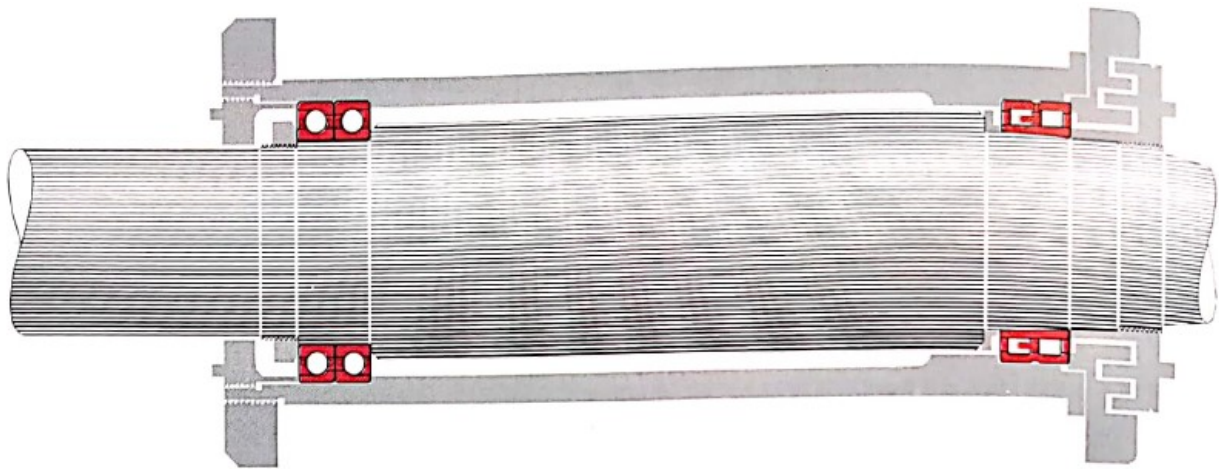


Spindle nose: Two single row angular contact ball bearings, series 70 AC, arranged back-to-back.

Rear: One double row cylindrical roller bearing, series NN 30 K.

*Permits higher speeds than II but is less stiff.*

4

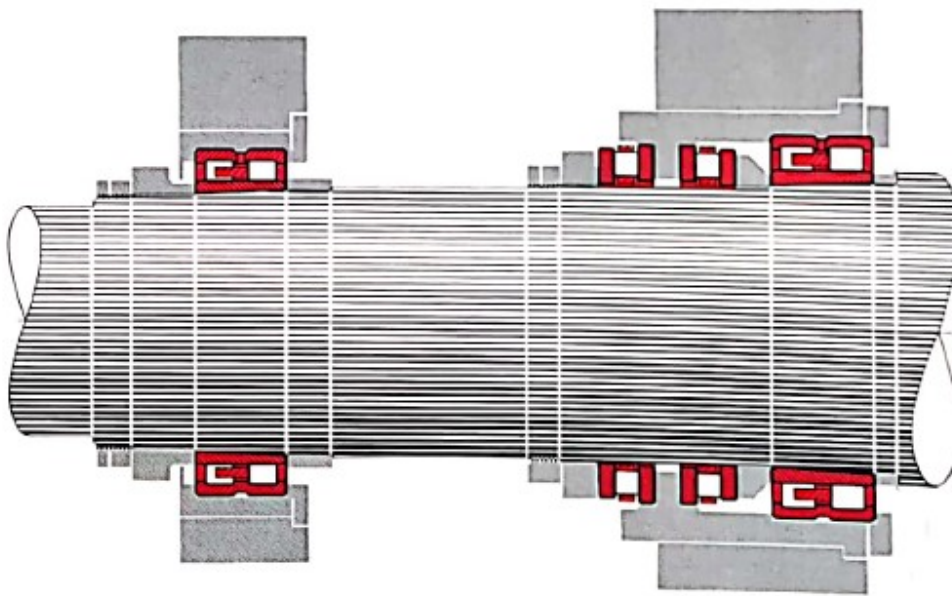


Spindle nose: One double row cylindrical roller bearing, series NNU 49 BK.

Rear: Two single row angular contact ball bearings, series 719 C, arranged back-to-back.

*These low sectional height bearings permit maximum spindle diameters to be used, giving high stiffness.*

5

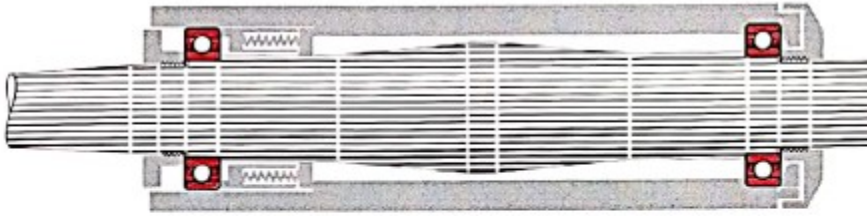


Spindle nose: One double row cylindrical roller bearing, series NNU 49 BK, and two single direction cylindrical roller thrust bearings, series 811.

Rear: One double row cylindrical roller bearing, series NNU 49 BK.

*For high stiffness, both radially and axially.*

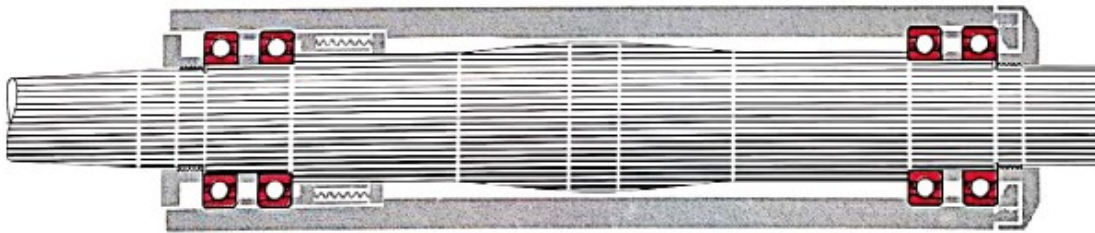
6



Spindle nose and rear: One single row angular contact ball bearing, series 70 C, at each end, arranged back-to-back; spring loaded.

*The most typical rolling bearing arrangement for high speeds.*

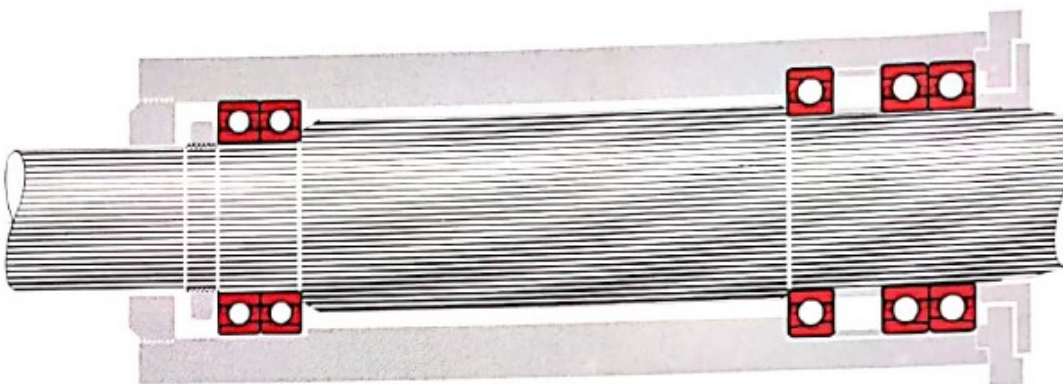
7



Spindle nose and rear: Two single row angular contact ball bearings, series 70 C, in tandem at each end. The pairs are mounted back-to-back.

*For high speeds; gives greater stiffness than example 7.*

8

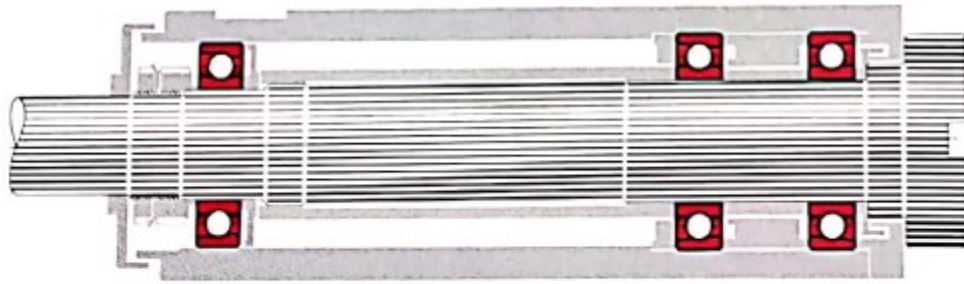


Spindle nose: Three single row angular contact ball bearings, series 70 C, two in tandem and the third back-to-back.

Rear: Two single row angular contact ball bearings, series 70 C, in a back-to-back arrangement.

*Gives higher stiffness than Standard arrangement No. III.*

9

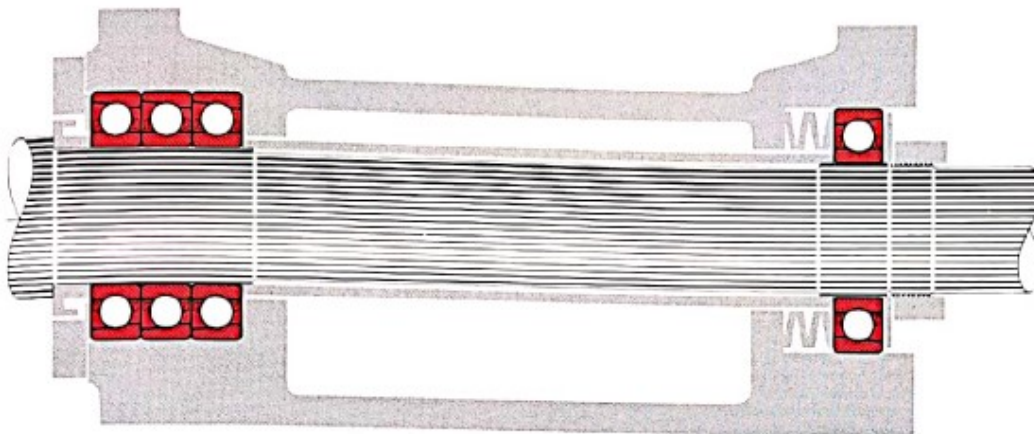


Spindle nose: Two single row angular contact ball bearings, series 72 AC, back-to-back.

Rear: One single row angular contact ball bearing, series 72 C.

*For higher speeds than Standard arrangement No. II.*

10

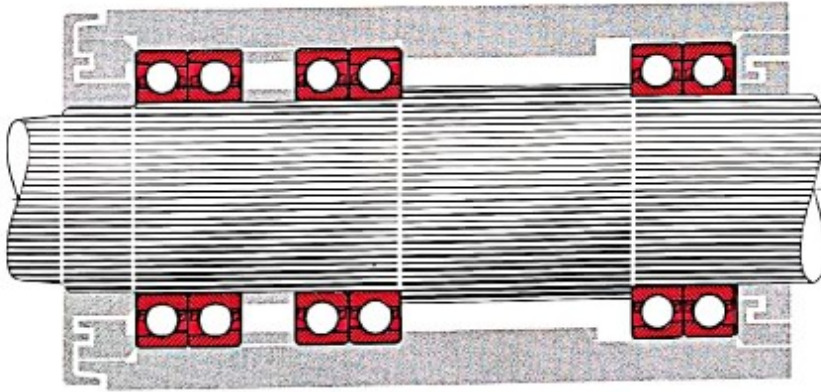


Spindle nose: Three single row angular contact ball bearings, series 72 AC, arranged in tandem.

Rear: One single row angular contact ball bearing, series 72 AC, arranged back-to-back to the nose bearings.

*For high axial stiffness in one direction and relatively high speed operation.*

11

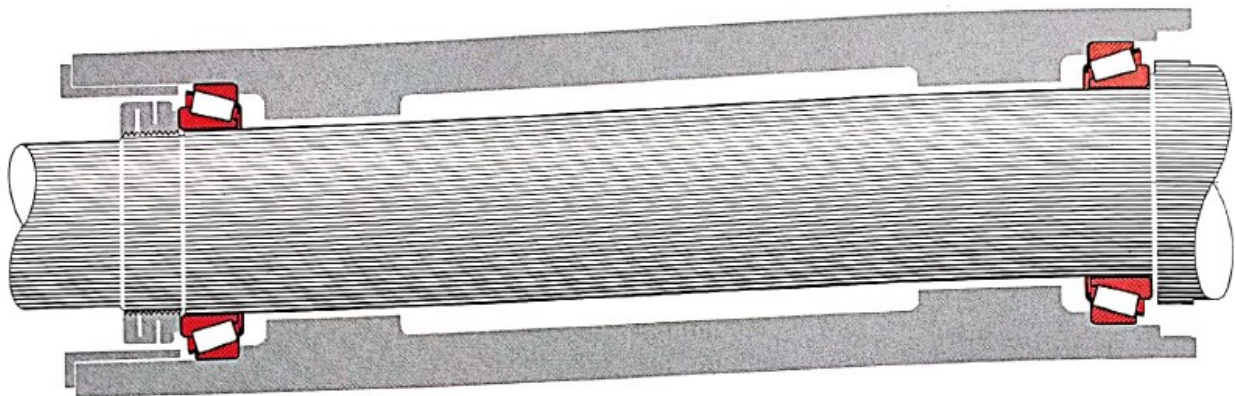


Spindle nose: Four single row angular contact ball bearings, series 70 C, mounted in two tandem pairs arranged back-to-back.

Rear: Two single row angular contact ball bearings, series 70 C, mounted back-to-back.

*This gives a higher radial stiffness than that obtained with other arrangements with angular contact ball bearings.*

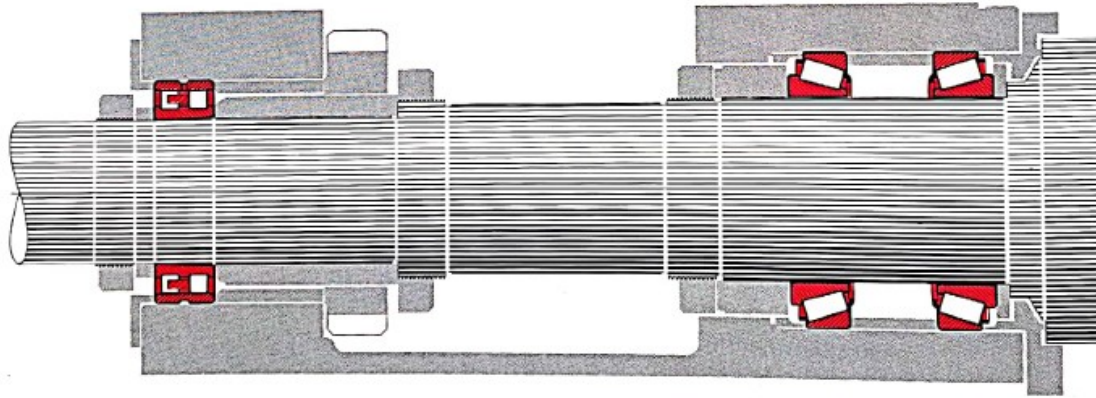
12



Spindle nose and rear: One single row taper roller bearing, series 320 XC, at each end, adjusted against each other in a back-to-back arrangement.

*High radial and also axial load carrying capacity.*

13

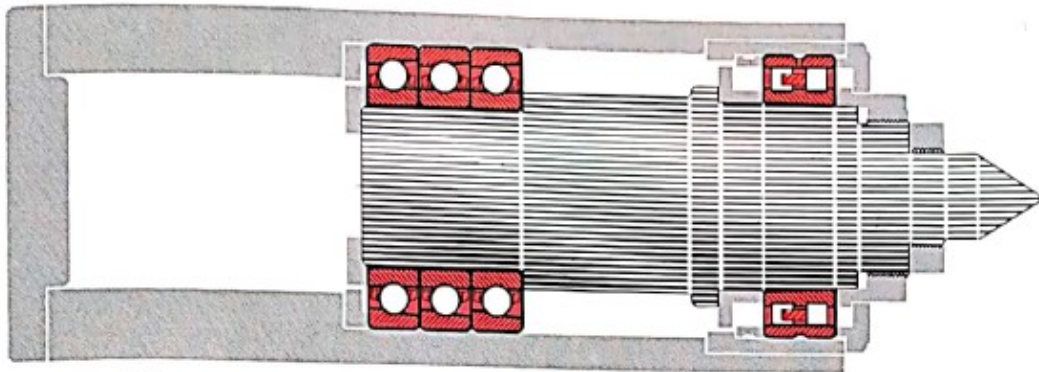


Spindle nose: Two single row taper roller bearings, series 320 XC, arranged back-to-back.

Rear: One double row cylindrical roller bearing, series NN 30 K.

*A "taper roller bearing" spindle with extra stiffness.*

14



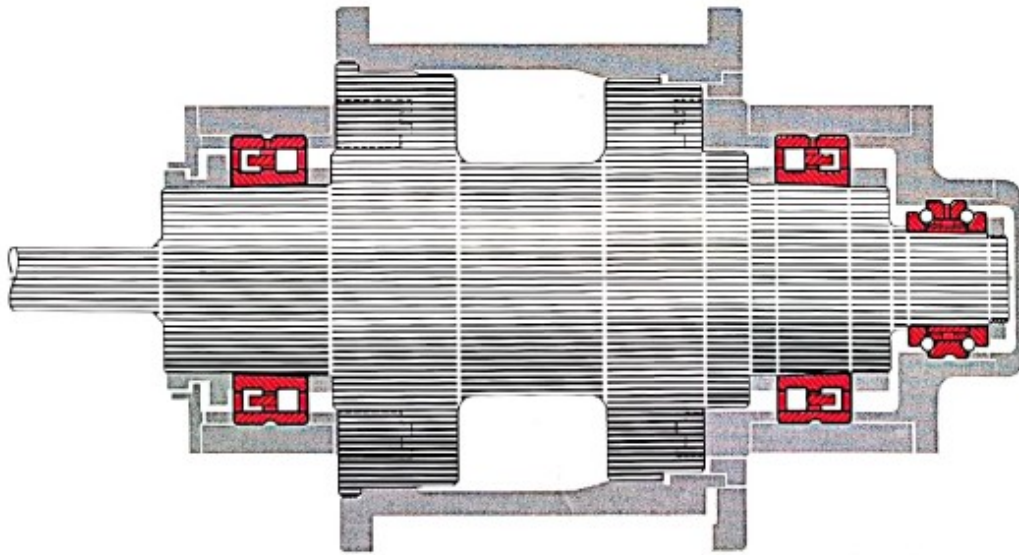
Live centre arrangement.

Nose: One double row cylindrical roller bearing, series NN 30 K.

Rear: A matched set of three single row angular contact ball bearings, series 72 AC, arranged in tandem.

*Combines high radial and axial stiffness with high speed capability.*

15



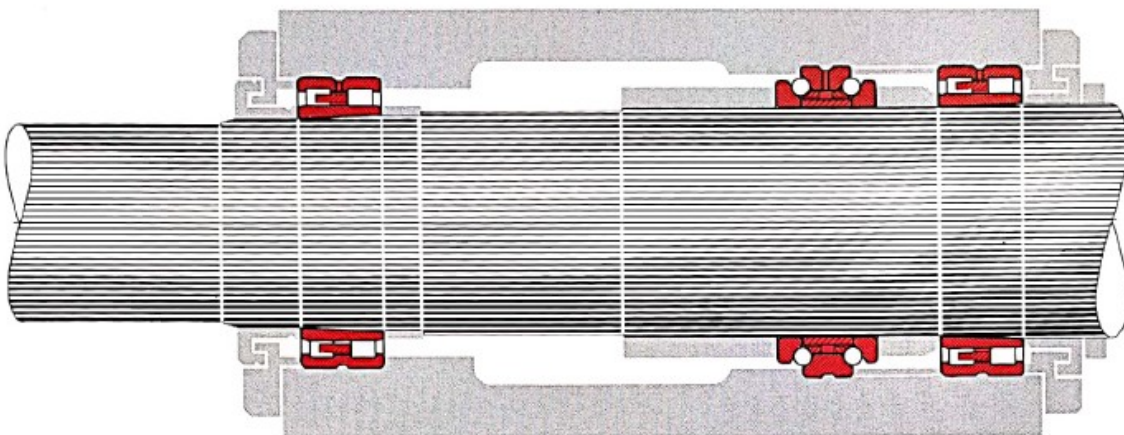
Centreless grinding machine spindle.

Radial bearings: Two double row cylindrical roller bearings, series NN 30 K.

Thrust bearing: One double direction angular contact thrust ball bearing, series 2344(00) B.

*For high stiffness and accuracy of machining.*

16



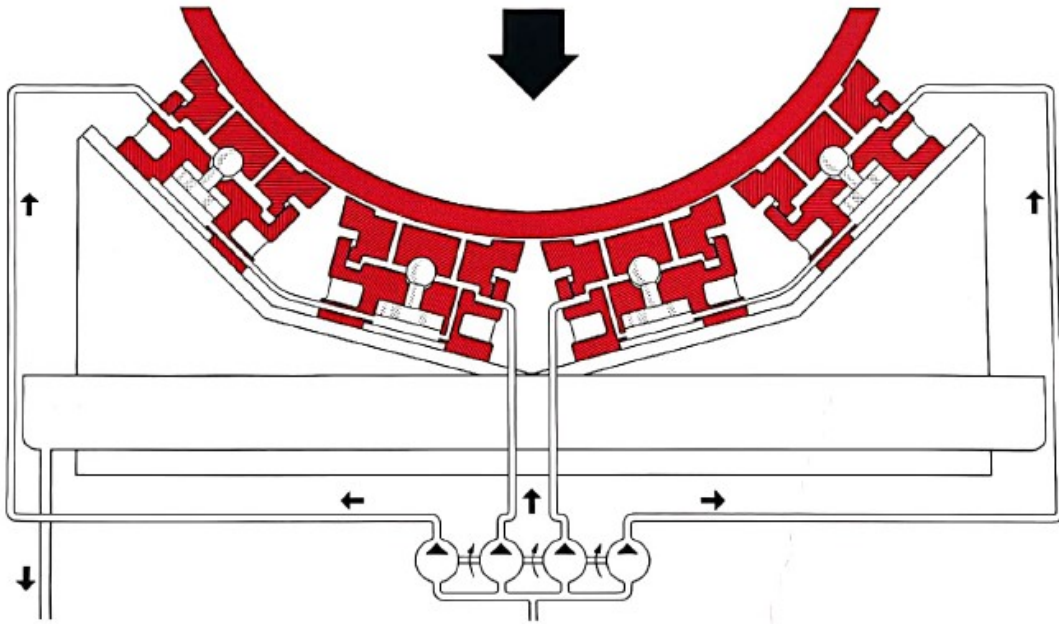
Spindle nose: One double row cylindrical roller bearing series NNU 49 BK and one double direction angular contact thrust ball bearing series 2494(00)

Rear: One double row cylindrical roller bearing, series NNU 49 BK

*Gives high radial and axial stiffness (bearing arrangements similar to standard arrangement No I, but bearings with lower sectional height).*

17



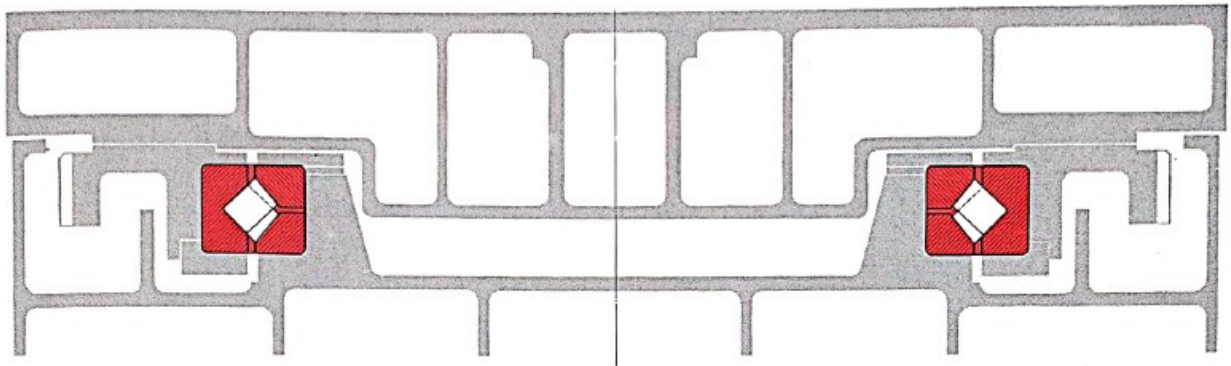


Workpiece support.

Hydrostatic shoe bearings provide radial support for very heavy workpieces; generally 2 or 4 shoes are used at each end.

*With this bearing arrangement, there is virtually no limit to workpiece size or weight.*

18

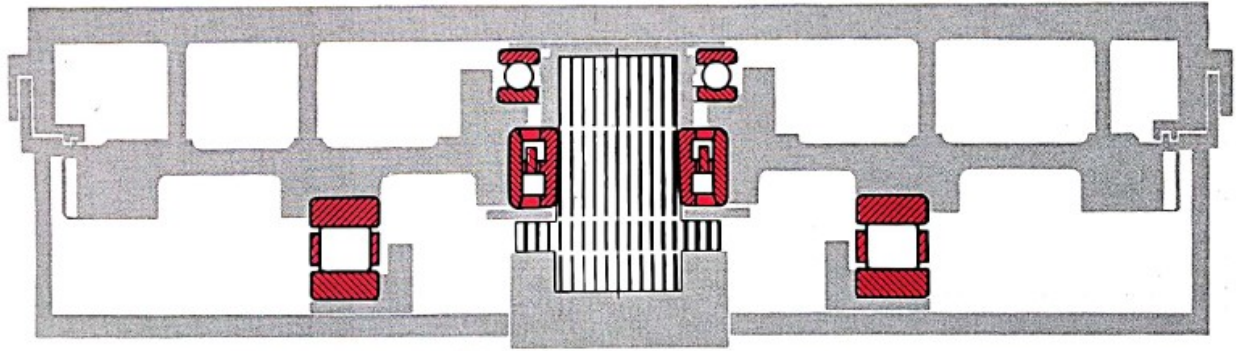


Rotating table.

Support bearing arrangement: One precision crossed taper roller bearing.

*Can accommodate radial and axial loads as well as tilting moments.*

19

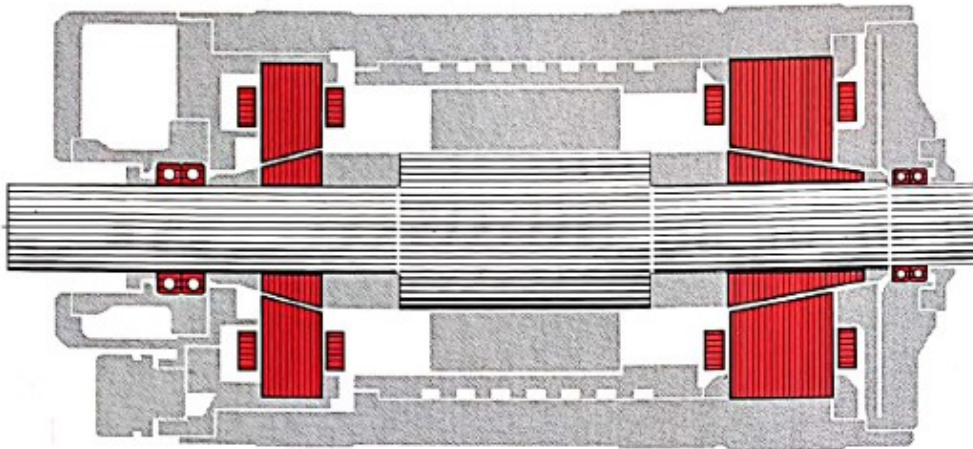


Rotating table.

Support bearing arrangement: One single direction cylindrical roller thrust bearing, series 811, one single direction thrust ball bearing, series 511, and one double row cylindrical roller bearing, series NN 30 K.

*Tilting moments are accommodated between the large cylindrical roller thrust bearing and the smaller thrust ball bearing.*

20



Active magnetic bearings open new horizons in machine tool design.

*They provide extreme accuracy, very high speed capability, excellent stiffness and damping properties and can operate under extreme conditions with no change in performance, using only a fraction of the energy consumed by more conventional bearings. (The small ball bearing pairs serve solely to keep the spindle in position when it is not in operation.)*

21