



Index

Operation and Characteristics Page 3

Standard Mandrels Page 4

Manual and Automatic Mandrels Page 5

Spline and Needle Mandrels Page 6

Mandrels for Turbines and Jet Engines Page 7

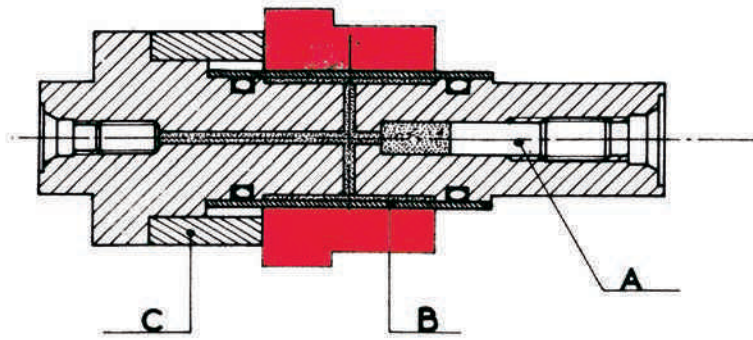
Application Examples Page 8-9

Balancing and Threaded Mandrels Page 10

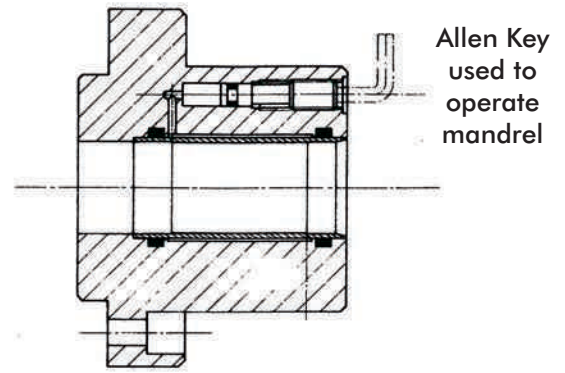
Workholding and Flange Mandrels Page 11-12

Using “3P” Slotted Sleeves for variable part sizes Page 13

Workholding and Part Inspection Applications Page 14-15



Mandrel Operation



Manually Operated Workholding Mandrels

(1) OPERATION:

"Pressure is applied manually, hydraulically, pneumatically or mechanically against the internal hydraulic fluid (A). The metallic wall(B) expands in parallel and centers the parts to be tightened, gripped, or clamped.

(2) CHARACTERISTICS:

a) DIMENSIONS: 8 to 700 mm Ø; max length: 1 meter

b) CONCENTRICITY: (in total, measured with a comparator)

6 to 50 Ø	0,002 mm
51 to 100 Ø	0,003 mm
101 Ø and above	0,005 mm

c) EXPANSION: Total expansion = $\frac{\text{Ø} \times 3}{1000}$

Example: Expandable 20 mm Ø mandrel

$$\text{Total expansion} = \frac{20 \times 3}{1000} = 0,06 \text{ mm}$$

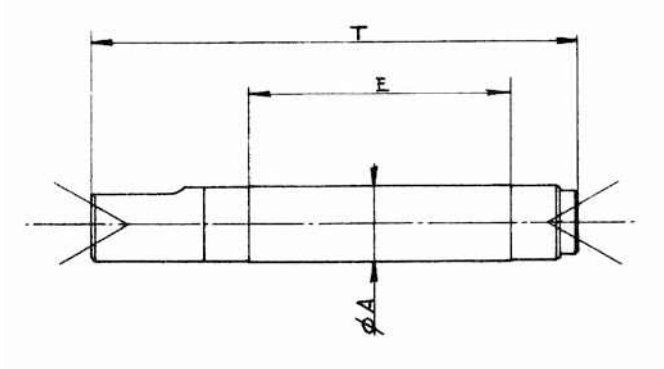
d) EXPANDABLE AREA LENGTH:

Dependent on the parts to be adjusted:

- Manually operated mandrels: are available in extended lengths
- The expandable length of the automatic mandrels must be equal to or lower than the length of the part to be adjusted.
- To use an automatic mandrel with parts of different lengths, it is necessary to use removable stops in order to cover the area which isn't used and prevent deformations.



- Standard Products
- Manual Control of Expansion and Retraction



Manually operated mandrels use Allen keys for operation. Applications include assembly inspection, grinding and fine turning of parts.

MANDREL SIZING CHART

Note: On standard mandrels the Allen key is inserted on the left side for manual control of the mandrel expansion and retraction.

Nominal A Ø	T total length	E expandable length	Ø diameter in microns
14	135	50	40
15	145	60	42
16	160	70	45
17	160	70	51
21	130	70	63
18	130	70	50
20			56
22			62
24	130	70	67
25			70
26			72
25,4	130	70	70
27	155	80	81
28	155	80	84
30	175	95	90
32	175	90	96
35	175	90	105
40	175	100	120

Mandrel Size Example:

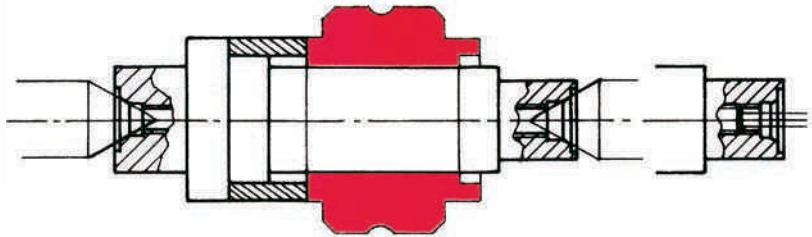
20 E 8 Ø part adjustment
 +0,078
 +0,040

- Ø 20,03 minimum Mandrel Dimension in (unloaded) Position
- Ø 20,09 maximum Mandrel Expansion (loaded)
 Concentricity 20,002 throughout length of "E" Dimension,
 Special sizes are available from 10 to 200 mm. Unless specified, the manual control of the expansion and retraction will be located on the left side
- Right side control is available and must be specified

Manual Mandrels



Manual Adjustment for Expansion and Contraction

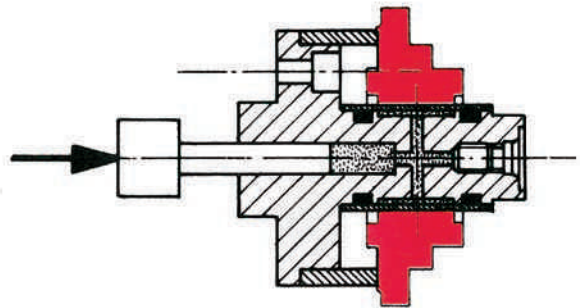


Manual Tailstock Centering Mandrel

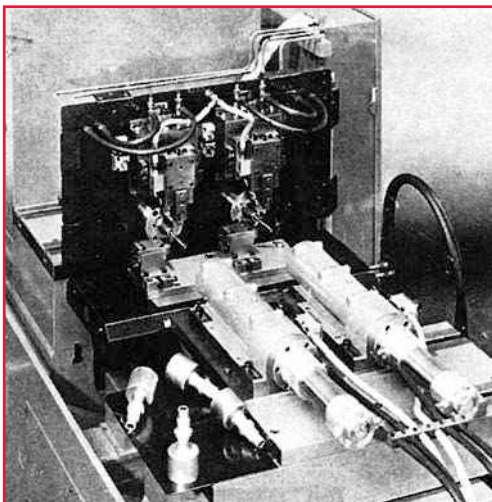
Automatic Mandrels



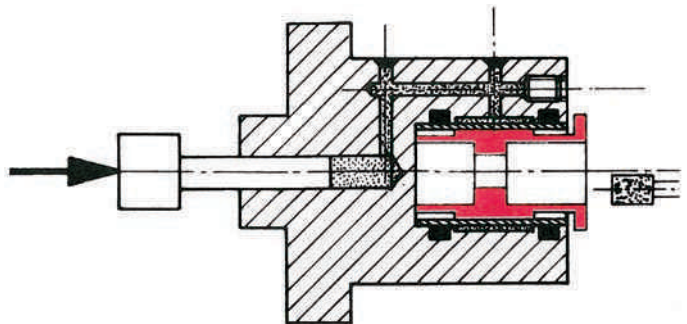
Automatic Grinding Mandrels with part positioning control and integrated sensors (4,000 parts per day).



Automatic Mandrels (lathe turning)



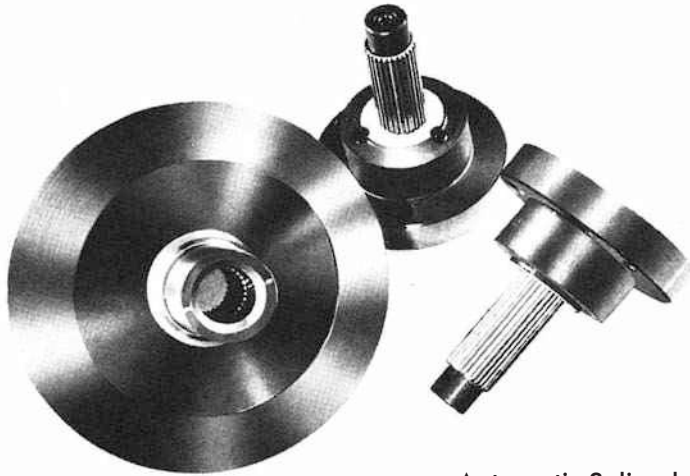
Dual expansion of automatic mandrels for ignition box



Automatic Mandrel (I. D. grinding)

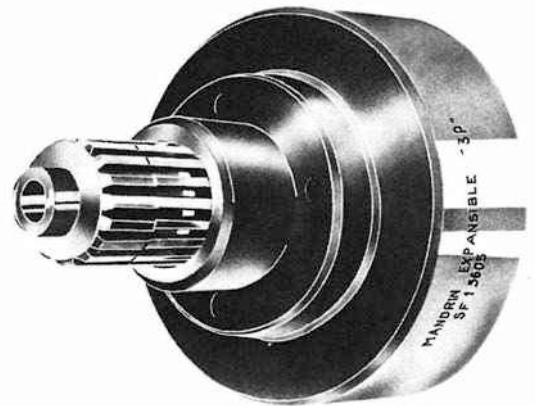
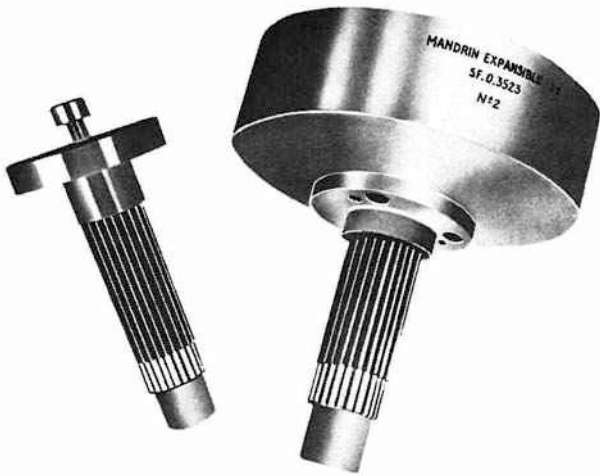
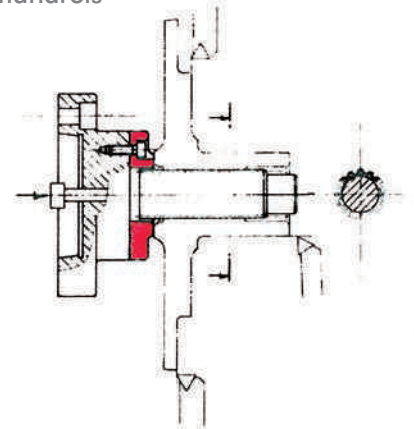
Splined Mandrels

USE: Turning – Grinding – Inspection – Balancing – Cutting, etc...

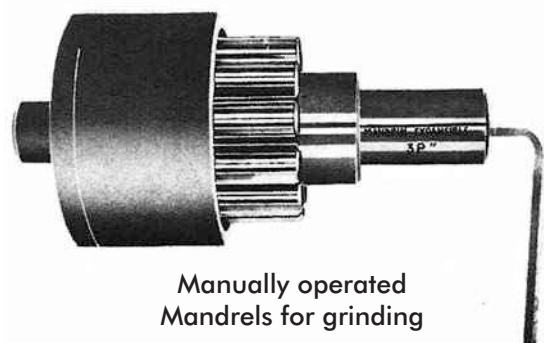
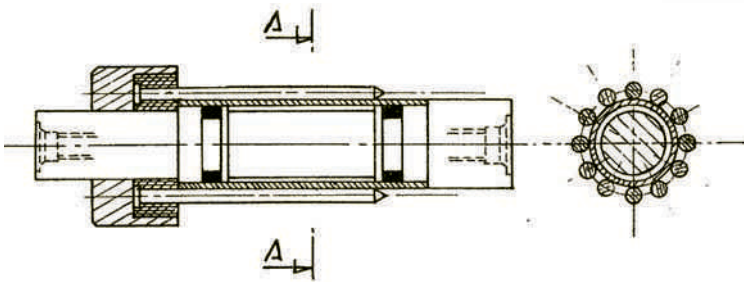


Automatic Splined Mandrels

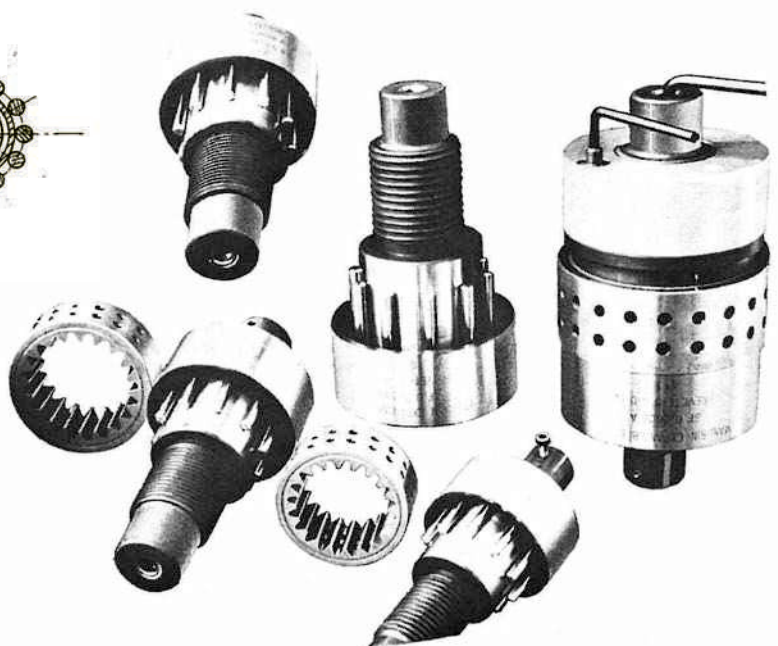
Grooved skirting mandrels.
Machining automotive brake discs.
Splined Mandrels are capable
of 0,005 mm concentricity.
Splined expanding mandrels
are possible.

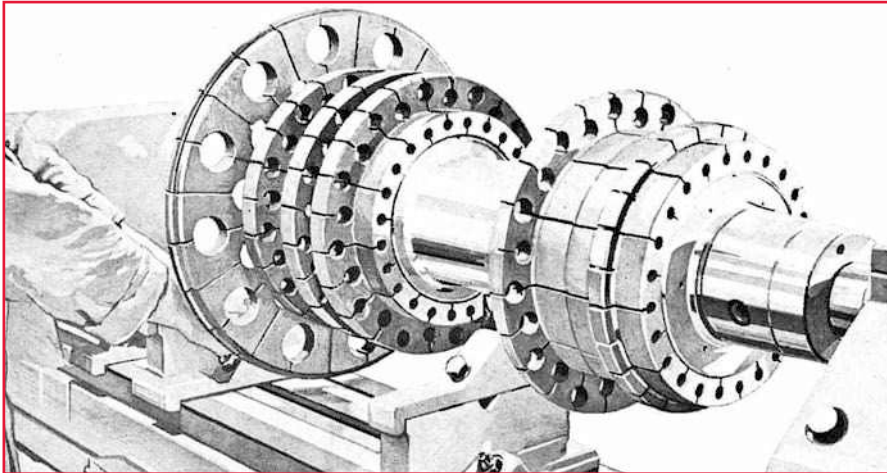


Needle Mandrels



Manually operated
Mandrels for grinding

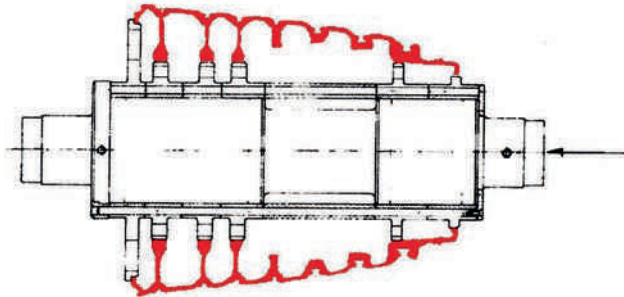




- Ø 350-600 mm range
- 0,005 concentricity
- weight: 450 kg max.

Turning Mandrels for Turbine Disc

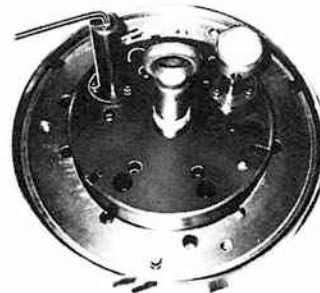
Machining of jet engine components on a CNC lathe at S.N.E.C.M.A



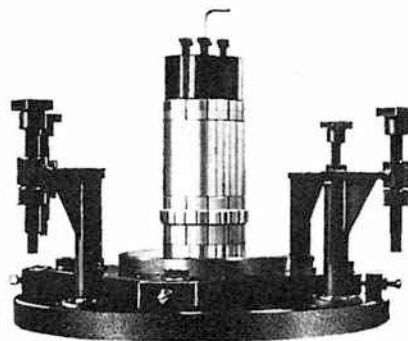
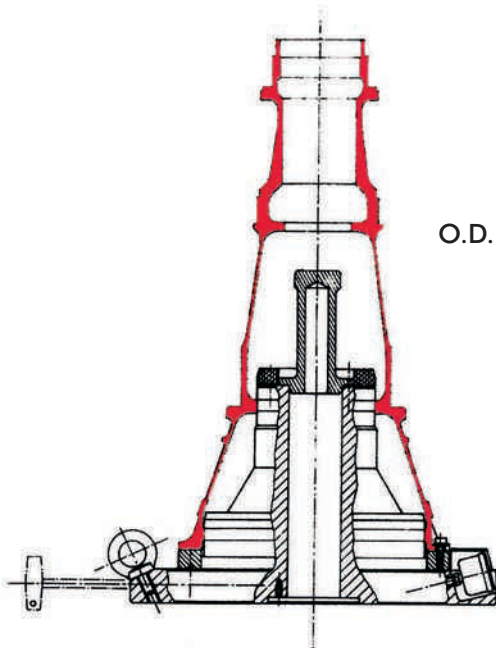
Broaching of turbine blade components on horizontal machining Center

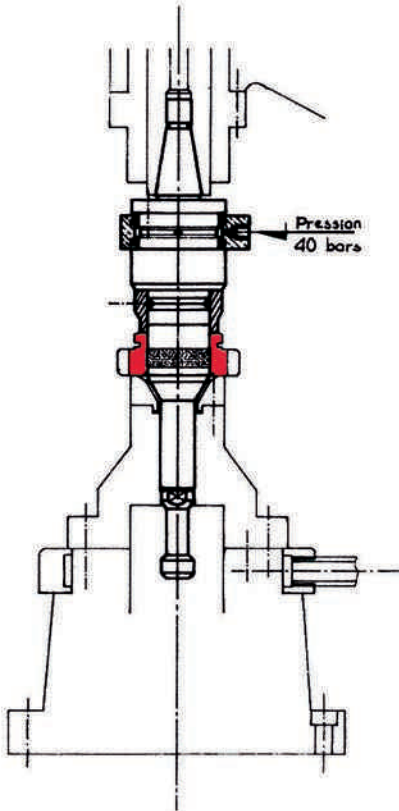


Broaching of turbine blade components on the CFM 56 (SNECMA) drum



O.D. Grinding:





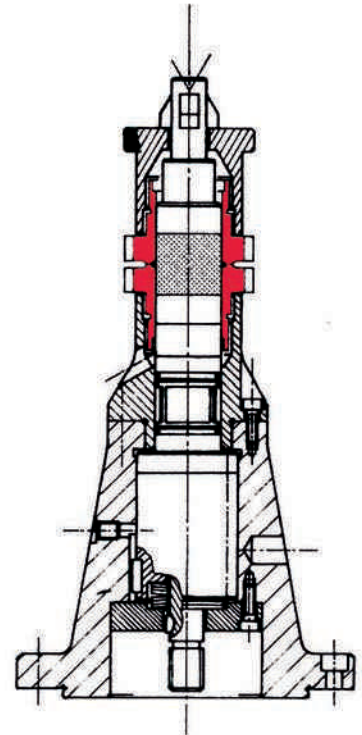
Cutting 1

The excellent centering precision and robustness of the "3P" expanding mandrels improve the quality of cutting, hobbing and grinding operations on manual or automatic machines.

DE-STA-CO's precision mandrel offering and performance delivers value by increasing your quality, productivity, and profitability.

CUTTING 1 GEARBOX PINION

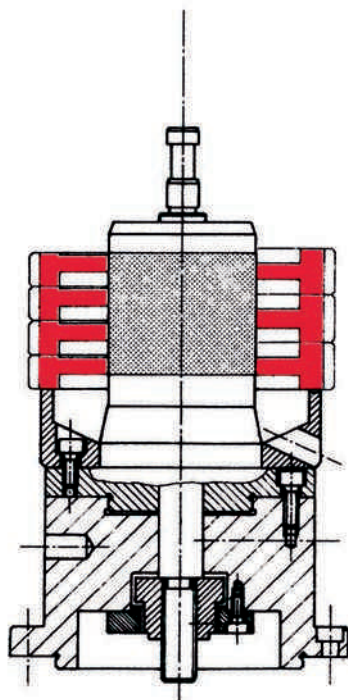
Centring parts by hydraulic fluid at 40 bars, using a rotary seal. Parts on the I.D. surface are secured via the machine cylinder.



Cutting 2

CUTTING 2 GEARBOX PINION

Centering and holding parts via the initial mandrel expansion – Holding the parts on the I.D.



Cutting 3

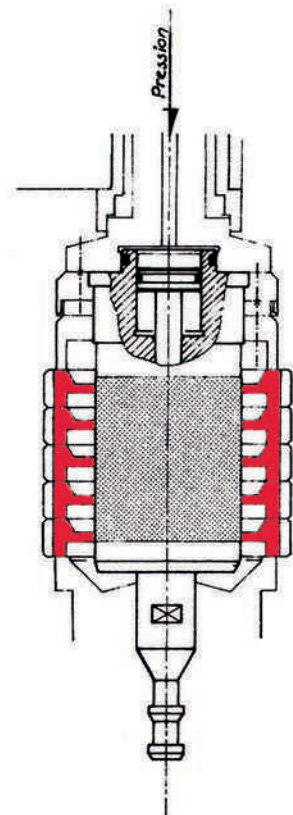
CUTTING 3 GEAR BLANKS

Centering parts via the mandrel expansion – Holding the parts on the I.D.

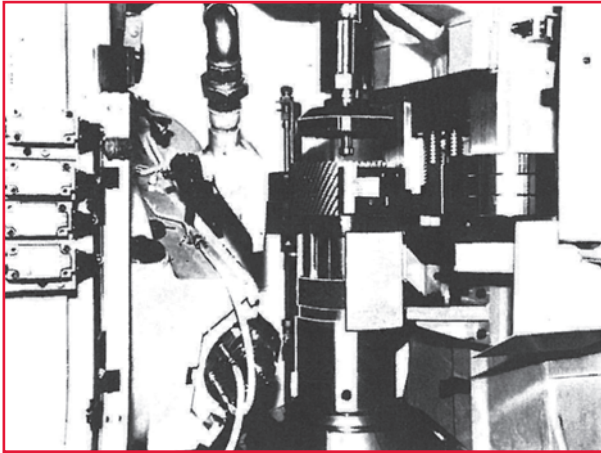
Part height compensated by Belleville washers inside the "3 P".

CUTTING 4 GEAR BLANKS

Centering parts using hydraulic fluid at 50 bars through the I.D. centre – Tightening the parts on the I.D. via the machine cylinder.

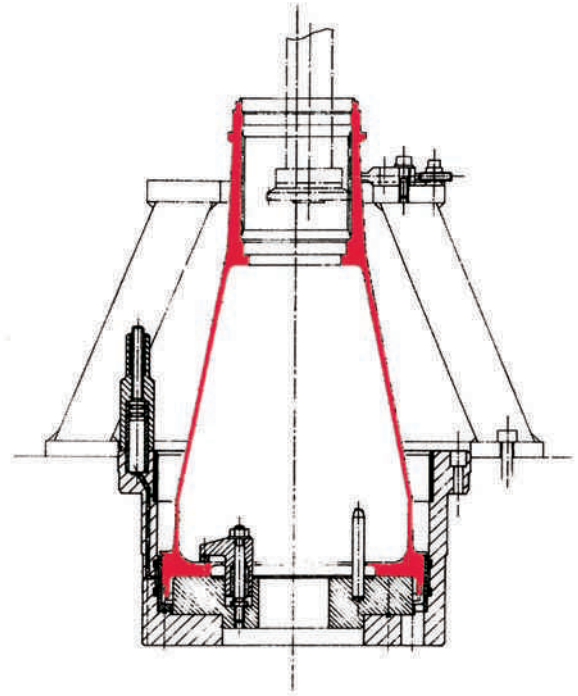


Cutting 4

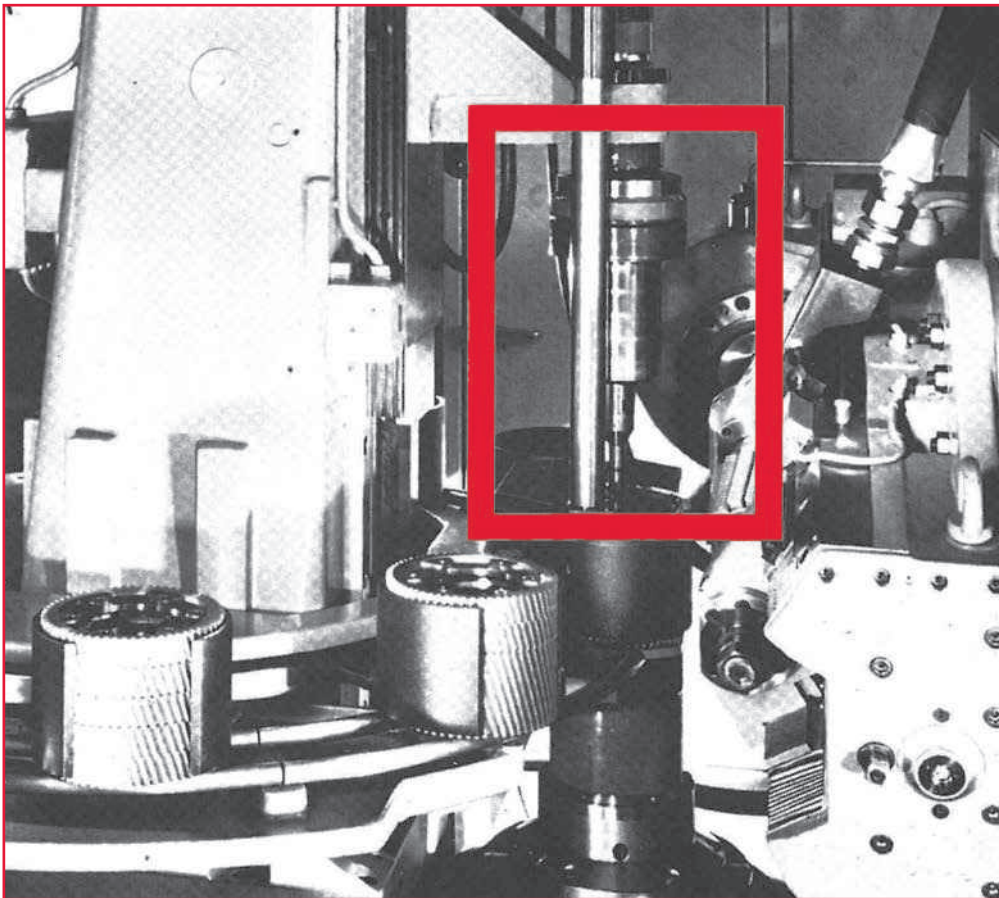


Cutting Gears

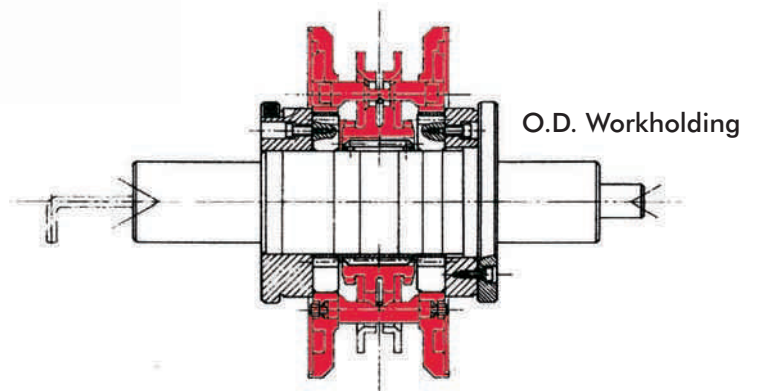
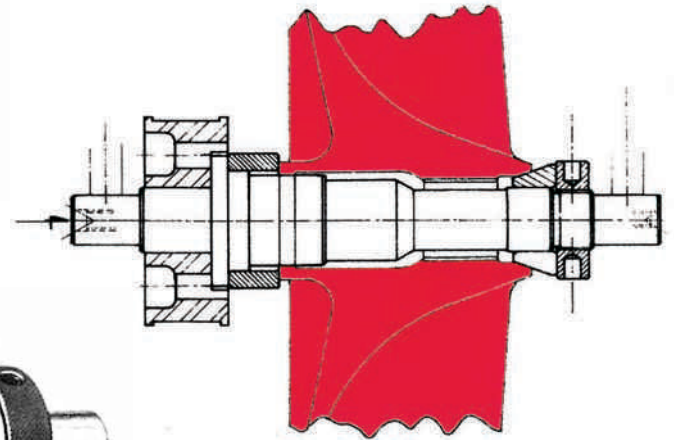
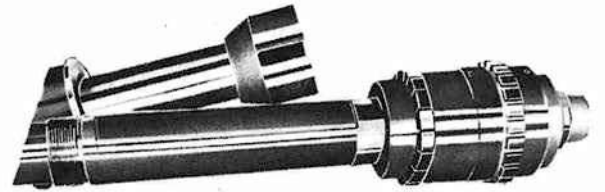
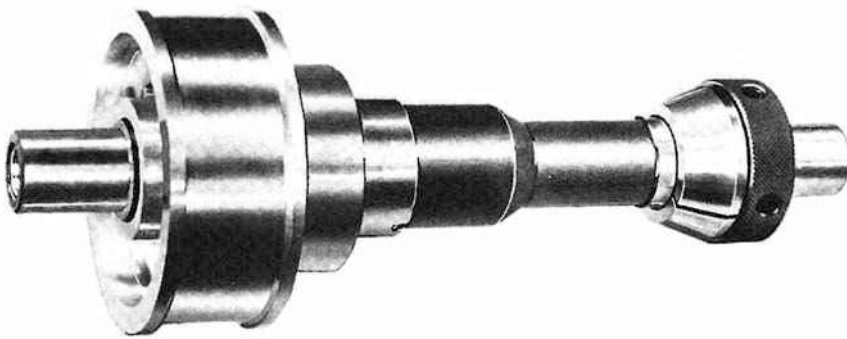
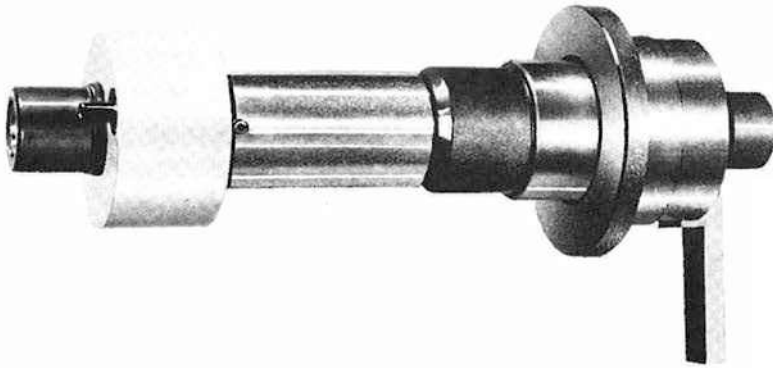
Automotive Workholding



Cutting with a "LORENZ"
Gear Hobbing machine

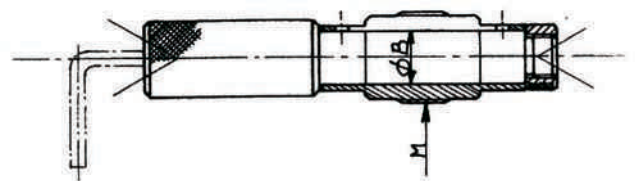
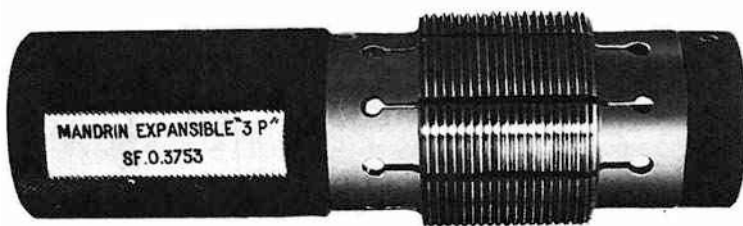


Balancing Mandrels



Clamping and Balancing of Turbine and Jet Engine Components

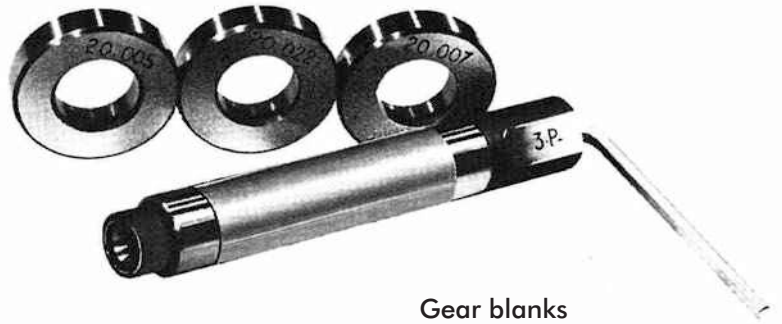
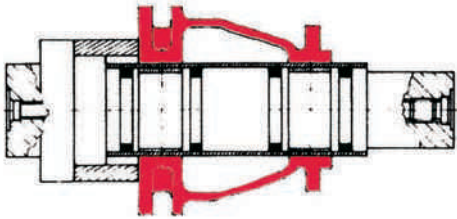
Threaded Mandrels



Requires several threaded inserts in order to cover tolerance.

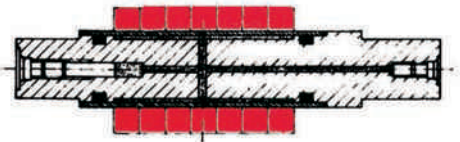
Example: On a B 14 Ø Mandrel, ring nuts can be used from M 18 to M 24.

Holding two similar part diameters separated by a gap.

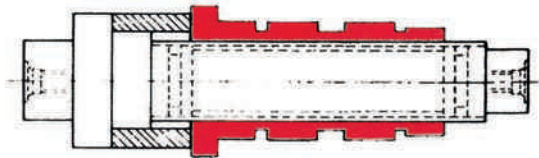
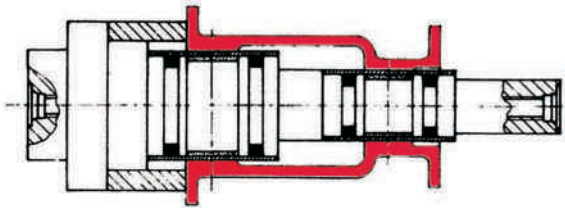


Gear blanks

Simultaneous clamp and release of several parts.

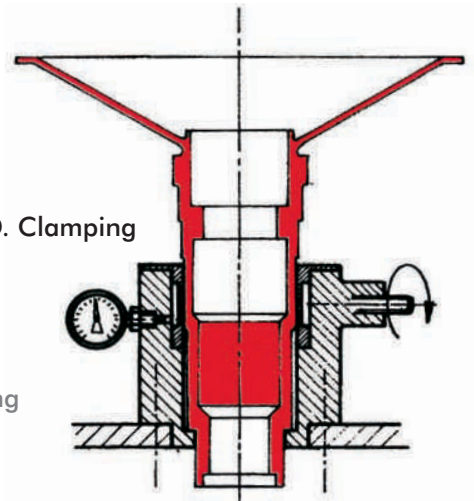


Control of two or several different part diameters.

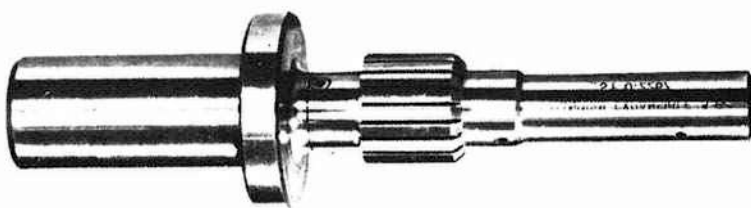


Manual O.D. Mandrel.
Application: Constant monitoring of jet engine components being assembled.

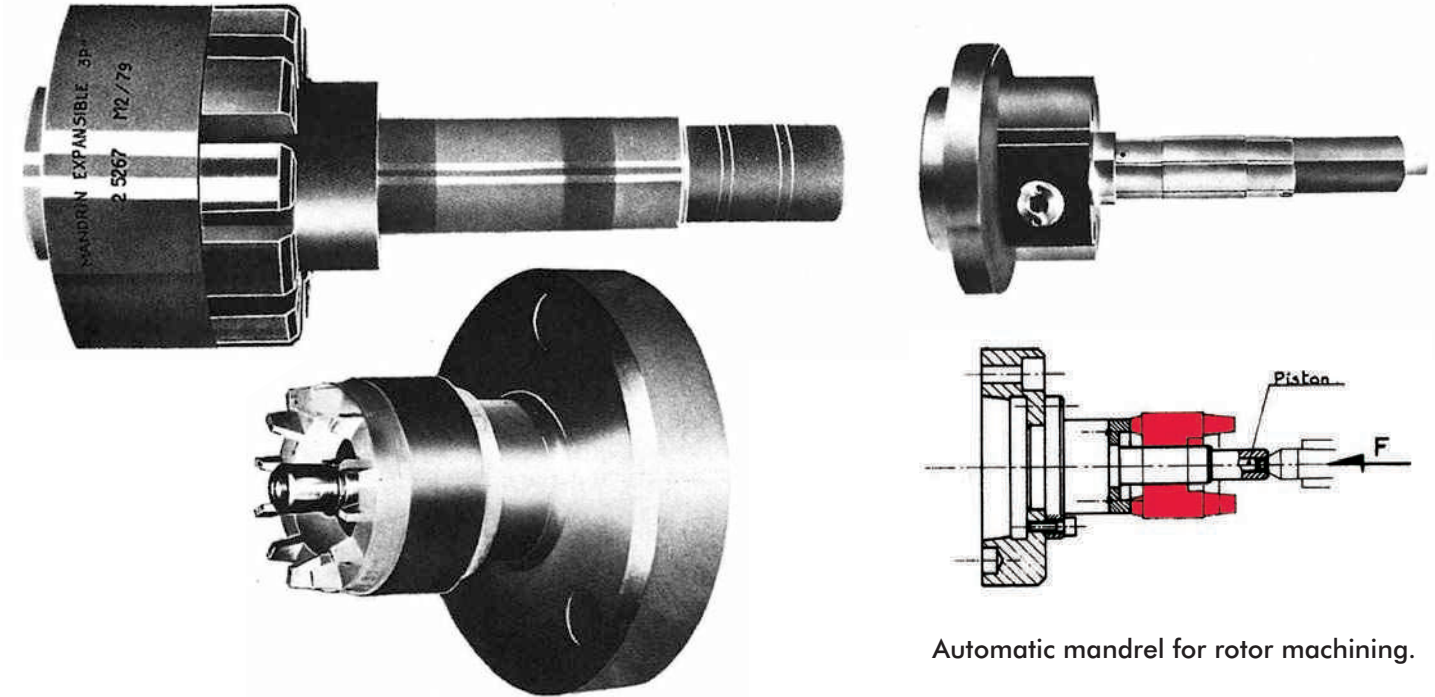
O.D. Clamping



Flanged Mandrels used for accurate stop location

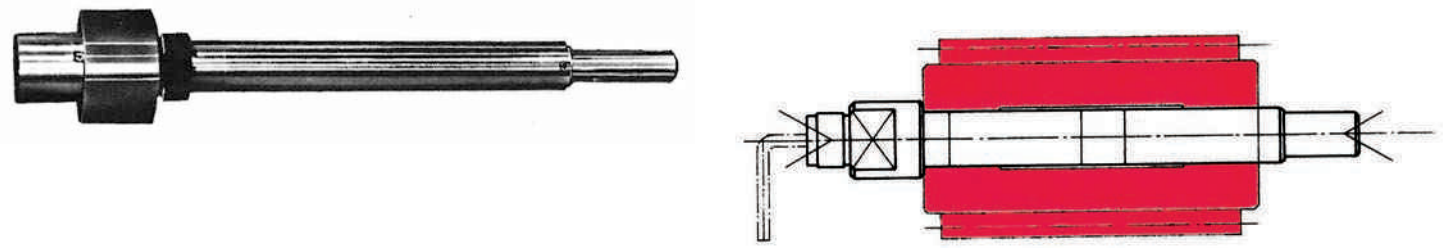


Mandrels used on tail stock for lathes



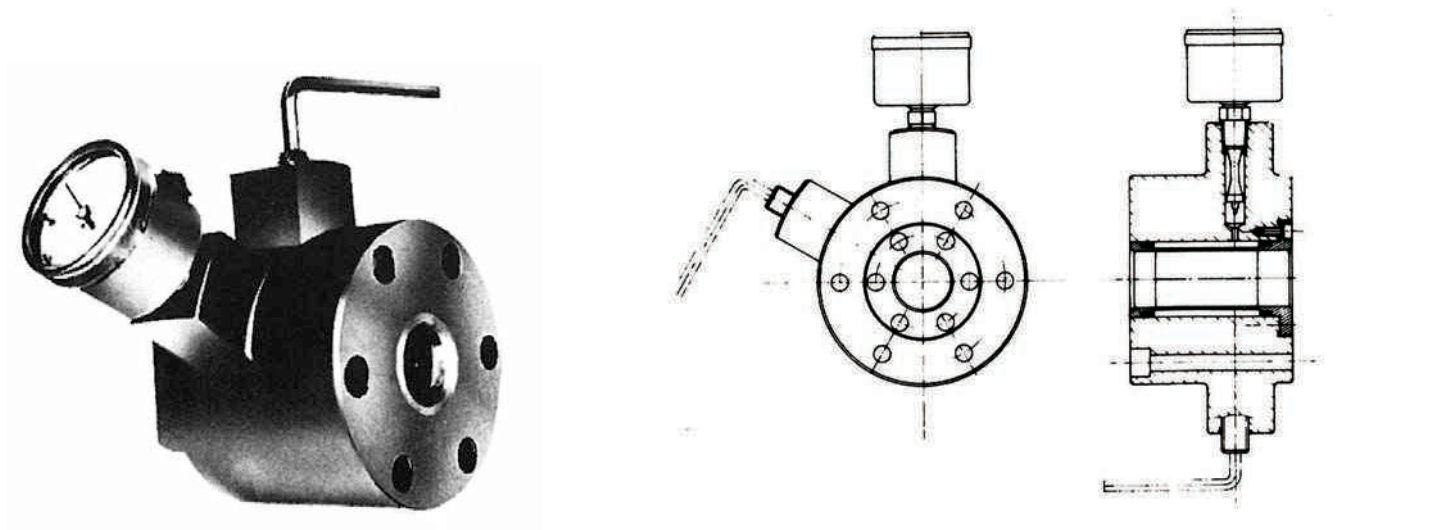
Automatic mandrel for rotor machining.

Gear Hobbing Mandrels

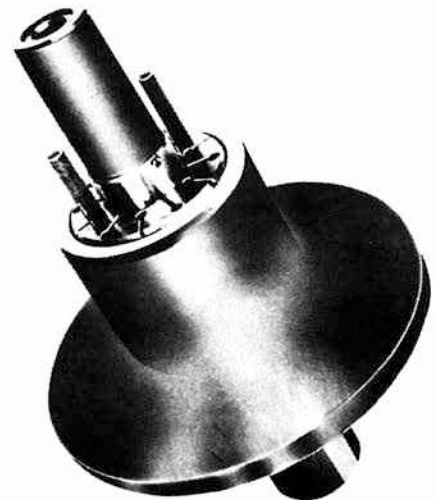
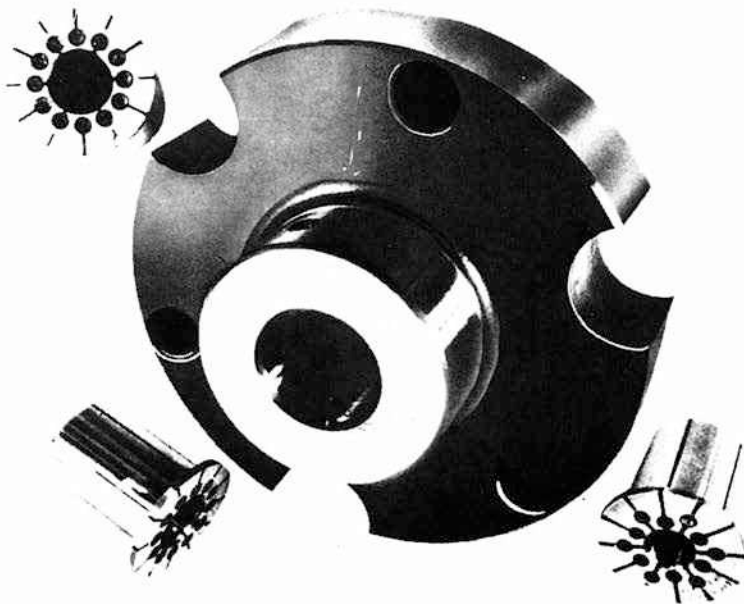
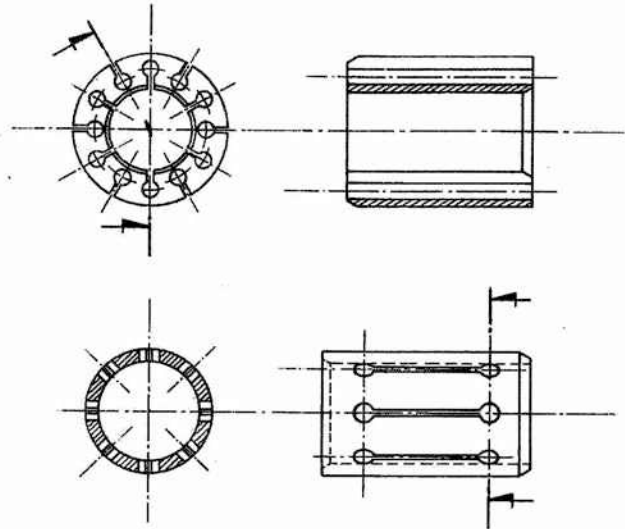


Manual on/off expansion/retraction of part

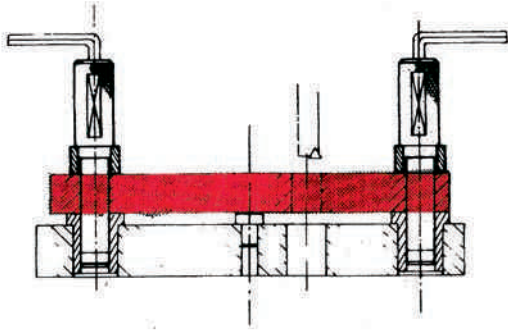
Hydraulic O.D. mandrel with pressure gauge and manual on/off clamp/unclamp function



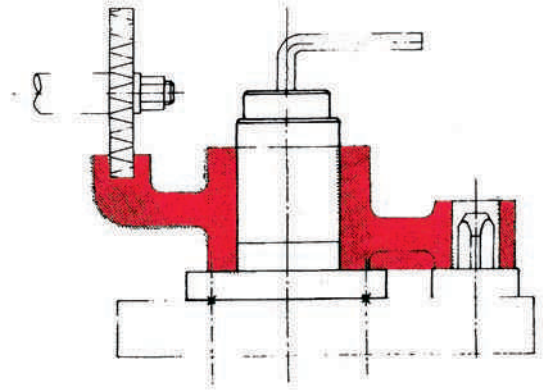
On a basic "3 P" mandrel, one or several expandable clip sets can be fitted and used in order to hold parts of different diameters. Precision workholding tolerances of (2 microns).



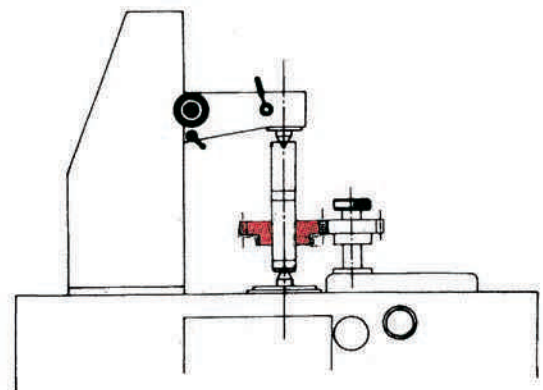
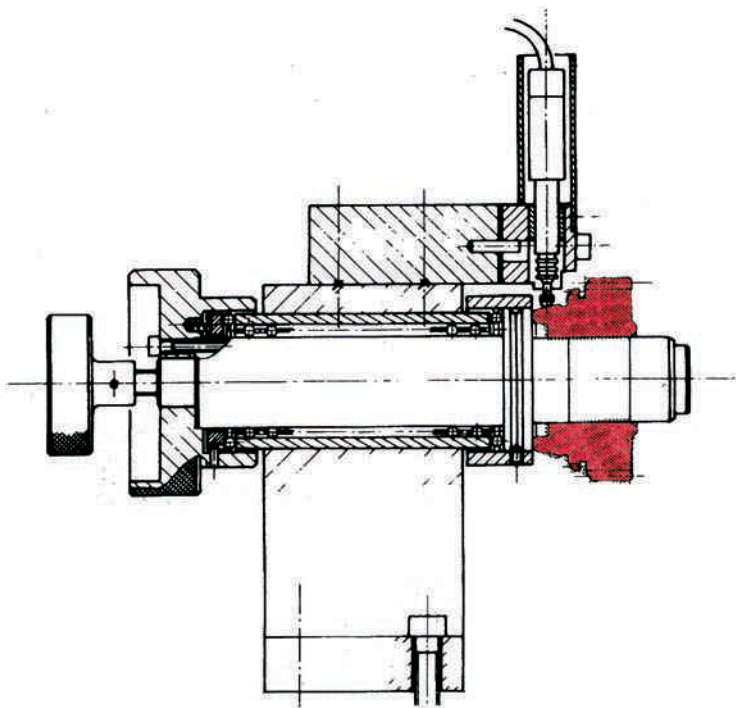
Aerospace Tooling
Centering-clamping of the I.D. designed
into workholding fixture



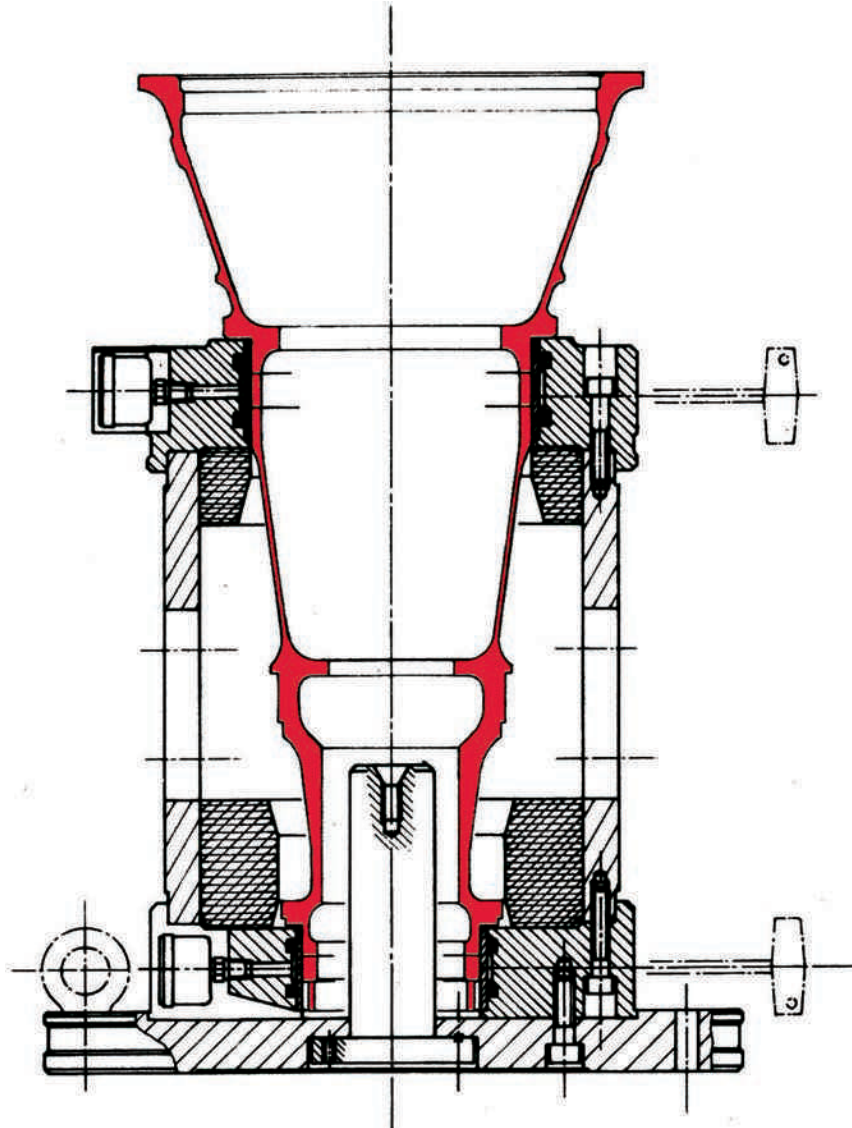
Cutting – Parallel Grinding Inspection



Inspection of Pinions



Part Centering



If your part tolerances are higher than our Mandrels shown, please contact us for application assistance using our **MECHANICAL EXPANDABLE SLEEVE MANDRELS.**

