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
(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
   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.
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.

<table>
<thead>
<tr>
<th>Nominal A Ø</th>
<th>T total length</th>
<th>E expandable length</th>
<th>Ø diameter in microns</th>
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</tr>
</tbody>
</table>

**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...

Grooved skirting mandrels. Machining automotive brake discs. Splined Mandrels are capable of 0.005 mm concentricity. Splined expanding mandrels are possible.

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**Needle Mandrels**

Manually operated Mandrels for grinding
Expandable Mandrels for Aerospace Turbines and Jet Engine Components

- 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 the CFM 56 (SNECMA) drum

O.D. Grinding:
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 GEARBOX PINION**
Centering and holding parts via the initial mandrel expansion – Holding the parts on the I.D.

**CUTTING 3 GEAR BLANKS**
Centring 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.
Application Examples

Cutting Gears

Cutting with a “LORENZ” Gear Hobbing machine

Automotive Workholding
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.
Flanged Mandrels used for accurate stop location

Holding two similar part diameters separated by a gap.

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.

Gear blanks

O.D. Clamping
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 gange 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.