PTG
workholding limited

PRECISION | INNOVATION | RELIABILITY

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WEBSITE

INTRODUCTION

PTG Workholding Ltd, a wholly owned subsidiary of Plymouth based Applied Automation (Holdings) Ltd, is a leading supplier of workholding technology.

We have the skills and expertise to meet the most exacting and demanding engineering tasks.

As modern manufacturing advances, and in response to customer demand, we now offer a full and versatile range of workholding equipment. Complementing the core business of expanding mandrels and sleeves, we can also design and manufacture customised fixtures in addition to special collet chucks.

Our experienced CAD team will take account of all your particular requirements in preparing a proposal. Whilst most holding operations can be successfully obtained by using the modular system and good tool design, PTG are able to offer unmatched engineering knowledge that only years of experience can yield.

PTG Workholding Ltd, works in many existing markets, including organisations within the following sectors:

- Automotive
- Aerospace
- Machine tool manufacturing
- Sub-contract operations
- Electrical engineering
- Medical

MODULAR MANDREL SYSTEM

PTG produce and supply precision expanding mandrels capable of automatic clamping in component bores, achieving the highest accuracy and holding power to resist the cutting forces imposed on the work piece.

PTG's modular mandrel system provides the following benefits:

- Our unique double-angle principle allows for fast loading and unloading of components.
- A standard expansion range of 0.8mm (0.032").
- Guaranteed accuracy of 0.013mm (0.0005") is available on all our standard and custom ranges.
- Greater holding power by applying pressure evenly along the length of the sleeve.
- No need to hold the components to close bore tolerance.
- One mandrel can accommodate a wide range of sleeve sizes.
- Availabile for multiple sleeves for components with greater length-to-diameter ratios, eliminating wobble and chatter.
- Pull-back of component onto end locator for positive location.
- PTG Workholding are generally able to recondition arbors by re-grinding the angles to return mandrels to their original accuracy.

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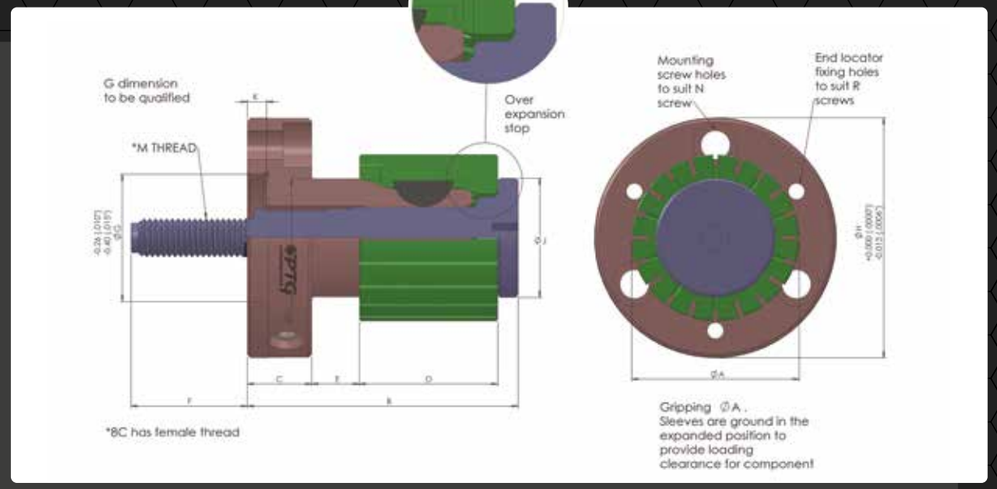
FACEPLATE DRAWBAR OPERATED MANDREL



The faceplate drawbar operated expanding mandrel can be used on any machine with drawbar facilities, for general turning and grinding operations.

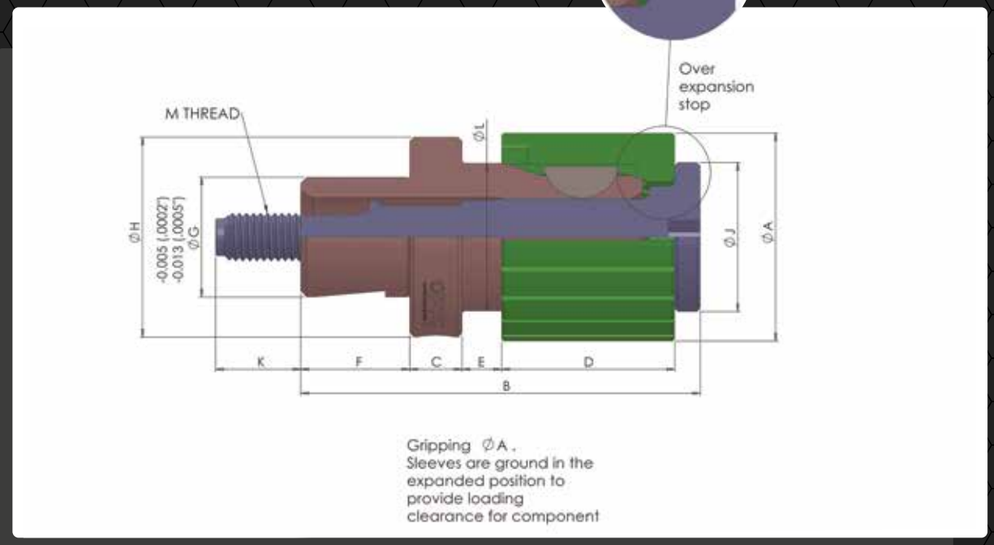
Adaptor plates made to suit the machine mounting can be manufactured by PTG Workholding. Component end-locators, solid type or compensating (for out of square locating faces) can also be manufactured to your requirements.

The natural pull-back action of the sleeve ensures the component is hard against the location face. There is an over-expansion stop built into the expander pin to avoid over-stressing the expanding sleeve.

For maximum efficiency, expansion sleeves should be pre-loaded to maintain contact with mandrel double-angles at all times.

	A		B	C	D	E	F	G	H	J	K	L	M	N		R		F Max (daN)	Tool #
	Min	Max												DP	Ø	DP	Ø		
3A	12.5	16	60	20	22	14.6	20	40	75	11	6	12.6	M4	58	M8	28	M4	700	90.800.210.1
2C	16	22	66	20	27	15	22	40	75	15	6	14.1	M8	58	M8	28	M4	1000	90.800.215.1
1C	22	28.5	72	20	32	15.5	30	40	75	20	6	20.7	M8	58	M8	58	M6	1200	90.800.221.1
18C	28.5	41	79	20	38	15.3	31	40	75	26.5	6	26.3	M10	58	M8	58	M6	1800	90.800.227.1
4C	41	63.5	84	20	43	14.8	36	40	75	37.5	6	37	M12	58	M8	58	M6	2300	90.800.234.1
5C	63.5	76.2	109	25	51	25.3	36	60	120	55	6	57.3	M20	94	M10	94	M8	2800	90.800.241.1
6C	76.2	89	118	25	57	24.7	37	60	120	74.5	6	71.1	M20	94	M10	94	M8	3200	90.800.248.1
7C	89	130	133	30	63.5	25.2	47	100	180	86.5	6	84.1	M24	150	M12	150	M10	3700	90.800.253.1
8C	130	178	153	30	79.5	24.6	22	100	180	124	6	123	M36	150	M12	150	M10	5500	90.800.259.1

SPIGOT DRAWBAR OPERATED MANDREL



The spigot drawbar operated expanding mandrel can be used on any machine with drawbar facilities, for general turning and grinding operations.

Adaptor plates made to suit the machine mounting can be manufactured by PTG Workholding. Component end-locators, solid type or compensating (for out of square locating faces) can also be manufactured to your requirements.

The natural pull-back action of the sleeve ensures the component is hard against the location face. There is an over-expansion stop built into the expander pin to avoid over-stressing the expanding sleeve.

For maximum efficiency, expansion sleeves should be pre-loaded to maintain contact with mandrel double-angles at all times.

	A		B	C	D	E	F	G	H	J	K	L	M	F Max (daN)	Tool #
	Min	Max													
3A	12.5	16	66	11	22	9.8	20	20	26	11	14	9.5	M4	700	90.810.210.1
2C	16	22	70	11	27	8	20	20	26	15	18	14.1	M8	1000	90.810.215.1
1C	22	28.5	85	11	32	10	27	30	40	20	17	20.7	M8	1200	90.820.221.1
18C	28.5	41	92	11	38	10.5	27	30	40	26.5	18	26.3	M10	1800	90.820.227.1
4C	41	63.5	99	13	43	9.5	27	30	50	37.5	21	37	M12	2300	90.820.234.1

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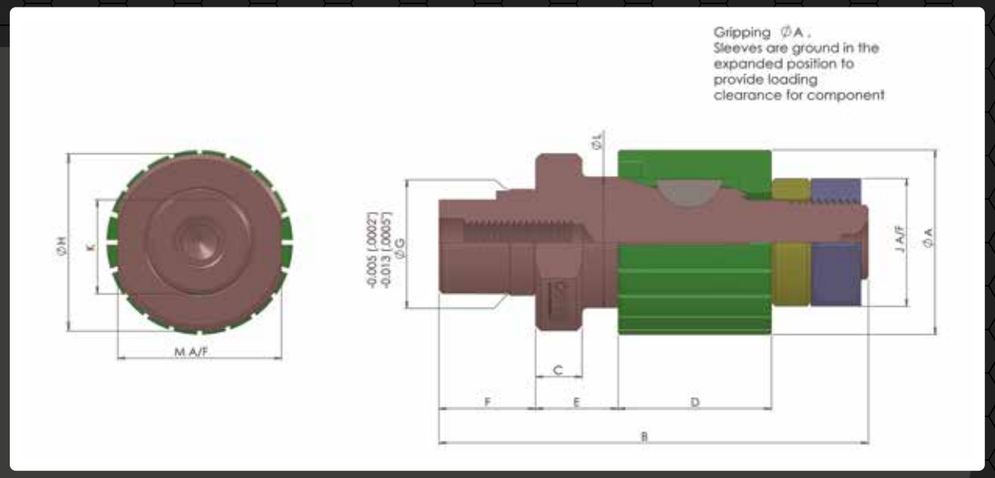
POWER OPERATED MANDRELS

BETWEEN CENTRES MANDREL



The nut operated between-centres expanding mandrel is generally mounted between 60 degree centres, and can be driven from the drive flat with a carrier or drive plate. It is possible to attach a simple component end locator, if required, at diameter L.

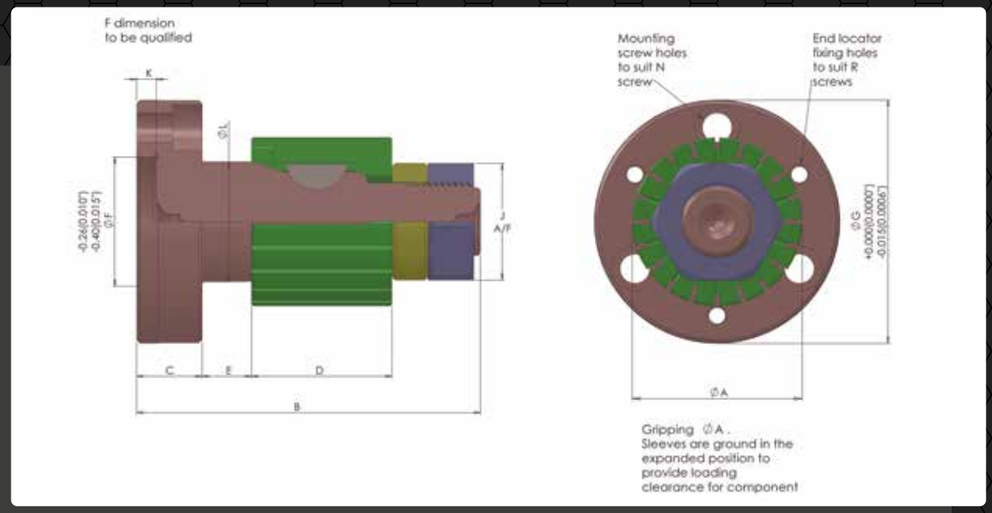
There is a ground diameter G to adapt this mandrel to face-plate mounted, if required, by use of an adaptor plate. Adaptor plates made to suit the machine mounting can be manufactured by PTG Workholding. Component end locators, solid-type or compensating (for out-of-square locating faces) can also be supplied.

These mandrels are generally used for small-batch grinding operations. They are hand-operated by use of conventional spanners, and are often used for inspection purposes.

For maximum efficiency, expansion sleeves should be pre-loaded to maintain contact with mandrel double-angles at all times.

	A		B	C	D	E	F	G	H	J A/F	K	L	M	Tool #
	Min	Max												
3A	12.5	16	77	11	22	21	20	20	26	10	18	9.5	22	90.811.110.1
2C	16	22	83	11	27	20	20	20	26	13	18	14.1	22	90.811.115.1
1C	22	28.5	99	11	32	21.5	27	30	40	19	27	20.7	36	90.821.121.1
18C	28.5	41	107	11	38	21.2	27	30	40	24	27	26.3	36	90.821.127.1
4C	41	63.5	120	13	43	23	27	30	50	36	27	37	46	90.821.134.1
5C	63.5	76.2	145	-	51	26	35	40	57.3	55	35	57.3	50	90.831.141.1
6C	76.2	89	155	-	57	26.3	35	50	71.1	65	45	71.1	60	90.841.148.1
7C	89	130	205	-	63.5	44	50	60	84.1	85√ò	55	84.1	70	90.851.153.1
8C	130	178	205	-	79.5	55.5	50	80	123	124√ò	73	123.1	105	90.861.159.1

FACEPLATE NUT OPERATED MANDREL



The face-plate nut operated expanding mandrel can be used on any machine with no drawbar facility, for general turning and grinding operations. These are a popular choice for milling fixture locators.

Adaptor plates made to suit the machine mounting can be manufactured by PTG Workholding.

Component end locators, solid-type or compensating (for out-of-square locating faces) can also be manufactured.

The natural pull-back action of the sleeve ensures the component is hard against the location face.

For maximum efficiency, expansion sleeves should be pre-loaded to maintain contact with mandrel double-angles at all times.

	A		B	C	D	E	F	G	J	K	L	N		R		Tool #
	Min	Max										DP	Ø	DP	Ø	
3A	12.5	16	73	20	22	15	40	75	10	6	12.6	58	M8	28	M4	90.800.110.1
2C	16	22	79	20	27	15	40	75	13	6	14.1	58	M8	28	M4	90.800.115.1
1C	22	28.5	86	20	32	15.5	40	75	19	6	20.7	58	M8	58	M6	90.800.121.1
18C	28.5	41	94	20	38	15.2	40	75	24	6	26.3	58	M8	58	M6	90.800.127.1
4C	41	63.5	105	20	43	15	40	75	36	6	37	58	M8	58	M6	90.800.134.1
5C	63.5	76.2	134	25	51	25	60	120	55	6	57.3	94	M10	94	M8	90.800.141.1
6C	76.2	89	144	25	57	25	60	120	65	6	71.1	94	M10	94	M8	90.800.148.1
7C	89	130	166	30	63.5	25	100	180	85Ø	6	84.1	150	M12	150	M10	90.800.153.1
8C	130	178	185	30	79.5	25	100	180	124Ø	6	123.1	150	M12	150	M10	90.800.159.1

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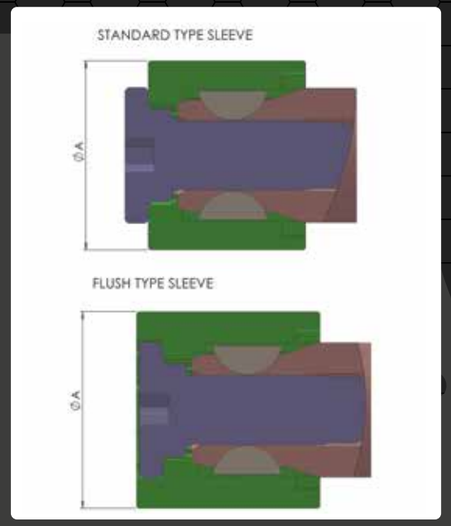
STANDARD SLEEVES

Our standard length sleeves can be used with all types of mandrel, and are interchangeable within the diameter range of each type. For example, the 3A drawbar operated mandrel will accept a 3A1 standard-type or a 3A2 flush-type sleeve, which may have been originally used on a 3A thread-operated mandrel.

PTG Workholding can supply bonded sleeves to keep swarf away from the double-angle form, helping to prolong the sleeve's life and accuracy.



Ordering Information

To order the correct sleeve to meet your requirements please email us on: sales@ptgworkholding.co.uk or phone: 01179 701101

We would also recommend customers' orders specify the type and model number of the mandrel.

All sleeve orders must specify the type and model number, the component bore and tolerance to be gripped.

e.g. 1 off type 18C1 bonded sleeve to grip 38.10mm diameter bore = 92.150.210.3810

Bond

Standard Type Sleeve

Model	Gripping Diameter		Length	Expanded Position	Tool #
	Min	Max			
3A1	12.5	16	22	0.13	92.000.200.XXXX
2C1	16	22	27	0.13	92.050.200.XXXX
1C1	22	28.5	32	0.13	92.100.200.XXXX
18C1	28.5	41	38	0.13	92.150.200.XXXX
4C1	41	63.5	43	0.26	92.200.200.XXXX
5C1	63.5	76.2	51	0.26	92.250.200.XXXX
6C1	76.2	89	57	0.26	92.300.200.XXXX
7C1	89	130	63.5	0.39	92.350.20X.XXXX
8C1	130	178	80	0.39	92.400.20X.XXXX

Flush Type Sleeve

Model	Gripping Diameter		Length	Expanded Position	Tool #
	Min	Max			
3A2	16.5	22	26	0.13	92.001.200.XXXX
2C2	22	28.5	32	0.13	92.051.200.XXXX
1C2	28.5	40	38	0.13	92.101.200.XXXX
18C2	40	51	45	0.13	92.151.200.XXXX
4C2	51	73	50	0.26	92.201.200.XXXX
5C2	73	89	60	0.26	92.251.200.XXXX
6C2	89	102	69	0.26	92.301.200.XXXX
7C2	101	143	78.5	0.39	92.351.20X.XXXX
8C2	143	178	99.5	0.39	92.401.20X.XXXX

SPECIAL SLEEVES AND MANDRELS

We have available a comprehensive range of special sleeves, that have been developed to accommodate the varying conditions and the more difficult workholding problems, that modern industry is faced with today. PTG design engineer's can use any combination of the following to provide the ideal clamping solution.

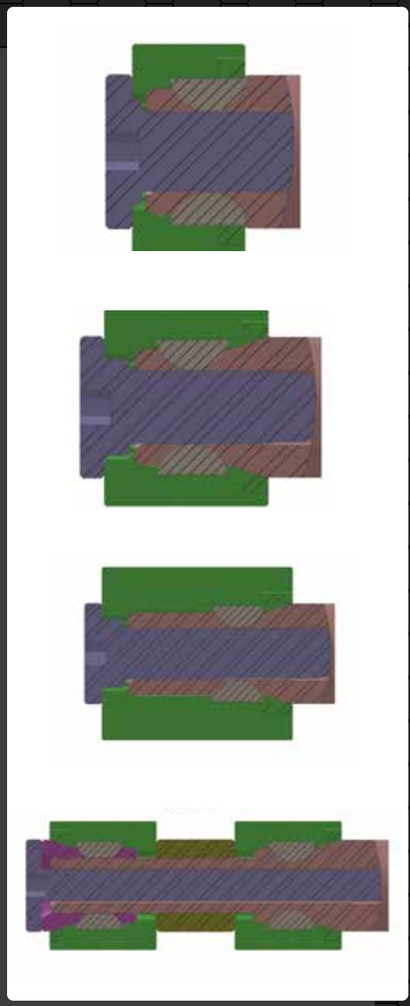
All of the expanding sleeves below can be supplied with their expansion slots bonded with silicone as specials. This is recommended to keep swarf away from the double angle form. This will prolong the life and accuracy of the expanding mandrel assembly.

Short length (1/2C1)
There are many situations where the customers component is too short for our standard sleeve. We therefore have a full range of short sleeves.

Standard length (C1)
The standard sleeve has it's double angles spaced at their optimum position to provide positive clamping and accuracy.

Extended length (C11)
There are many situations where the customers component is too long for our standard sleeve. We therefore have a full range of long sleeves.

Dual Sleeve
There are many situations where the customers component is too long for our extended sleeve. We can then mount dual combinations of the above sleeves. This provides a rigid method of clamping a long component.



SPECIAL APPLICATION ENGINEERING

Over the years our highly experienced engineering design team have provided countless solutions to customers with special requests.

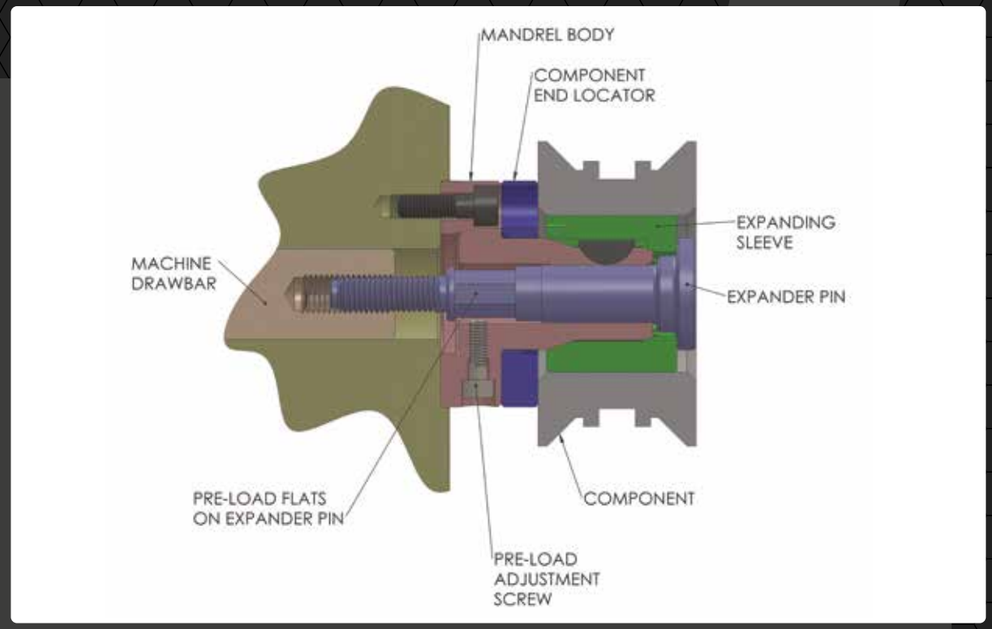
For example, Rolls Royce Aerospace, an existing customer, approached us to develop two high specification weld fixtures. The first fixture needed to improve both the weld production time and the fuel efficiency of their Trent 1000 engine. The second fixture needed to provide similar benefits for their XWB engine which is installed on Airbus's A350 aircraft.

Working closely with Rolls Royce mechanical engineers our design team developed a workable solution, albeit one which still had a number of technical challenges to overcome.

Suffice to say that for each challenge a solution was found and with the design and 3D model approved, the two fixtures were manufactured. After delivery, the benefits of both fixtures were apparent from day one. They passed their acceptance trials without fault and they achieved both labour and fuel efficiency savings. Rolls Royce have now purchased another four fixtures for use in their business.

To read the full version of this Rolls Royce Aero Case Study, along with other similar examples please go to: www.ptgworkholding.co.uk

INSTALLATION & PRE-LOADING INSTRUCTIONS



- Ensure the machine drawbar is fully forward.
- Load mandrel body to machine spindle (using clock register or double-angle form to check concentricity)
- Fit end-locator to mandrel body (if not already fitted).
- Ensure double-angles are clean on both the mandrel body and sleeve.
- Place expanding sleeve on mandrel body.
- Ensure pre-load adjustment screw is retracted, and place expander pin in mandrel body. Screw the pin clockwise into the drawbar until the head of the pin contracts with the sleeve, ensuring the pin does not expand the sleeve.
- Load component onto the mandrel assembly in its working position.
- Screw expander pin clockwise into the drawbar until the sleeve grips the component.
- Back-off expander pin anti-clockwise until first available pre-load flat is adjacent to pre-load adjustment screw.
- Remove component and check loading clearance to ensure easy loading.
- Tighten pre-load adjustment screw ensuring expander pin has slight radial movement, to allow pin to slide freely.
- Finally, check by loading the component and operating the drawbar, ensuring the component is satisfactorily held. Ensure that the drawbar pressure is sufficient to prevent slippage.
- The mandrel is now ready for operation.

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