Mechanical Bow Spring Centralizer

MAN-TTT-911 (R01)

Thru-Tubing Technology

A Division of Owen Oil Tools LP

402 Machine Loop

Scott, Louisiana, 70583, USA

Phone: +1 (337) 984-1181

Fax: +1 (337) 984-3044

www.corelab.com/owen

Description

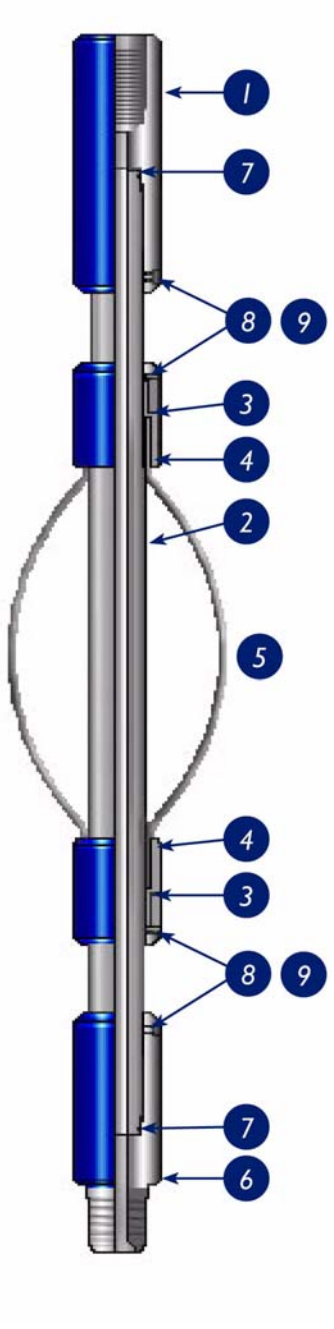
The Mechanical Bow Spring Centralizer is used to centralize the bottom hole assembly (BHA) inside larger tubing or casing after it has passed through a restricted ID, packer, or production tubing and then assist in fishing, cutting, milling, under-reaming, or washing over.

Operation

The Centralizer was designed for the springs to be at maximum expansion constantly, collapsing when passing through the restrictions, then expanding back to the desired tubing or casing size in which it is to centralize. Circulation can be maintained through the Centralizer for any hydraulic tools placed below it or for washing. Due to the design of the tool, the tool string will have drag while running in and out of the wellbore. Care should be taken when approaching any restricted diameters, to prevent damage to the springs.

Note: Unless otherwise indicated, all the strength figures given in this manual, are the result of calculations based on the yield strength of the material used in the manufacture of this product. These strength calculations are considered accurate within plus or minus 20% and are to be used only as a guide. They do not constitute a guarantee, actual or implied. In use, appropriate allowance should be made as a safety factor.

TT0911-168C BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0911-168C-001
2	1	Mandrel	TT0911-181C-002
3	2	Spring Carriers	TT0912-168D-004
4	2	Spring Covers	TT0911-168C-005
5	4	Bow Spring	TT0911-168B-006
6	1	Bottom Sub	TT0911-168C-007
7	2	O-Rings 7/8" x 1" x 1/16" 2-020	PUR-TORV000-020
8	8	Steel Allen Set Screws 1/4-20 x 1/4"	PUR-TSAS160-016
9	8	Steel Allen Set Screws 10-32 x 3/16"	PUR-TSAS121-012

Tool Name: 1.688 in. Mechanical Bow Spring Centralizer

Product Code: TT0911-168C **Tool OD:** 1.688 in. **Tool ID:** 0.56 in.

Material: AISI 4140 HT **Tool Length:** 45.0 in. w/1 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The shoulder on either end of the Mandrel, 34,900 lbs.

Burst Point and Burst Pressure: Either O-ring groove on the Mandrel, 43,800 psi.

Torsional Weak Point and Ft-Lbs to Yield: 507 ft-lbs as a function of torsional yield of either pin end of the Mandrel, at the thread relief groove.

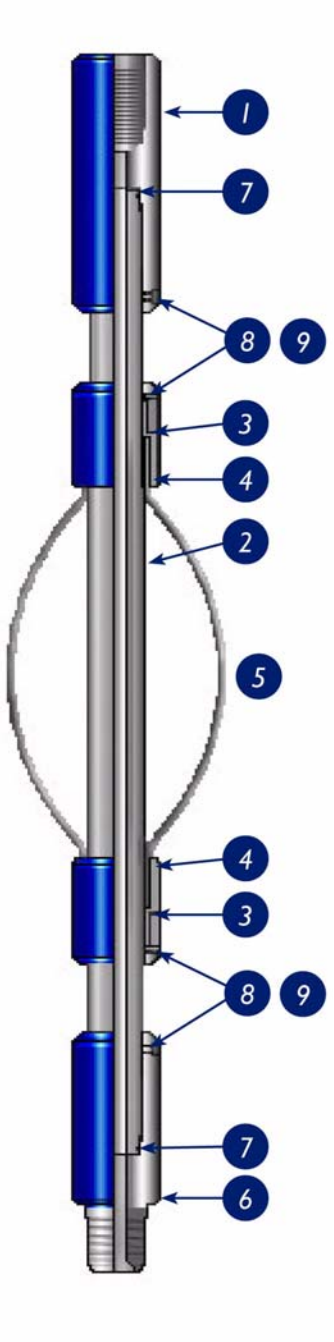
Recommended Make Up Torque:

1st Connection: The Top Sub - Mandrel Stub Acme connection - 297 ft-lbs then tighten the 1/4”- 20 steel Allen set screws – 85 in-lbs.

2nd Connection: The Mandrel - Bottom Sub Stub Acme connection – 297 ft-lbs then tighten the 1/4”- 20 steel Allen set screws – 85 in-lbs.

3rd Connection: Spring Carrier and Spring Cover connection - Hand Tighten or 15 ft-lbs then tighten the 10-32 steel Allen set screws - 40 in-lbs.

TT0911-175C BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0911-175C-001
2	1	Mandrel	TT0911-181C-002
3	2	Spring Carriers	TT0912-181D-004
4	2	Spring Covers	TT0911-175C-005
5	4	Bow Springs	TT0911-168B-006
6	1	Bottom Sub	TT0911-175C-007
7	2	O-Rings 7/8" x 1" x 1/16" 2-020	PUR-TORV000-020
8	8	Steel Allen Set Screws 1/4-20 x 1/4"	PUR-TSAS160-016
9	8	Steel Allen Set Screws 10-32 x 3/16"	PUR-TSAS121=012

Tool Name: 1.750 in. Mechanical Bow Spring Centralizer

Product Code: TT0911-175C **Tool OD:** 1.750 in. **Tool ID:** 0.56 in.

Material: AISI 4140 HT **Tool Length:** 45.0 in. w/1 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The shoulder on either end of the Mandrel, 34,900 lbs.

Burst Point and Burst Pressure: Either O-ring groove on the Mandrel, 43,800 psi.

Torsional Weak Point and Ft-Lbs to Yield: 507 ft-lbs as a function of torsional yield of either pin end of the Mandrel, at the thread relief groove.

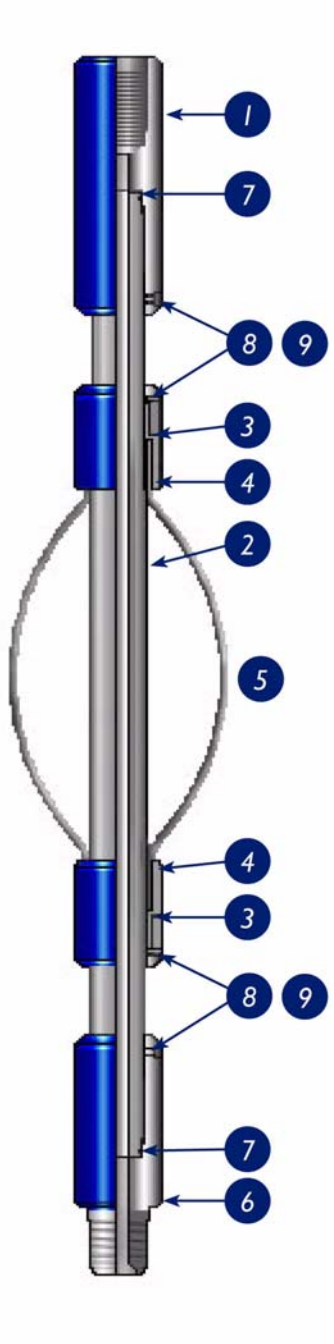
Recommended Make Up Torque:

1st Connection: The Top Sub - Mandrel Stub Acme connection - 297 ft-lbs then tighten the 1/4”- 20 steel Allen set screws – 85 in-lbs.

2nd Connection: The Mandrel - Bottom Sub Stub Acme connection – 297 ft-lbs then tighten the 1/4”- 20 steel Allen set screws – 85 in-lbs.

3rd Connection: Spring Carrier and Spring Cover connection - Hand Tighten or 15 ft-lbs then tighten the 10-32 steel Allen set screws - 40 in-lbs.

TT0911-181C BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0911-181C-001
2	1	Mandrel	TT0911-181C-002
3	2	Spring Carriers	TT0912-181D-004
4	2	Spring Covers	TT0911-181C-005
5	4	Bow Springs	TT0911-168B-006
6	1	Bottom Sub	TT0911-181C-007
7	2	O-Rings 7/8" x 1" x 1/16" 2-020	PUR-TORV000-020
8	8	Steel Allen Set Screws 1/4-20 x 1/4"	PUR-TSAS160-016
9	8	Steel Allen Set Screws 10-32 x 3/16"	PUR-TSAS121-012

Tool Name: 1.813 in. Mechanical Bow Spring Centralizer

Product Code: TT0911-181C **Tool OD:** 1.813 in. **Tool ID:** 0.56 in.

Material: AISI 4140 HT **Tool Length:** 45.0 in. w/1 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The shoulder on either end of the Mandrel, 34,900 lbs.

Burst Point and Burst Pressure: Either O-ring groove on the Mandrel, 43,800 psi.

Torsional Weak Point and Ft-Lbs to Yield: 507 ft-lbs as a function of torsional yield of either pin end of the Mandrel, at the thread relief groove.

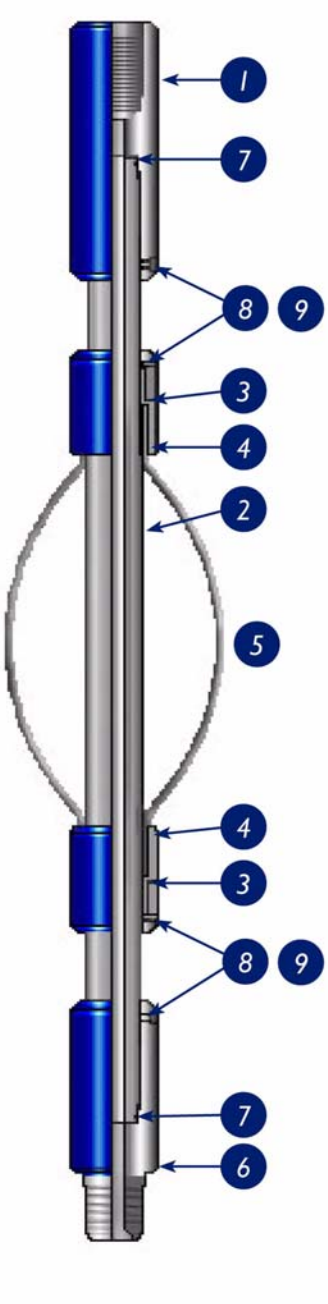
Recommended Make Up Torque:

1st Connection: The Top Sub - Mandrel Stub Acme connection - 297 ft-lbs then tighten the 1/4"- 20 steel Allen set screws – 85 in-lbs.

2nd Connection: The Mandrel - Bottom Sub Stub Acme connection – 297 ft-lbs then tighten the 1/4"- 20 steel Allen set screws – 85 in-lbs.

3rd Connection: Spring Carrier and Spring Cover connection - Hand Tighten or 15 ft-lbs then tighten the 10-32 steel Allen set screws - 40 in-lbs.

TT0911-213C BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0911-213C-001
2	1	Mandrel	TT0911-213C-002
3	2	Spring Carriers	TT0912-213D-004
4	2	Spring Covers	TT0911-213C-005
5	5	Bow Springs	TT0911-168B-006
6	1	Bottom Sub	TT0911-213C-007
7	2	O-Rings 1 1/8" x 1 1/4" x 1/16" 2-024	PUR-TORV000-024
8	12	Steel Allen Set Screws 1/4-20 x 1/4"	PUR-TSAS160-016
9	8	Steel Allen Set Screws 10-32 x 1/4"	PUR-TSAS121-016

Tool Name: 2.125 in. Mechanical Bow Spring Centralizer

Product Code: TT0911-213C **Tool OD:** 2.125 in. **Tool ID:** 0.56 in.

Material: AISI 4140 HT **Tool Length:** 45.0 in. w/1-1/2 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The shoulder on either end of the Mandrel, 42,340 lbs.

Burst Point and Burst Pressure: Either O-ring seal bore on the Top and Bottom Subs, 48,400 psi.

Torsional Weak Point and Ft-Lbs to Yield: 1043 ft-lbs as a function of torsional yield of either pin end of the Mandrel, at the thread relief groove.

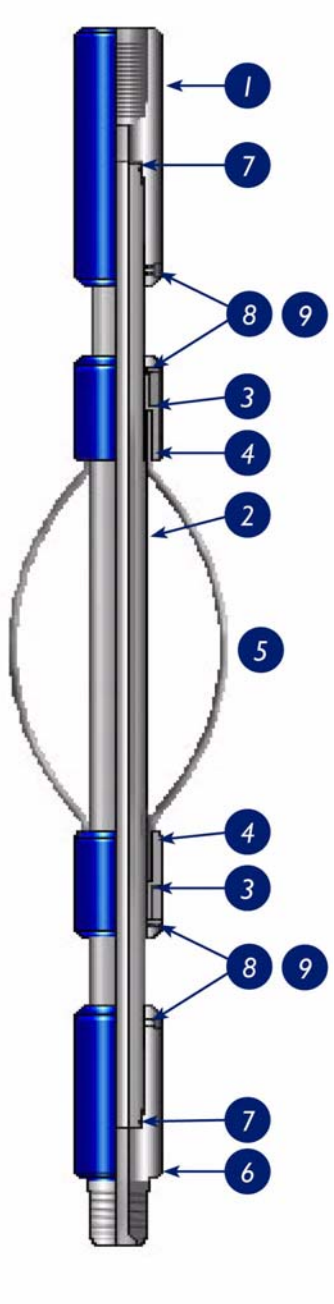
Recommended Make Up Torque:

1st Connection: The Top Sub - Mandrel Stub Acme connection - 641 ft-lbs then tighten the 1/4"- 20 steel Allen set screws – 85 in-lbs.

2nd Connection: The Mandrel - Bottom Sub Stub Acme connection – 641 ft-lbs then tighten the 1/4"- 20 steel Allen set screws – 85 in-lbs.

3rd Connection: Spring Carrier and Spring Cover connection - Hand Tighten or 15 ft-lbs, then tighten the 10-32 steel Allen set screws - 40 in-lbs.

TT0911-225C BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0911-225C-001
2	1	Mandrel	TT0911-213C-002
3	2	Spring Carriers	TT0912-213D-004
4	2	Spring Covers	TT0911-225C-005
5	5	Bow Springs	TT0911-168B-006
6	1	Bottom Sub	TT0911-225C-007
7	2	O-Ring 1 1/8" x 1 1/4" x 1/16" 2-024	PUR-TORV000-024
8	12	Steel Allen Set Screws 1/4-20 x 1/4"	PUR-TSAS160-016
9	8	Steel Allen Set Screws 10-32 x 3/16"	PUR-TSAS121-016

Tool Name: 2.250 in. Mechanical Bow Spring Centralizer

Product Code: TT0911-225C **Tool OD:** 2.250 in. **Tool ID:** 0.56 in.

Material: AISI 4140 HT **Tool Length:** 45.0 in. w/1-1/2 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The shoulder on either end of the Mandrel, 42,340 lbs.

Burst Point and Burst Pressure: Either O-ring seal bore on the Top and Bottom Subs, 52,650 psi.

Torsional Weak Point and Ft-Lbs to Yield: 1043 ft-lbs as a function of torsional yield of either pin end of the Mandrel, at the thread relief groove.

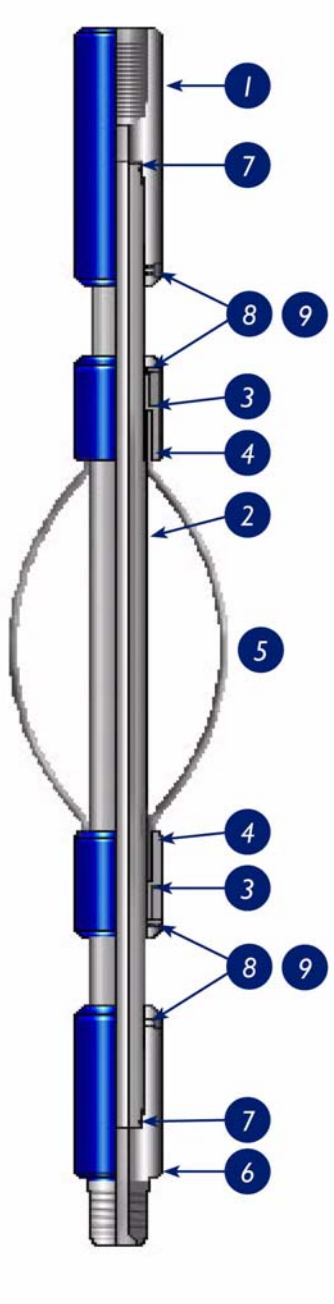
Recommended Make Up Torque:

1st Connection: The Top Sub - Mandrel Stub Acme connection - 641 ft-lbs then tighten the 1/4”- 20 steel Allen set screws – 85 in-lbs.

2nd Connection: The Mandrel - Bottom Sub Stub Acme connection – 641 ft-lbs then tighten the 1/4”- 20 steel Allen set screws – 85 in-lbs.

3rd Connection: Spring Carrier and Spring Cover connection - Hand Tighten or 15 ft-lbs, then tighten the 10-32 steel Allen set screws - 40 in-lbs.

TT0911-288C BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0911-288C-001
2	1	Mandrel	TT0911-288C-002
3	2	Spring Carriers	TT0912-288D-004
4	2	Spring Covers	TT0911-288C-005
5	7	Bow Springs	TT0911-168B-006
6	1	Bottom Sub	TT0911-288C-007
7	2	O-Rings 1 11/16" x 1 7/8" x 3/32" 2-131	PUR-TORV000-131
8	16	Steel Allen Set Screws 3/8-16 x 5/16"	PUR-TSAS240-020
9	8	Steel Allen Set Screws 10-32 x 3/16"	PUR-TSAS121-012

Tool Name: 2.875 in. Mechanical Bow Spring Centralizer

Product Code: TT0911-288C **Tool OD:** 2.875 in. **Tool ID:** 1.00 in.

Material: AISI 4140 HT **Tool Length:** 48.0 in. w/2-3/8 in. PAC DSI Connections

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The shoulder on either end of the Mandrel, 95,990 lbs.

Burst Point and Burst Pressure: Either O-ring seal bore on the Top and Bottom Subs, 40,320 psi.

Torsional Weak Point and Ft-Lbs to Yield: 3370 ft-lbs as a function of torsional yield of either pin end of the Mandrel, at the thread relief groove.

Recommended Make Up Torque:

1st Connection: The Top Sub - Mandrel Stub Acme connection - 990 ft-lbs then tighten the 3/8”- 16 steel Allen set screws – 288 in-lbs.

2nd Connection: The Mandrel - Bottom Sub Stub Acme connection – 990 ft-lbs then tighten the 3/8”- 16 steel Allen set screws – 288 in-lbs.

3rd Connection: Spring Carrier and Spring Cover connection - Hand Tighten or 15 ft-lbs, then tighten the 10-32 steel Allen set screws - 40 in-lbs.

1.0 Pre-Assembly

Warning: ***Make sure all tool parts and components have been thoroughly cleaned or serious damage and/or injury could occur!***

Note: Verify that the correct O-ring redress kit and quantities are used as specified on the Bill Of Materials (for example, 5 each etc.…). Lay out all redress kit components on a clean surface.

Note: Make sure to lubricate all O-rings and threaded surfaces.

Note: Visually inspect all parts for damage or wear. Thread parts together without the O-rings to check fit. Repair or replace damaged parts.

Caution: ***Always file wrench marks or burrs and clean off debris!***

Caution: ***This tool should always be disassembled, cleaned thoroughly, inspected and reassembled after job!***

2.0 Assembly

2.1 Grease the entire ID of the Bottom Sub (item #6) and put it into a vise.

2.2 Put the 1 O-rings (item #7) onto each end of the Mandrel (item #2).

2.3 Grease the area above the identification band of the Mandrel.

2.4 Grease the ID of the Spring Carrier (item #3) and install threads up onto the greased end of the Mandrel.

2.5 Grease the ID of the Spring Cover (item #4) and slip it onto the Mandrel. Do not screw it into the Spring Carrier yet.

2.6 Thread the Mandrel, carrier/cover end first, into the Bottom Sub.

2.7 Repeat steps 2.4 and 2.5 for the other end of the Mandrel.

2.8 Install the Top Sub (item #1) hand tight, onto the Mandrel.

2.9 Starting at one end of the Mandrel, put a Bow Spring (item #5) into one of the slots on the Spring Carrier (item #3), then screw on the Spring Cover (item #4) 1/4 of a turn. Repeat for the other end of the spring.

2.10 Repeat step 2.9 for the other springs.

Note: Hold on to the other springs when you loosen the Spring Cover so they do not fall out.

2.11 After the last Bow Spring has been installed, tighten both of the Spring Covers.

2.12 Using a backup wrench, make all of the connections wrench tight.

Caution: ***Do not wrench on the Mandrel areas above the springs! It is OK to wrench on the middle of the Mandrel!***

2.13 Install the 8 Set Screws (item #9) into the Spring Covers and tighten.

2.14 Install the 8 Set Screws (item #8) into the Top and Bottom Subs and tighten.

3.0 Disassembly

Caution: ***Do not wrench on the Mandrel areas above the springs! It is OK to wrench on the middle of the Mandrel!***

3.1 Put the tool in a vise on the Bottom Sub (item #6).

3.2 Remove the 8 Set Screws (item #8) from the Top and Bottom Subs (item #1 and #6).

3.3 Remove the 8 Set Screws (item #9) from the Spring Covers (item #4).

3.4 Loosen the Top Sub about half way.

3.5 Unscrew one of the Spring Covers and while holding on to the other springs, remove one spring from the slot in the Spring Carrier (item #3). Screw cover back on 1/4 of a turn. Repeat on other end of Mandrel.

3.6 Repeat step 3.5 until all of the Springs have been removed.

3.7 Remove the Top Sub.

3.8 Remove the carrier and cover from the Mandrel. Take assembly out of the vise and remove the other carrier and cover.

3.9 Finally, remove the Bottom Sub from the vise.

Note: Remove and discard all O-rings. Replace O-rings after each use. Thoroughly clean tool parts in a cleaner approved by state and/or local laws.

Note: Visually inspect tool for swelling after each use. Damaged or swelled components must be replaced.

Note: It is recommended that a Magnetic Particle Inspection (MPI) be completed on all components after each job.