Assembly Guide
Roundit^TM 2000NX EMI

Specified AECMA EN 6049-008

**While using this guide, all customers
must comply with
their own harness manufacturing rules.**
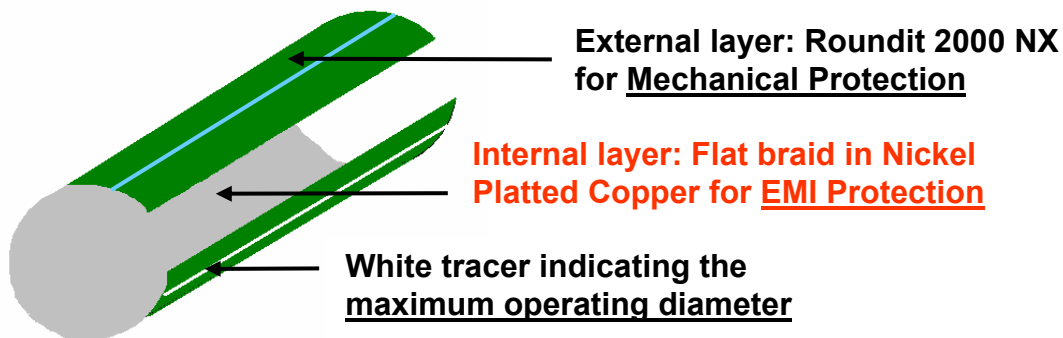
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1- Description

Roundit 2000NXEMI is a two-layer product combining Mechanical Protection and EMI shielding.

1- The outer layer is made of a flexible self-wrapping textile sleeve: Roundit 2000NX specified EN 6049-006
(Woven blend of textured meta-aramid yarn & PPS Monofilament with an anti-fray impregnation)

2- The inner layer is made of a flat braid made of nickel platted copper.

3- The two layers are sewn with meta-aramid yarns onto the inside of Roundit 2000NX.

External layer: Roundit 2000 NX for Mechanical Protection

Internal layer: Flat braid in Nickel Platted Copper for EMI Protection

White tracer indicating the maximum operating diameter

The sleeve **2000NXEMI** is endowed with a **blue tracer** to make the difference with the sleeve **Roundit 2000NX.**

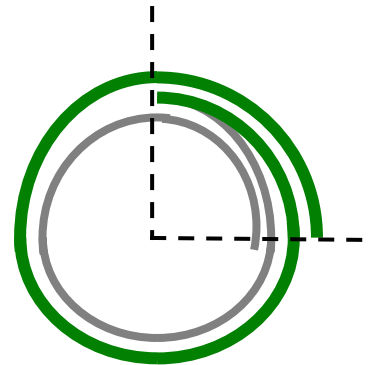**Two versions of Roundit 2000NXEMI are available:**
- **Roundit 2000NXEMI with PTFE**, used to avoid contact between cables and the metal braid
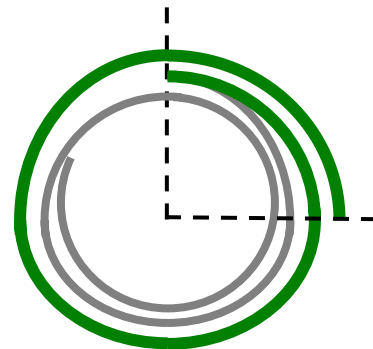

PTFE tape stuck on the metal braid

- **Roundit 2000NXEMI without PTFE**, used when the cables are already protected by Nomex or by a PTFE Tape.

Roundit 2000NXEMI size 5 to 38:

Exception **Roundit 2000NXEMI** size 6 (only):

2 - Application

The sleeve **Roundit 2000NXEMI** can be used for a:

- **EMI protection** and **bundling** for electrical harnesses in all aircraft zones
- **Open solution for modification in the original harness**
- **Repair of EMI shielding**

Use of **Roundit 2000NXEMI** has to seen as part of a global accessible system, including access to the cable ties and fixation to give the possibility of making repairs and modifications.

3 - Sleeve Installation on a Harness

3.1 - Preparation of the Wire Harness

3.1.1 - Bundles

The wire bundles have to be prepared before installing **Roundit 2000NXEMI**.

To help with installation, some breakout bundles can be tied to hold the wires in place.

This operation should be done minimally, using as little lacing tape or tape as possible since the complete harness with the sleeve will be tied after the installation of **Roundit 2000NXEMI**.

3.1.2 - Cutting

- **Cutting the sleeve**

The two layers of **Roundit 2000NXEMI** are cut with scissors. The textile fabric of the sleeve has an anti-fray system with a knot at the edge.

Good quality paper scissors are required in order not to damage to **Roundit 2000NXEMI** during cutting.

No space between the blades
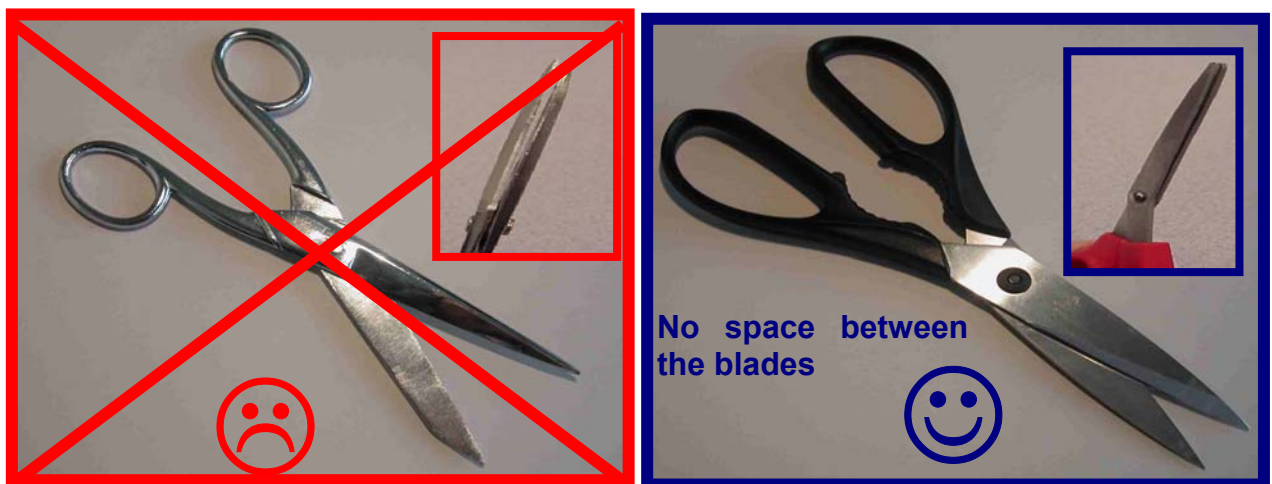
1 Make one straight cut across the width of **Roundit 2000NXEMI**

2 Using very light force, manually pull the loose fibers off the end of the cut edge

Go back to step 1 if final cut is not straight

3 Pull any remaining loose fiber over to tracer edge of **Roundit 2000NXEMI**. Filaments will stop unraveling. Cut off with scissors.
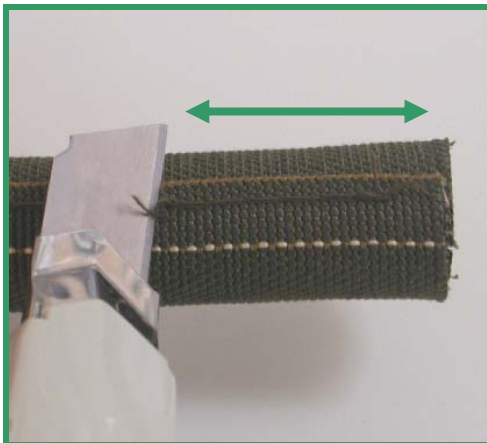
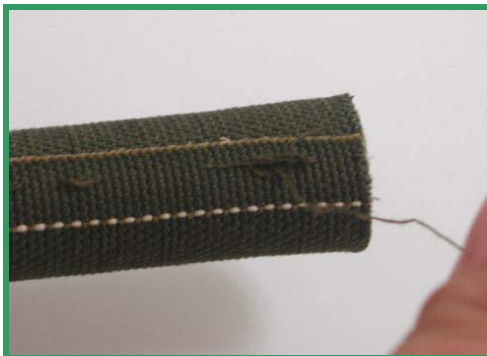- **Separating Roundit 2000NX EMI into 2 independent layers**

On the overlap part of **Roundit 2000NXEMI**, you will find a green meta-aramid yarn sewn to join the Nomex sleeve and the metal braid.

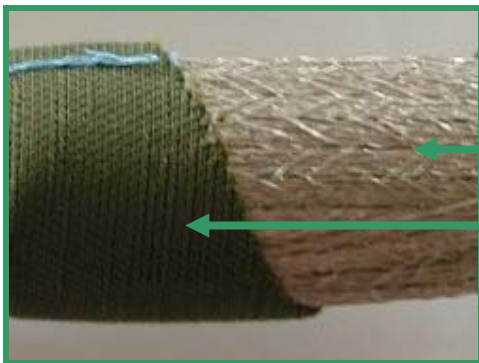To unpick this yarn, use of a box cutter is recommended.

Lengthways you need to separate the textile sleeve from the metal braid, you have to rub the box cutter on the yarn to cut it.

Remove the pieces of yarn you have just cut.

The sleeve is now separated into two independent layers.

Metal Braid

Nomex Braid

- **Splitting with PTFE**

Use a box cutter to cut the PTFE tape at 5 mm from the end of the sleeve regardless of the length of PTFE you need to remove.

Remove the length of unwanted PTFE without removing the 5mm strip.

Use scissors to cut the PTFE Tape.
Use a ruler if necessary.

Cut the 5 mm strip.

This method prevents the metal braid from being damaged during PTFE removal

3.1.3 - Tools

2 tool designs can be used to facilitate the installation of **Roundit 2000NXEMI** on bundles for sizes below 25 while removal of the sleeve can be performed manually without tools.

**Two-head Tool:
4-size tool**

Sizes 5-8 & 13-19

**One-head Tool:
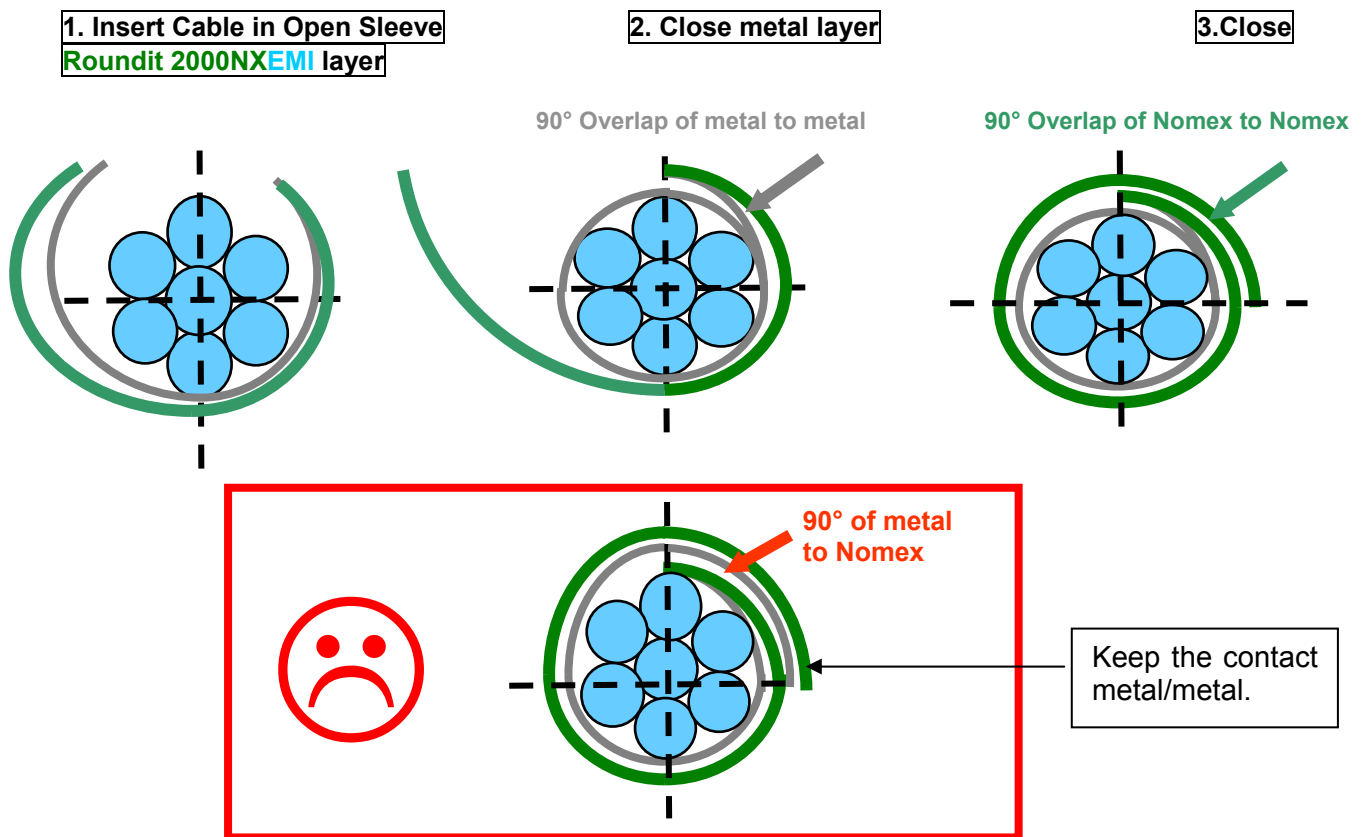1 tool per size**

Sizes 5, 8 & 13

Use of the tools is explained in section 6

3.1.4 - Installation

Roundit 2000NXEMI on the bundle must be **tight** in order to avoid folds.

To make it easier for multi-branch harnesses, it is better to start covering the smallest bundle and finish with the biggest. This makes it possible to cover the small size by a bigger size on the break-out.

In order to use the maximum diameter indicator correctly, **respect the position of the ivory line** on the overlap direction (Please refer to the diagram in section 3.2).

1. Insert Cable in Open Sleeve Roundit 2000NXEMI layer

2. Close metal layer

3.Close

90° Overlap of metal to metal

90° Overlap of Nomex to Nomex

90° of metal to Nomex

Keep the contact metal/metal.

3.1.5 - Twisting

Roundit 2000NXEMI must be **twisted on all bundles**.

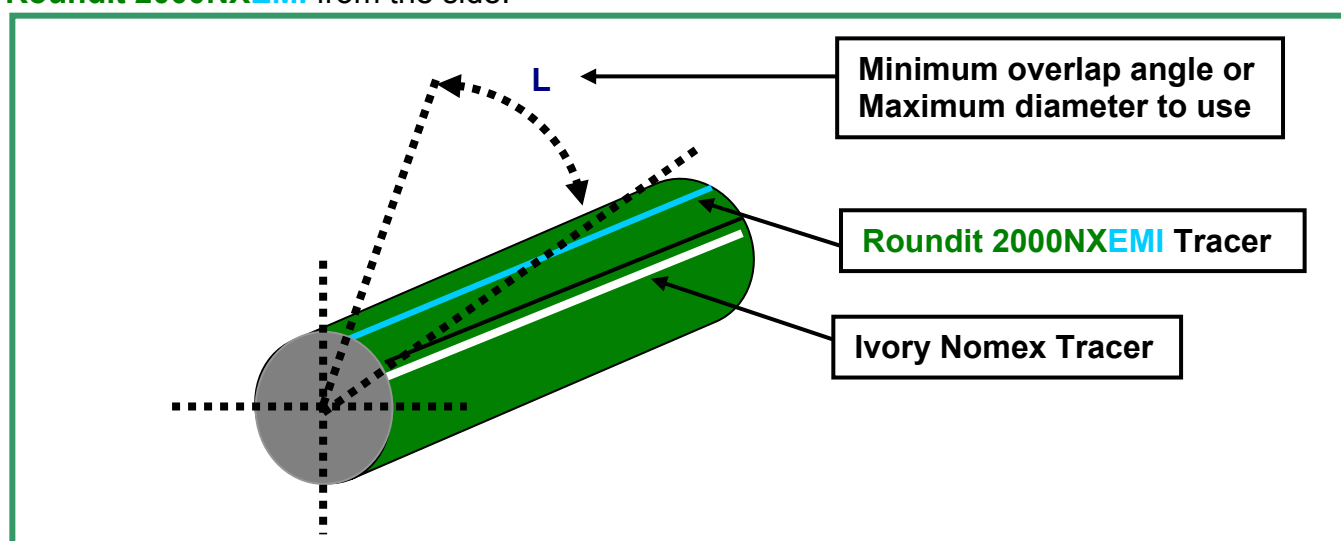The **twist** shall be on average around **1 to 2 turns per linear meter** (2 turns/yard) of the bundle.

In order to ensure the good performance of the transfer impedance, **it is important not to twist Roundit 2000NXEMI too much. Do not exceed two twists per meter.**
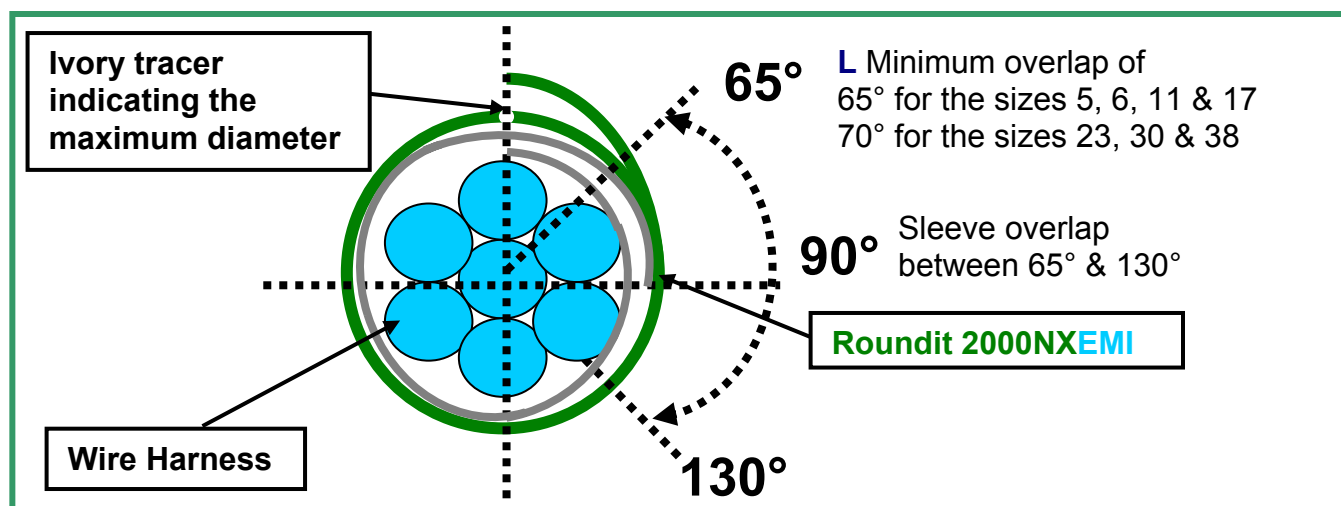
3.2 - Diameters of Bundles/Sizes

Roundit 2000NXEMI sizes must be adapted to suit the diameters of the bundles so that, in all cases, lip overlap is 130° maximum and 65° minimum. Overlap is 90° on nominal size.

Sizes mm (inches)	Bundle Diameter		Max back-shell diameter mm
	Max mm (inches)	Min mm (inches)	
5 (1/5")	**6** (1/4")	**1** (1/32")	**9,5**
6 (1/4")	**6** (1/4")	**1** (1/32")	**10,0**
11 (3/7")	**11** (3/7")	**6** (1/4")	**14,8**
17 (2/3")	**17** (2/3")	**11** (3/7")	**23,0**
23 (1")	**23** (1")	**17** (2/3")	**30,4**
30 (1-1/6")	**30** (1-1/6")	**23** (1")	**39,3**
38 (1-1/2")	**38** (1-1/2")	**30** (1-1/6")	**49,0**

Roundit 2000NXEMI from the side:

L

Minimum overlap angle or Maximum diameter to use

Roundit 2000NXEMI Tracer

Ivory Nomex Tracer

Roundit 2000NXEMI installed on a wire harness:

Ivory tracer indicating the maximum diameter

Wire Harness

65°

L Minimum overlap of 65° for the sizes 5, 6, 11 & 17 70° for the sizes 23, 30 & 38

90° Sleeve overlap between 65° & 130°

Roundit 2000NXEMI

130°

3.3 – Connection and Fixation of the sleeve

Roundit 2000NXEMI junction on connector back shell and break out accessories are made with Band-It. The sleeve on the bundle must be tied with cable ties or lacing tapes.

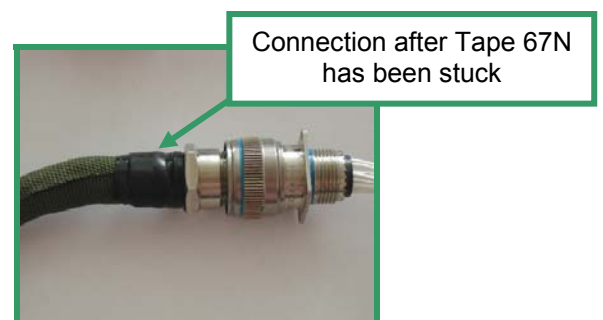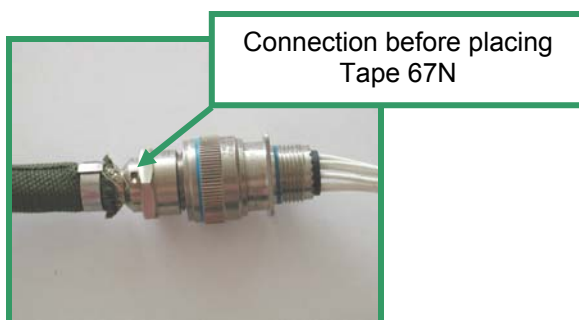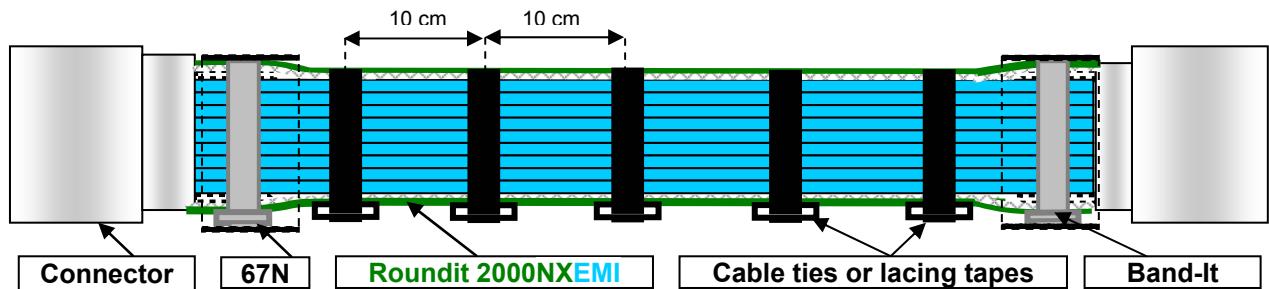The cable tie or lacing tape **interval is 10 cm.**

The **fixation** of the harness on the Aircraft **will increase the quantity of cable ties**.

A silicone tape 67N (ABS 5334) can be added to finish the ends. It adds local waterproof protection (salt spray resistance) and prevents injuries.

67N (ABS 5334)

- **Back-Shell Junction**

| Connector | 67N | Roundit 2000NXEMI | Cable ties or lacing tapes | Band-It |

Connection before placing Tape 67N

Connection after Tape 67N has been stuck

3.4 - Branches

- **Symmetrical branches**: 3 sleeves of **Roundit 2000NXEMI**

Coupe B-B

A

Branch 1

Branch 2

A

Branch 3

Coupe A-A

B

Branch 2

Coming from branch 2
Coming from branch 1
Coming from branch 3

Branch 3

B

⬛	67N Tape
🟧	Banding Split-Ring
▨	EMI Shielding
⬛	Band-It
🟩	Nomex
▨	Lacing Tape
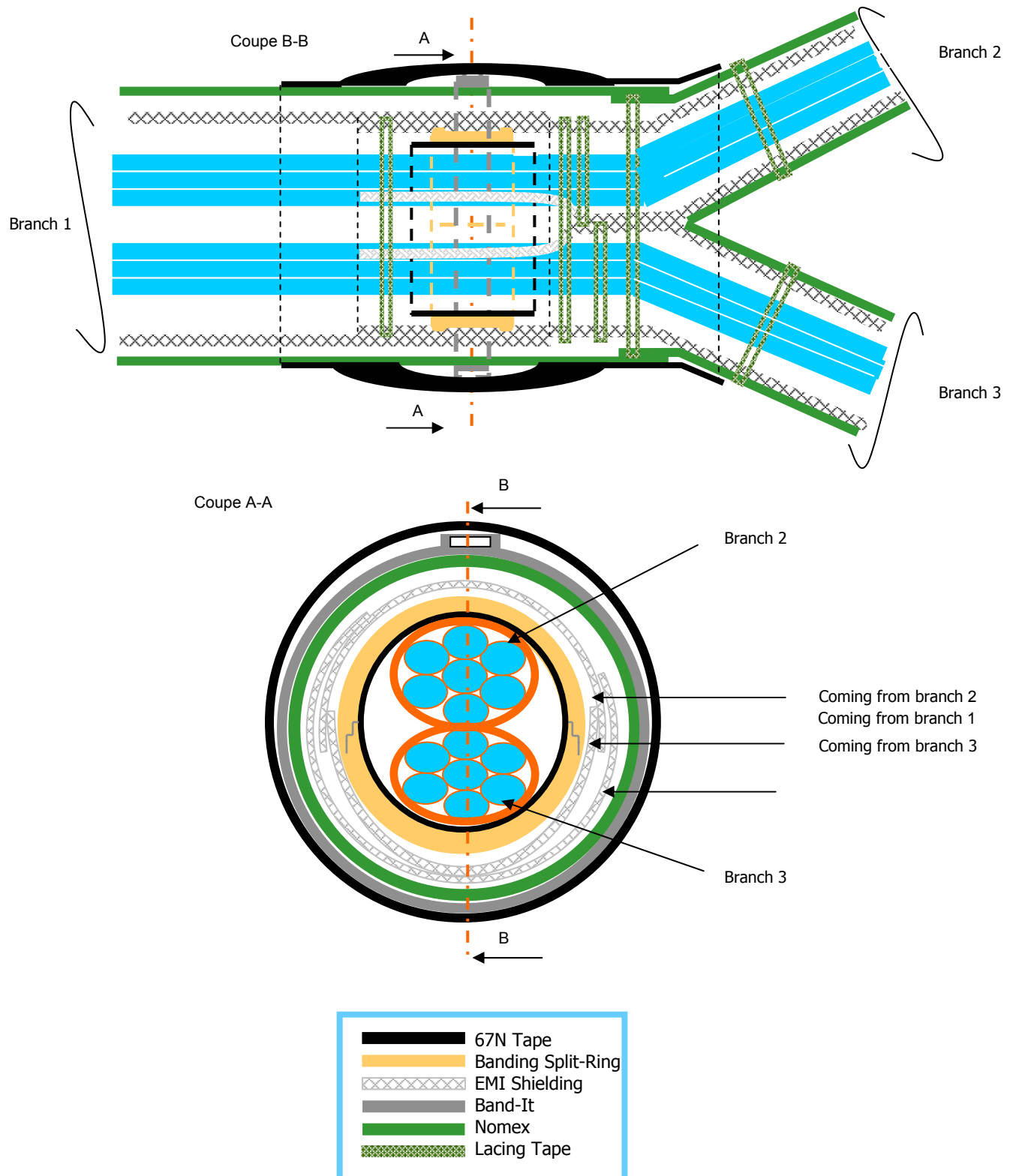
Assembly of branch 2 & 3

Assembly of branch 1 over branches 2 & 3
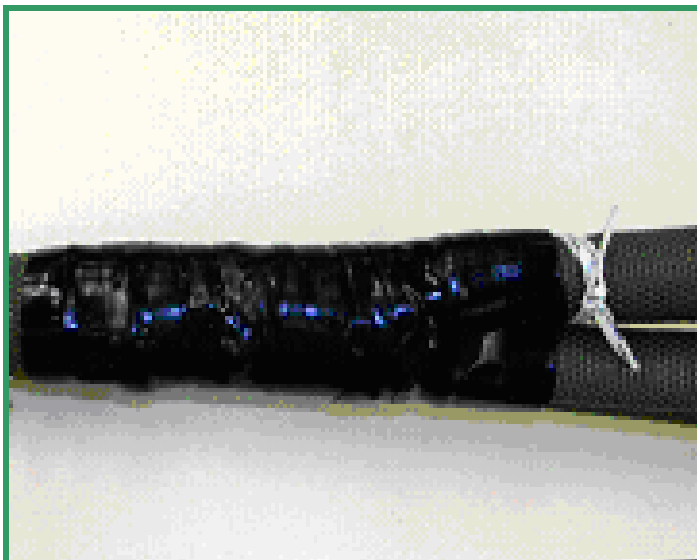
Final assembly once Tape 67N has been stuck

- **Asymmetrical branches: 2 sleeves of Roundit 2000NXEMI**
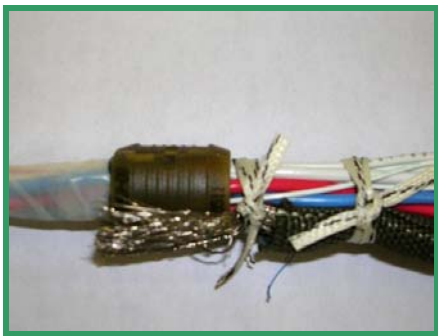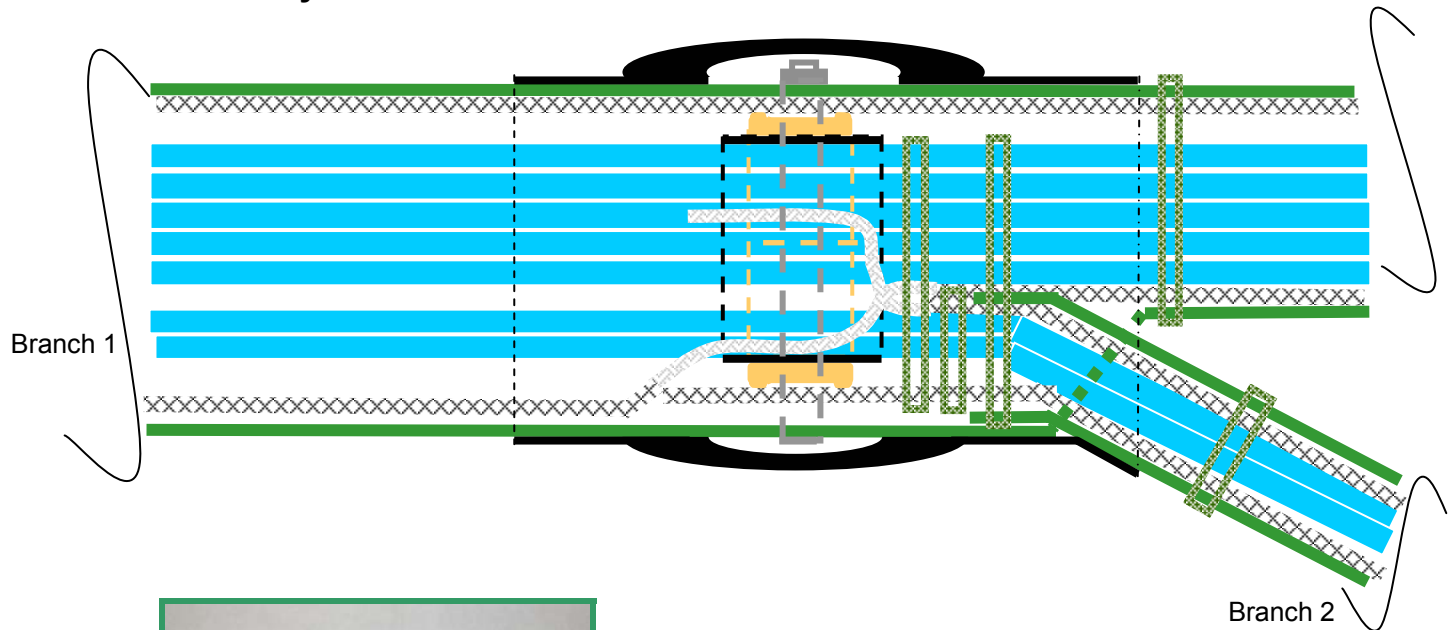
Branch 1

Branch 2

Branch 2 over Split Ring

Installation of branch 2 inside branch 1.

Assembly connected with Band-it.

Final Assembly once Tape 67N has been stuck.

- **Branches with accessories: 3 sleeves of Roundit 2000NXEMI**
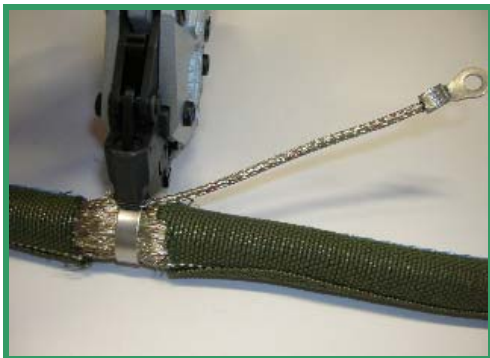
- **Bonding strap connection**

Link with the mass

67N
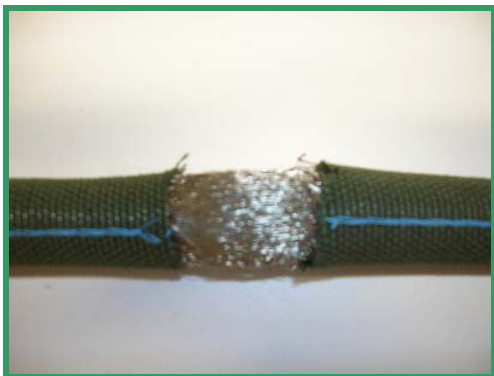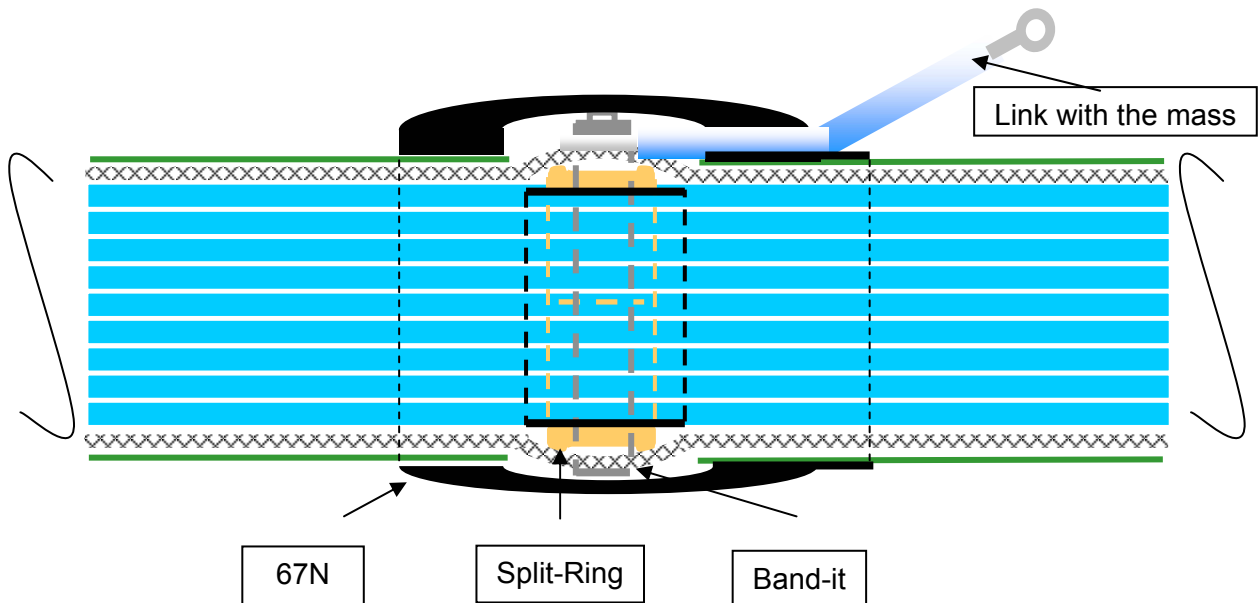
Split-Ring

Band-it

Removing the outside layer of **Roundit 2000NXEMI**

Installing Split-Ring over Tape 67N

Placing Bonding Strap with Band-It

Crimping of the Band-It on the Bonding Strap with the Band-It Tooling.

The electrical contact is now guaranteed

Final Assembly once Tape 67N has been stuck

4 - Harness Installation on Aircraft

When you use **Roundit 2000NXEMI**, the radii of curvature of the harnesses must respect the following recommendations: As a general rule, it is "10 times the diameter" of the bundle. It may be reduced to "5 times the diameter" of the bundle if it could make the installation easier on the aircraft. In any case, it cannot be reduced further otherwise damages to the sleeve could occur.

Drain holes are not required on the low points of bundles protected with **Roundit 2000NXEMI**. They can be made if necessary in a specific area.

Fixing the harness on the aircraft will add more cable ties on **Roundit 2000NXEMI**. This should be considered when installing cable ties or lacing tapes to secure **Roundit 2000NXEMI** on the bundles.

5 - Maintenance, Modifications & Repairs

5.1 - Maintenance/Modifications

Adding or removing wires made easier by cutting some cable ties and opening the **Roundit 2000NXEMI**. Adding a wire may require the use of tools.
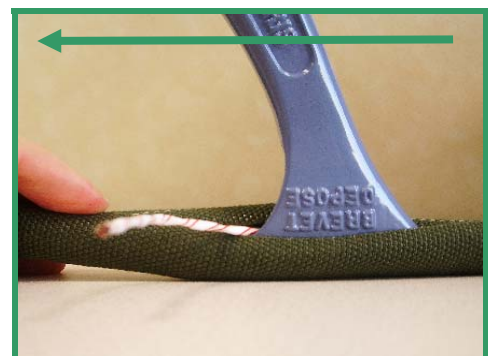
It is possible to replace **Roundit 2000NXEMI** without removing the harness.

Installation / removal of **Roundit 2000NXEMI** can be performed manually or with a Roundit® Tool.

Insert the whole wire harness + the additional wire in the tool through the lateral aperture
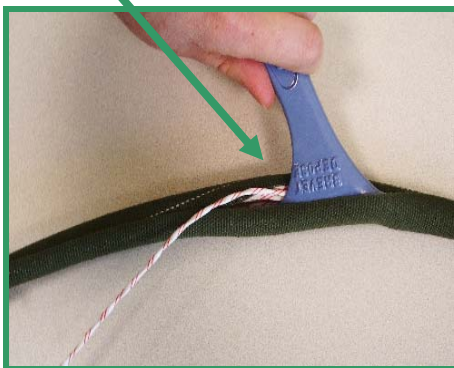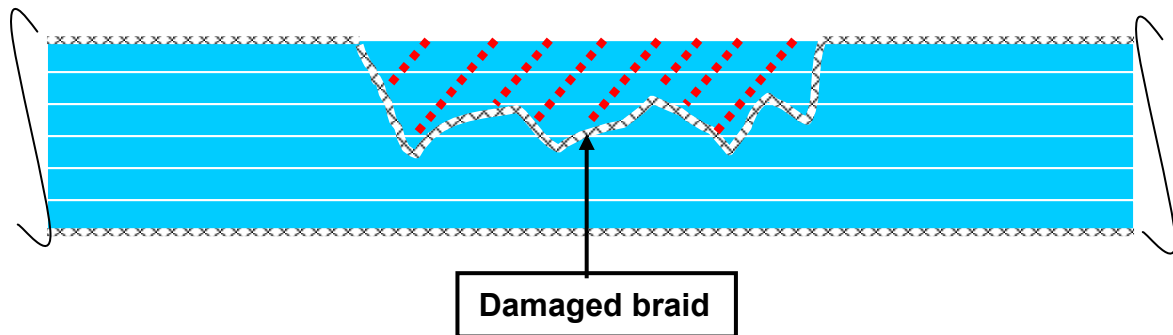

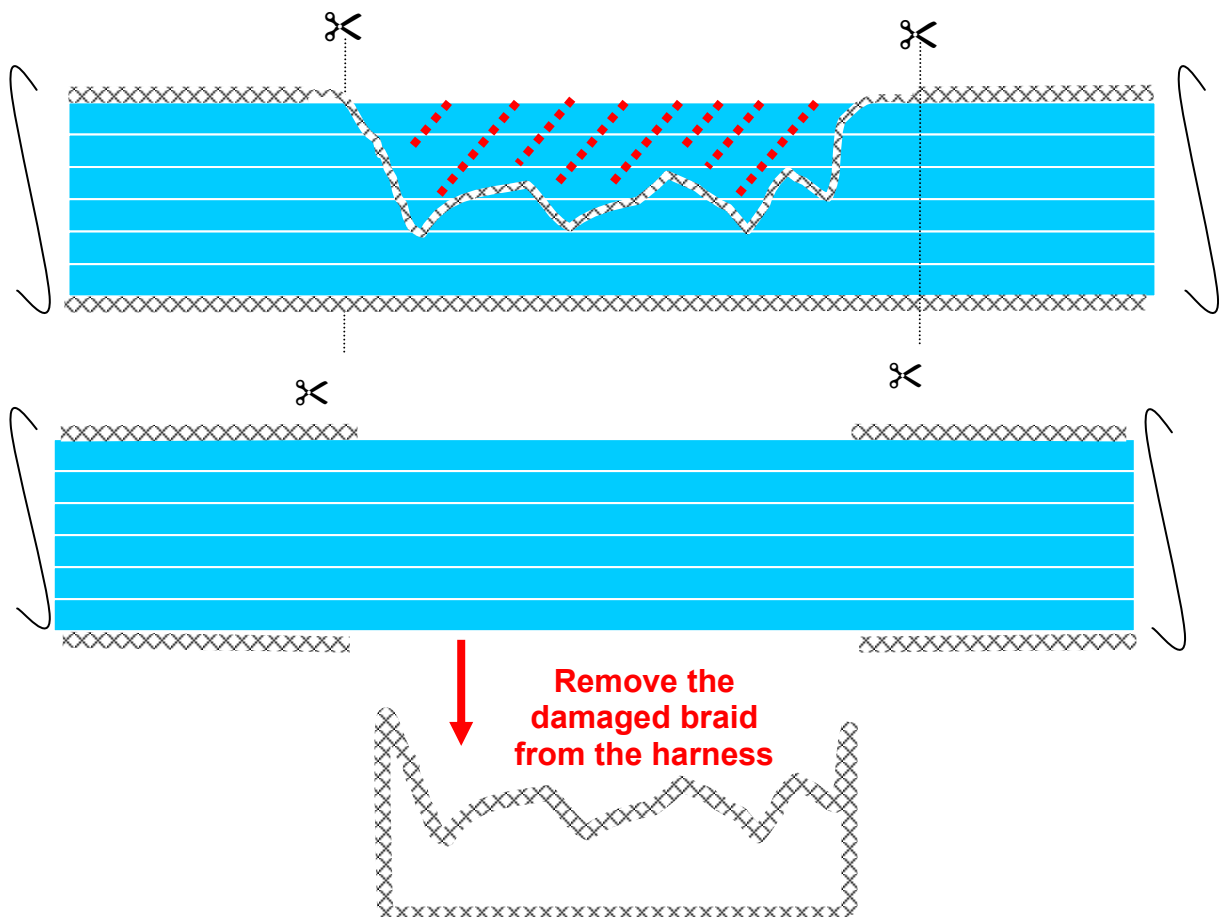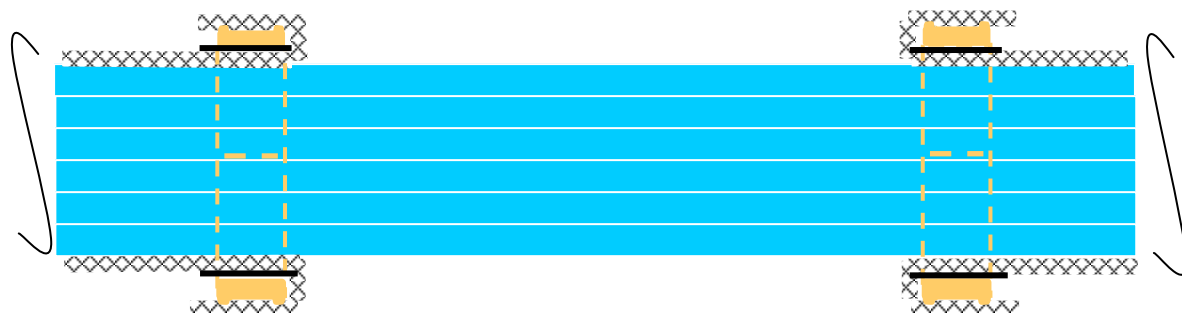Pull the tool along the wire harness to insert the whole length
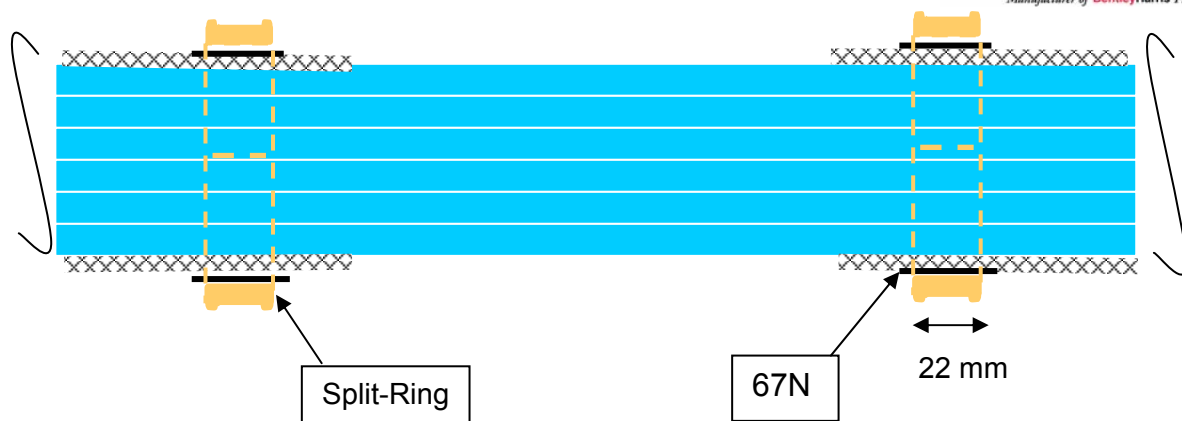
Operations on end items: It is possible to partially open **Roundit 2000NXEMI** on only the required sections.

5.2 – Repairs

Damaged braid
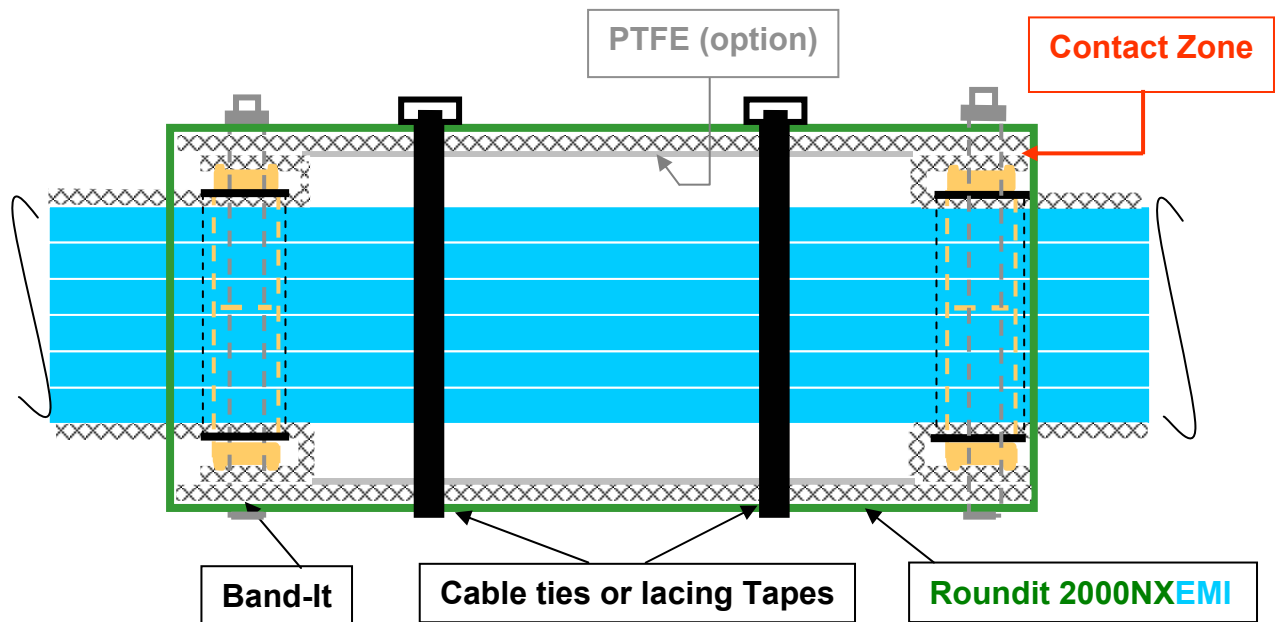

- **By removing the sleeve and replacing by Roundit 2000NXEMI**

Remove the damaged braid from the harness

Split-Ring

67N

22 mm

- **By over-sleeving Roundit 2000NXEMI on the damaged area**

PTFE (option)

Contact Zone

| Band-It | Cable ties or lacing Tapes | Roundit 2000NXEMI |

- **By waterproofing the assembly**

| **Band-It** | **Cable ties or lacing Tapes** | **Roundit 2000NXEMI** | **66N** |
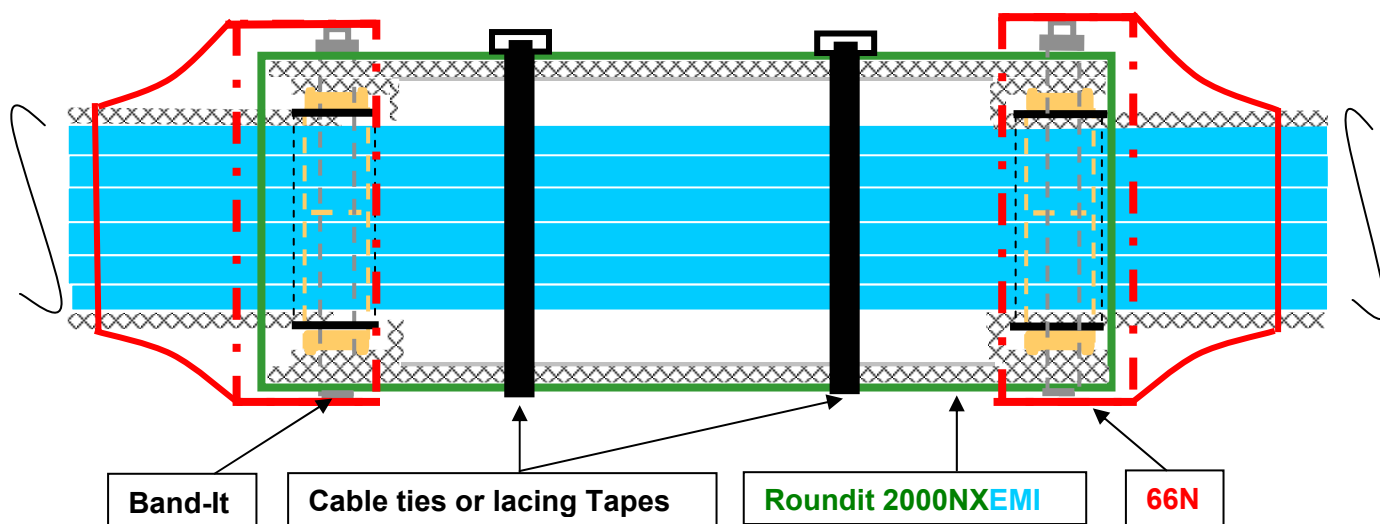
Tape 66 N for Repair

6 - Use of the Roundit®-Tool

Two-Head Roundit® Tool

Nose Cone

Lateral Aperture

Direction in which the tool must be moved

Sizes 5&6

Handle

Direction in which the tool must be moved

Lateral Aperture

Nose Cone

Sizes 11&17

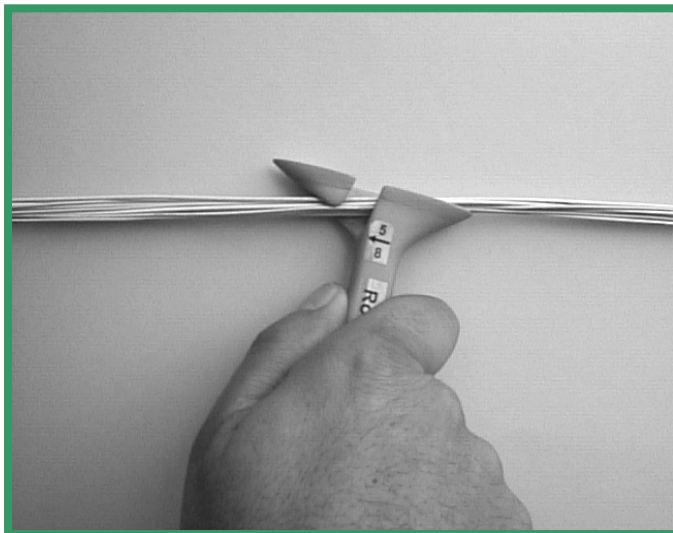**One-head Roundit® Tool**

Nose Cone

Lateral Aperture

Available in sizes:
5
8
13
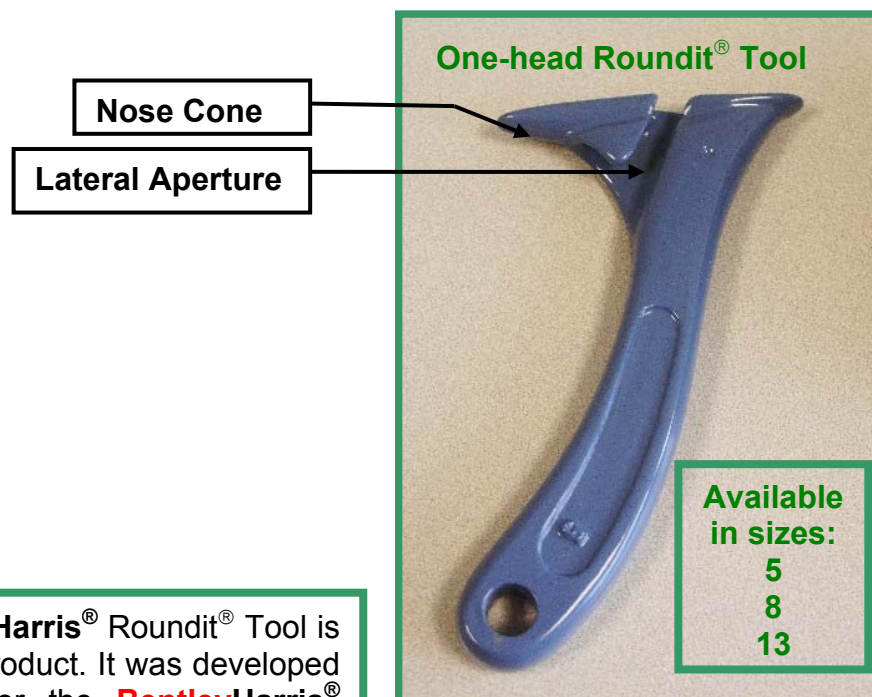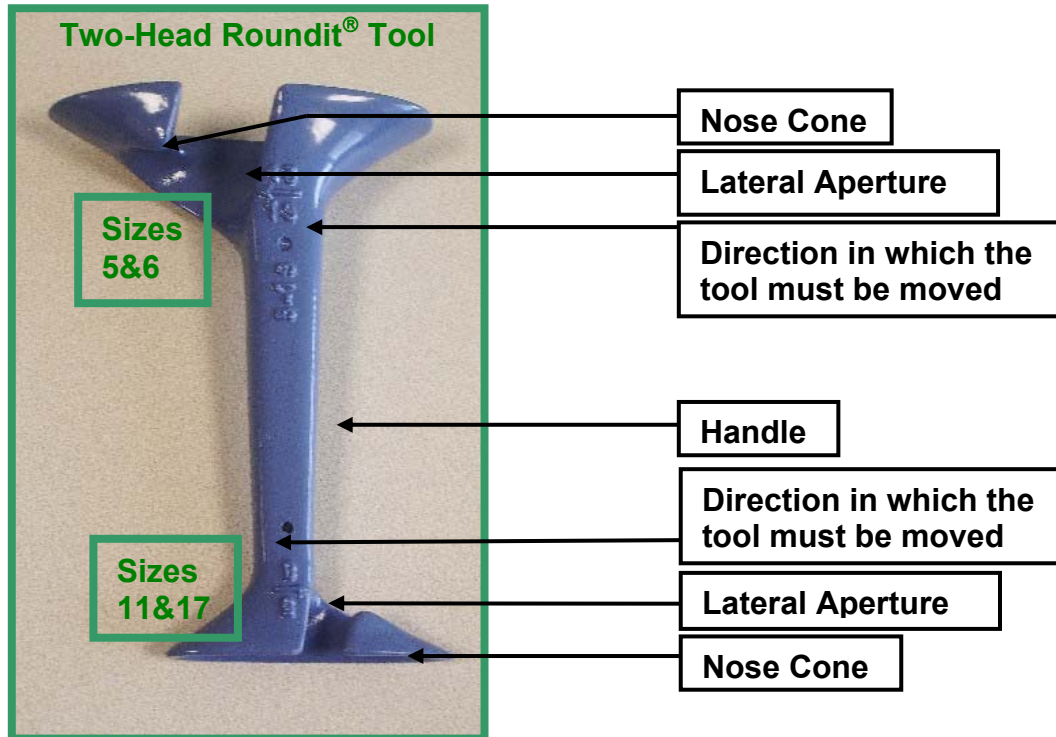
The **BentleyHarris®** Roundit® Tool is a patented product. It was developed specifically for the **BentleyHarris®** sleeves in the Roundit® 2000 family. It is not authorized for use on any other product.
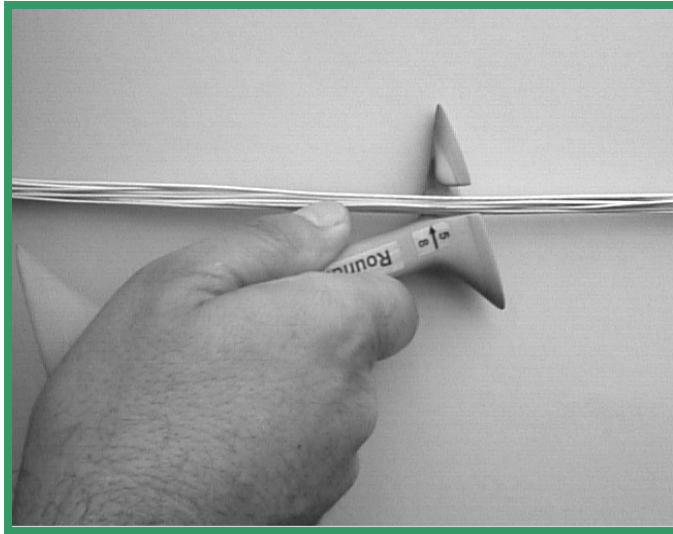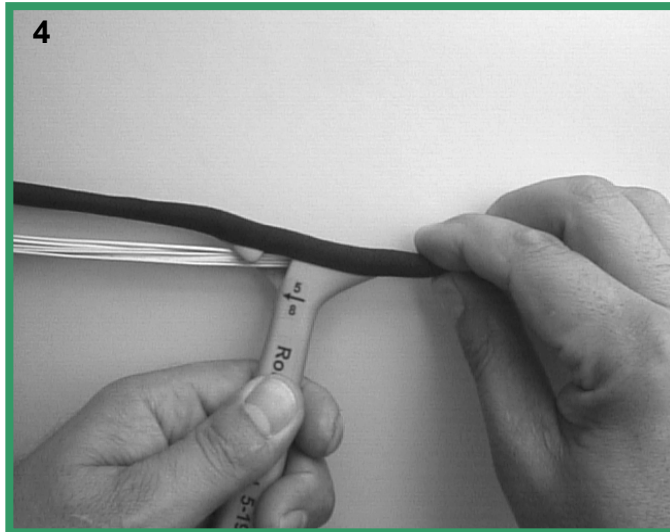
Select the head of the tool that fits the right size of Roundit 2000NXEMI.
Insert the harness on the Roundit®-Tool by the lateral aperture

**Group all the wire harness on the head of the Roundit®-Tool**
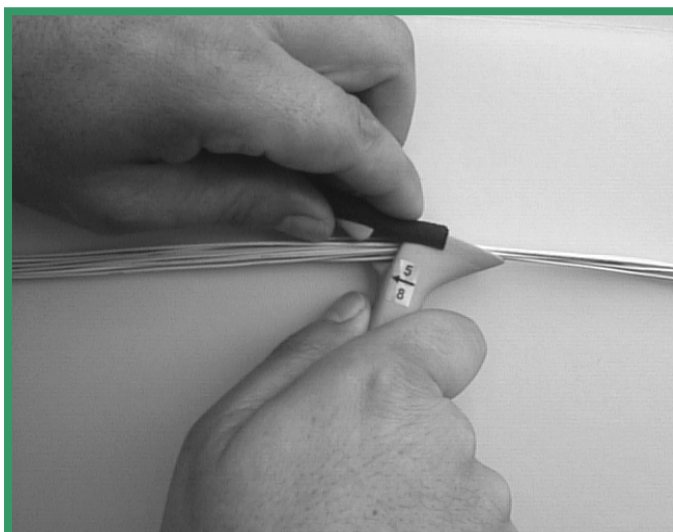
**Insert Roundit 2000NXEMI by the nose cone**

Assembly of the sleeve on the harness can be done by:

1. Moving the Roundit®-Tool along the wire and Roundit 2000NXEMI (Applicable to long wire harness made on a table)

2. Moving Roundit 2000NXEMI and the harness with the Roundit®-Tool fixed (Applicable to simple wire harness for serial manufacturing)

3. Moving Roundit 2000NXEMI and the Roundit®-Tool along the wire harness (Applicable to small harness on table)
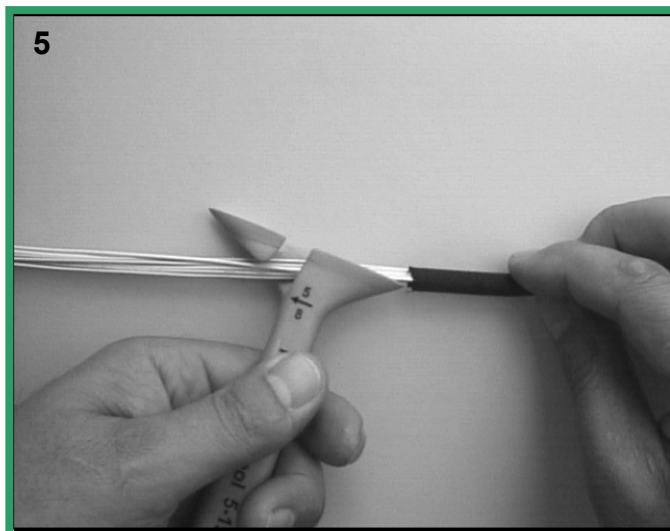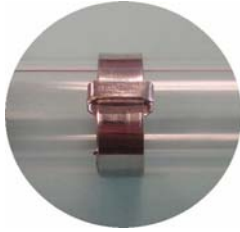

Remove the tool from Roundit 2000NXEMI
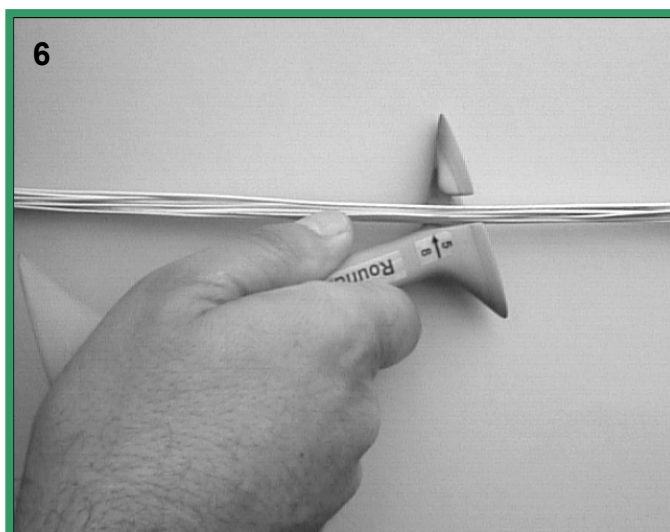
Remove the tool from the harness

7- Accessories

Band-it
Used to secure break out and repairs.

Banding Split-Ring
Used to protect cables from being damaged when a Band-It is installed over.

Silicone Tapes
67N standard manufacturing
66N for repair
Used to gather cables, cover Band-It for cut protection, and avoid cables and Banding Split Ring from moving.

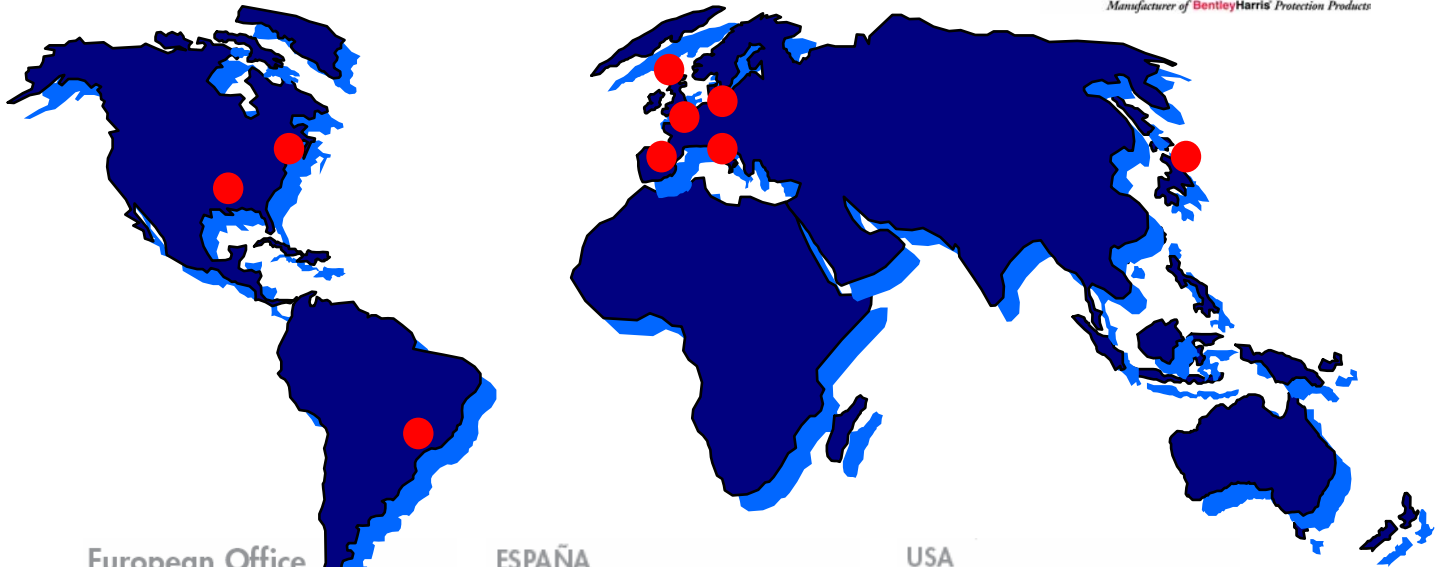**Cable Tie**
Used to secure the closure of the sleeve

Lacing Tapes
Used to secure the closure of the sleeve

Band-it Tooling
Used to fix and tighten a Band-It.

FEDERAL MOGUL
Systems Protection Group
Manufacturer of **BentleyHarris** *Protection Products*

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