

MRI Coil Repair Guide.pdf

This guide is widely used by MRI coil repair technicians.

Normal Use, General Wear	Preventable Damage
Cosmetic items	Broken screw bosses or stand-offs
Non-skid pads worn or missing	Mechanical components damaged or missing
Velcro worn or missing	Housing damage
Loose hardware	Mechanical part fabrication or replacement
Screws missing	Connector housing damage
Coil stiffeners worn or broken	Connector contact damage(pins,etc.)
Insert stripped or missing	Cable trauma
Foam worn,broken-down	Foam torn

Shenzhen HiFlexlink Technology Co.,Ltd

Compare the reported problem to main or contributing findings

Electrical Analysis

Normal Use, Random Electronic Failures		Preventable Damage
Capacitor failure	Blown fuse	Connector housing damage
Diode failure	Intermittent system cable	Connector contact damage (pins,etc.)
Resistor failure	Intermittent flex circuits	Cable trauma
Inductor failure	Worn/Intermittent wiring	Broken solder joints
SCR failure	Internal wires	Broken interconnects
FET failure		Component failure due to trauma
RF switch failure		
Preamp failure		
Logic control failure		
EEPROM failure		
Electronic tuning		

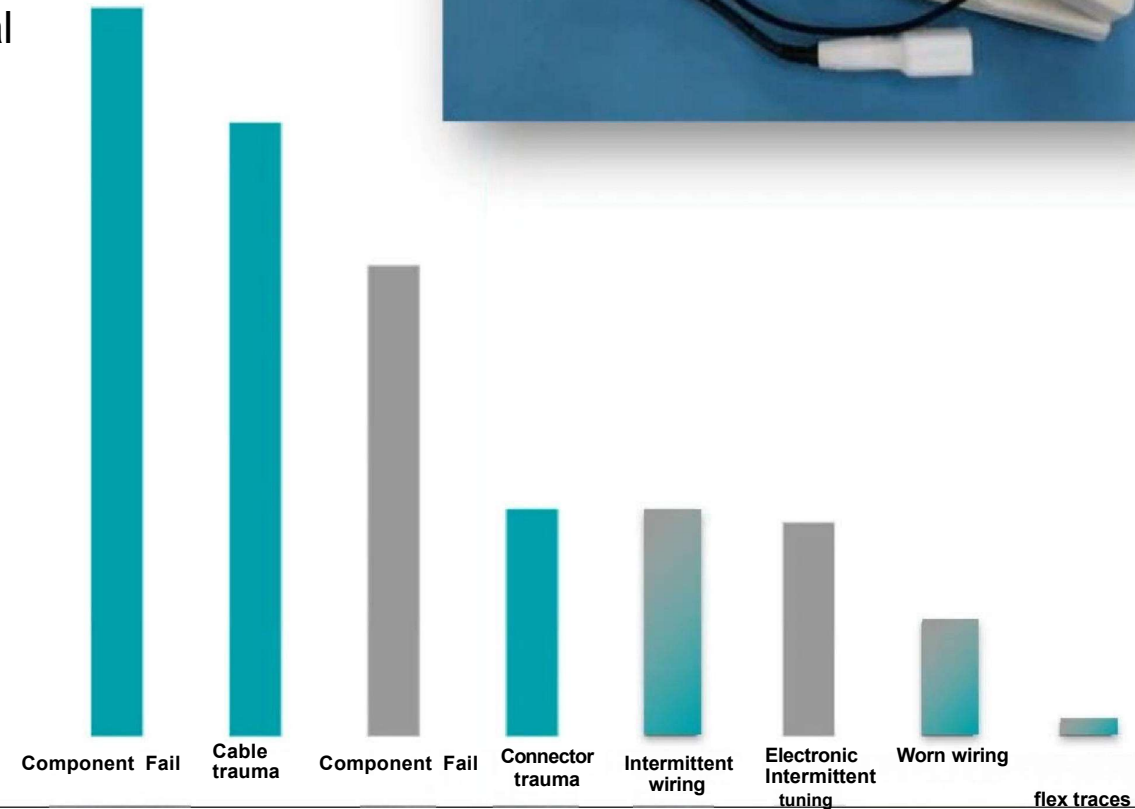
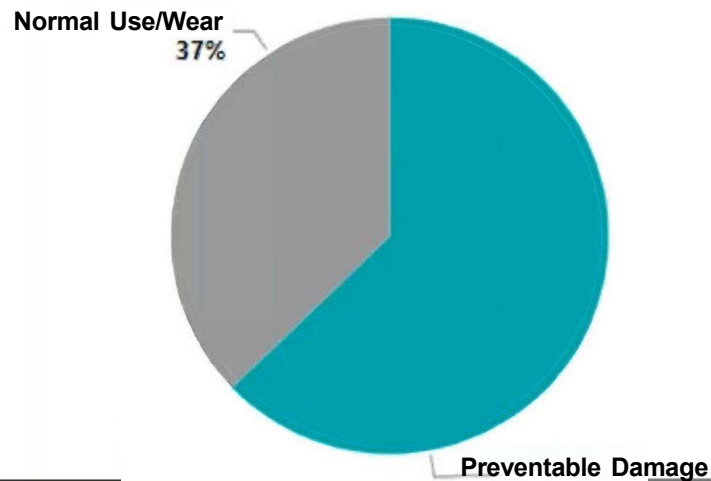
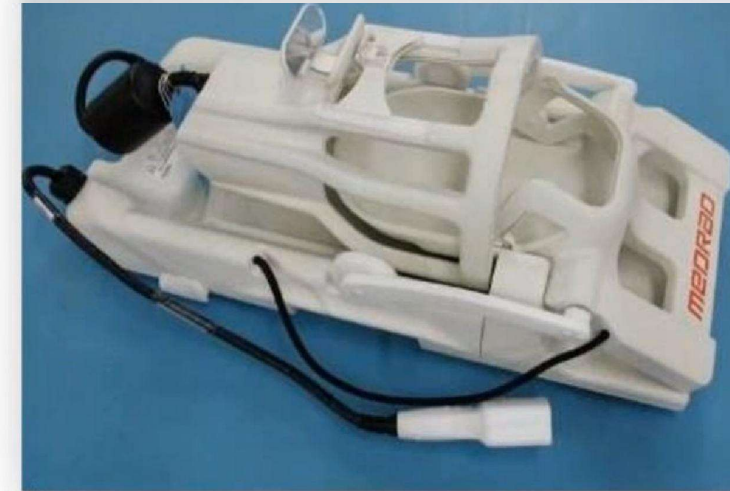
GE 1.5T Neurovascular Array

Part numbers:5117092-2,M3087JJ,M64NVA8-HD

>150 repairs

Most frequent failures

1. Intermittent solder connections and physical damage to electrical components
2. Cut,pull or damage to cable or strain relief
3. Random component failures



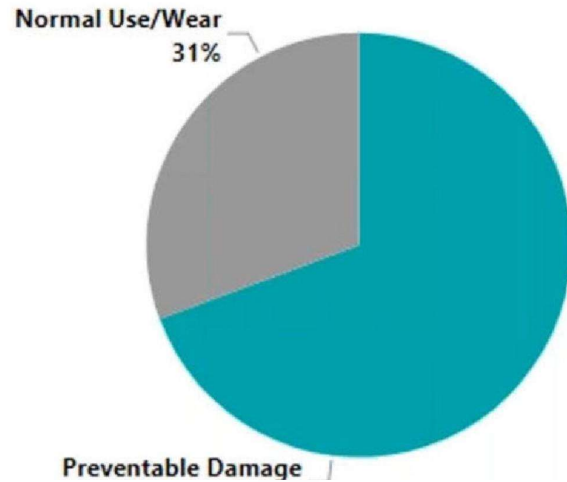
Siemens 1.5T Body Flex Array

Part numbers:7579555,5369554

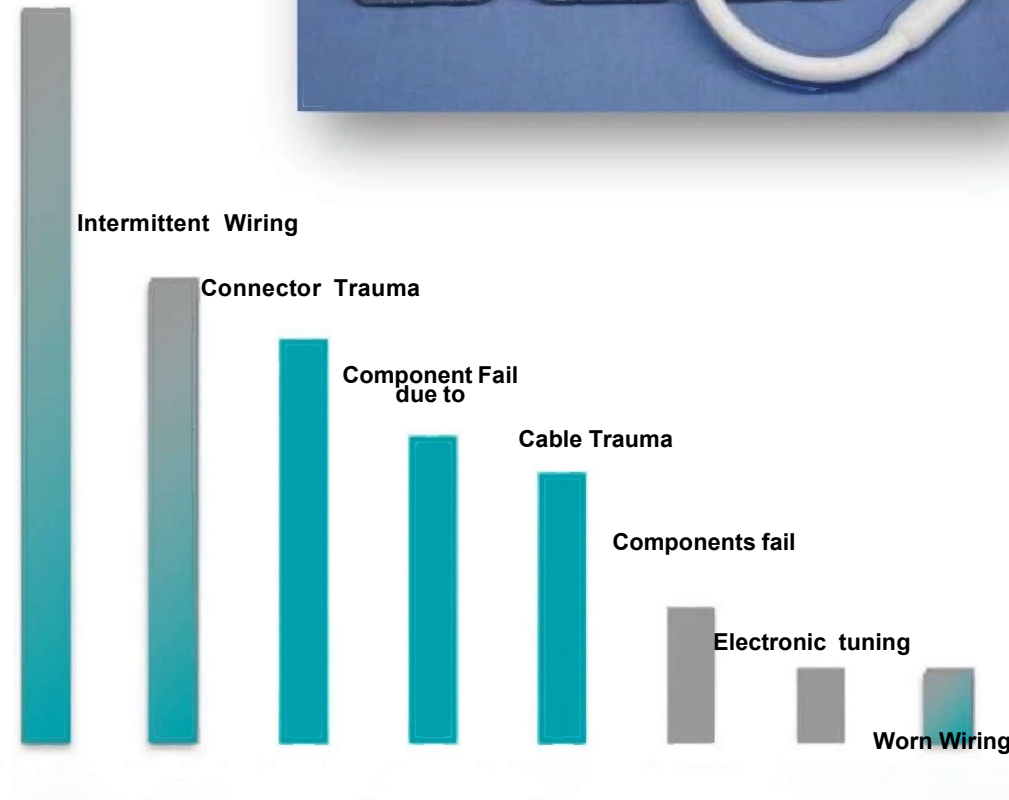
>150 repairs

Most frequent failures

1. Intermittent flex traces and wiring
2. Bent/damaged pins in connector
3. Intermittent solder connections and physical damage to electrical components



Intermittent flex traces



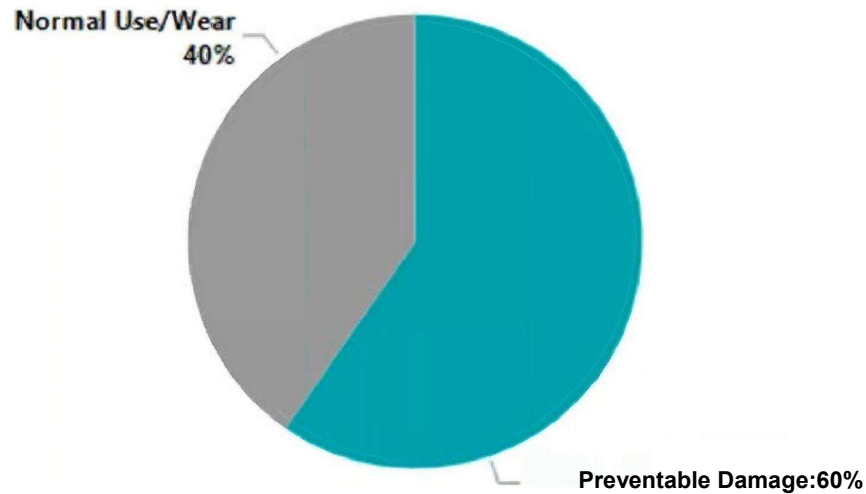
GE 1.5T 4Ch Small Flex Coil

Part number:5430692

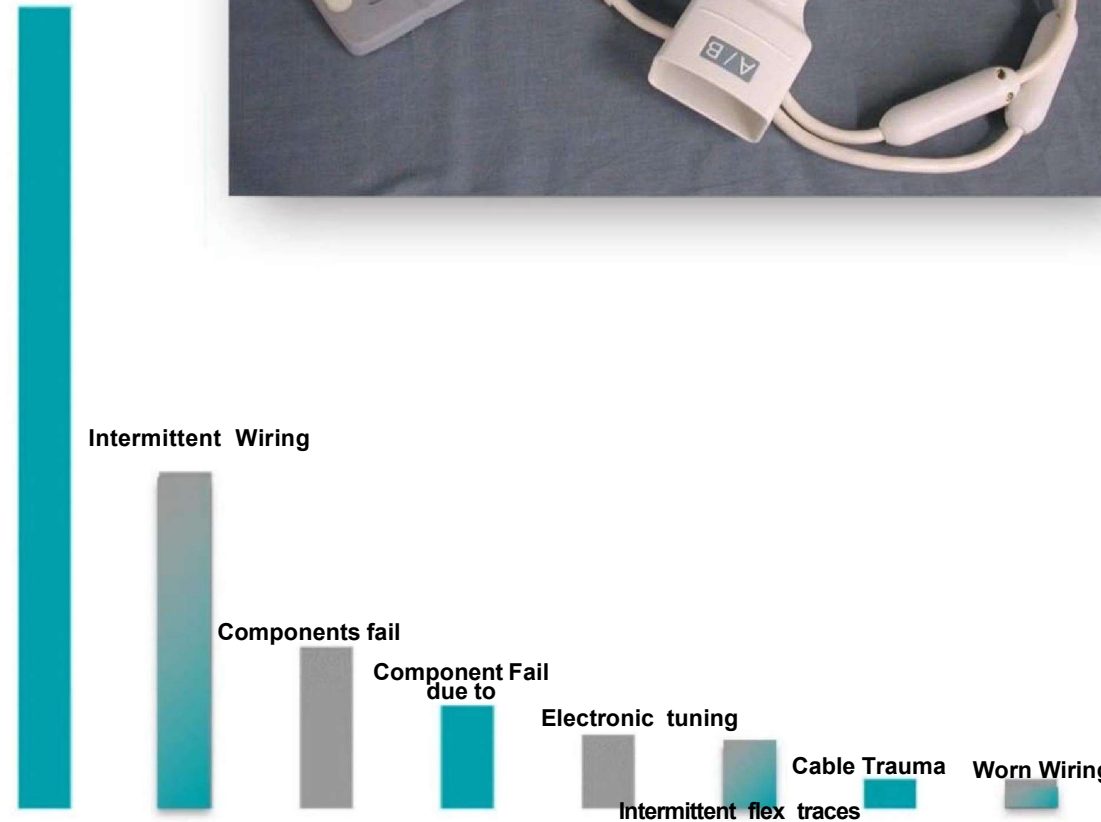
>130 Repairs

Most frequent failures

1. Bent/damaged pins in connector
2. Intermittent/damaged wiring
3. Random component failures



Connector Trauma



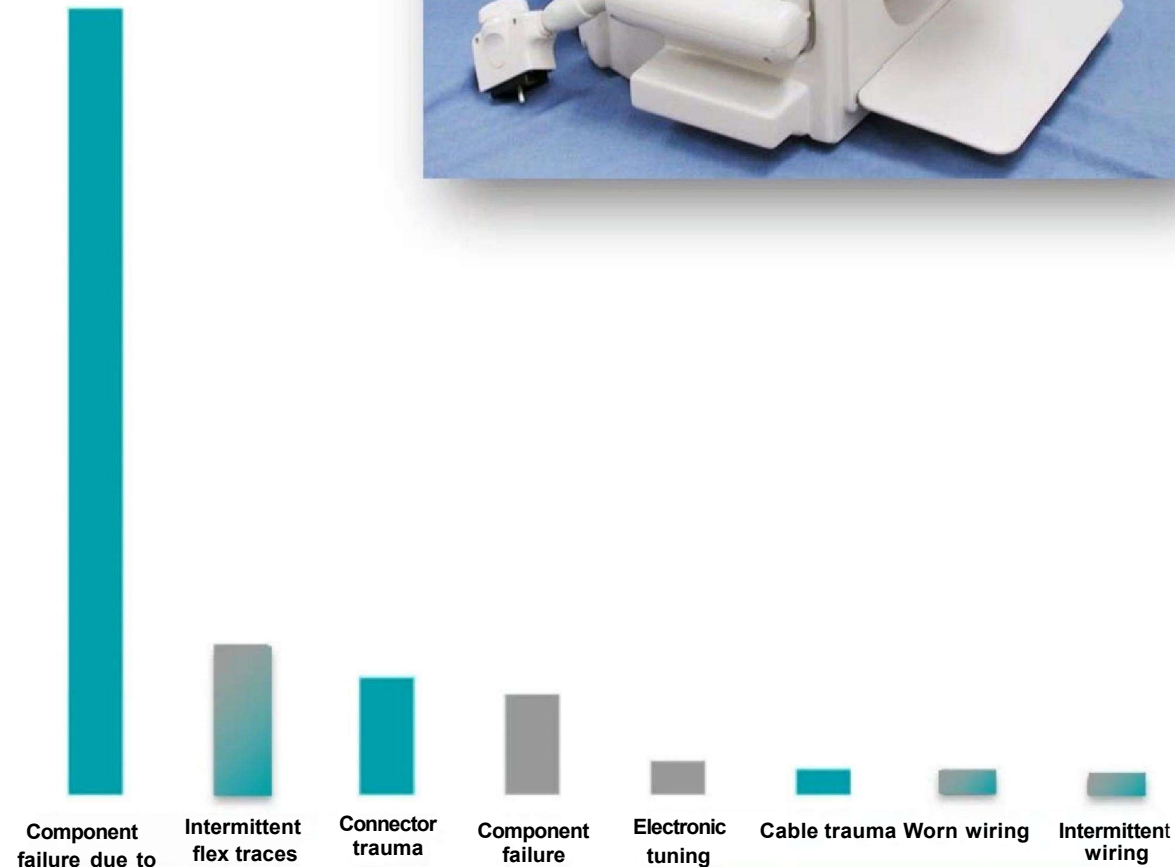
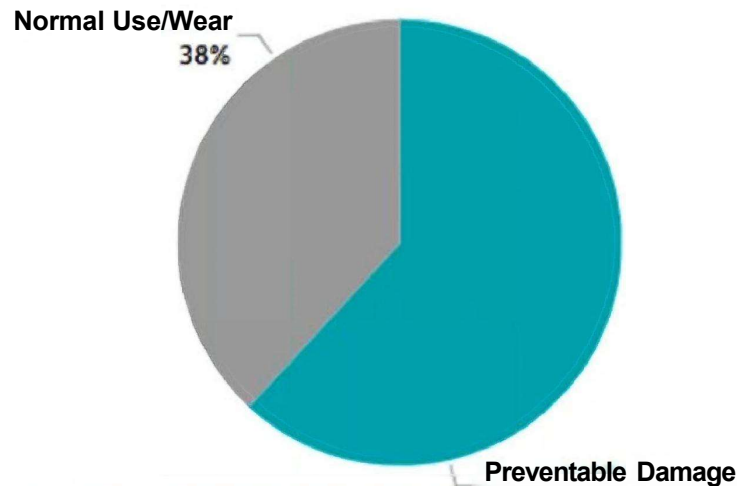
Toshiba 1.5T Neurovascular Atlas

Part numbers: MJAH-137A, 2000205, 2000206, 2000207, 2000208, 5465781

>125 Repairs

Most frequent failures

1. Intermittent solder connections and physical damage to electrical components
2. Damaged interconnects
3. Bent/damaged pins in connector



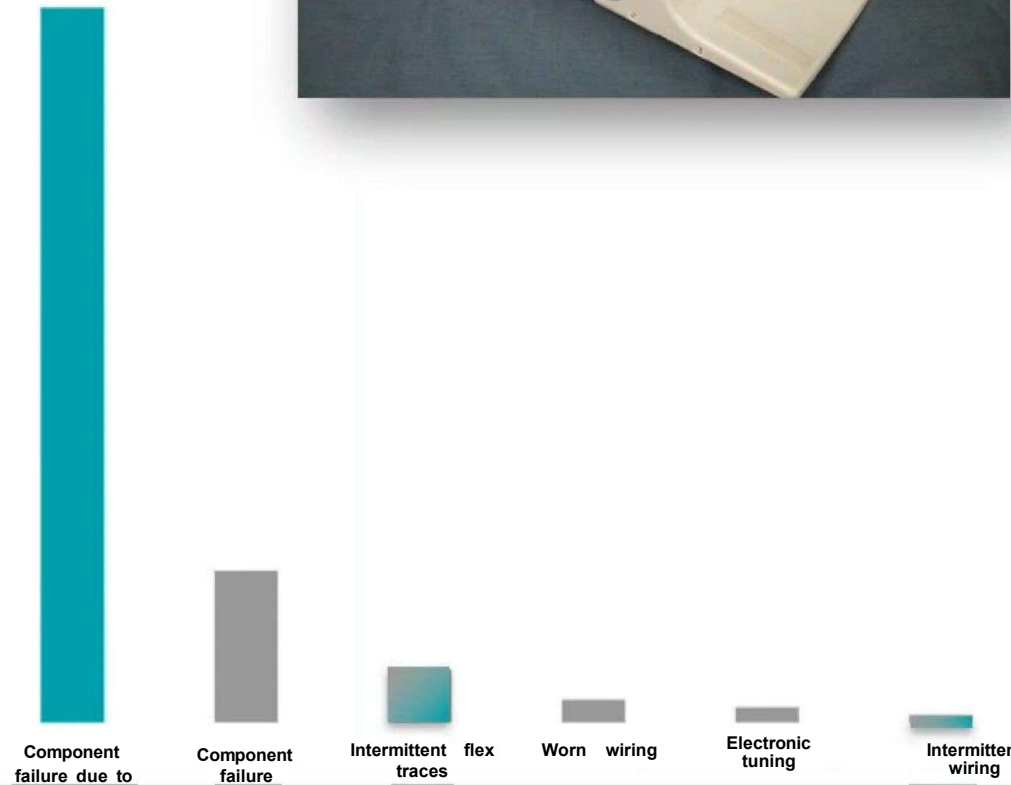
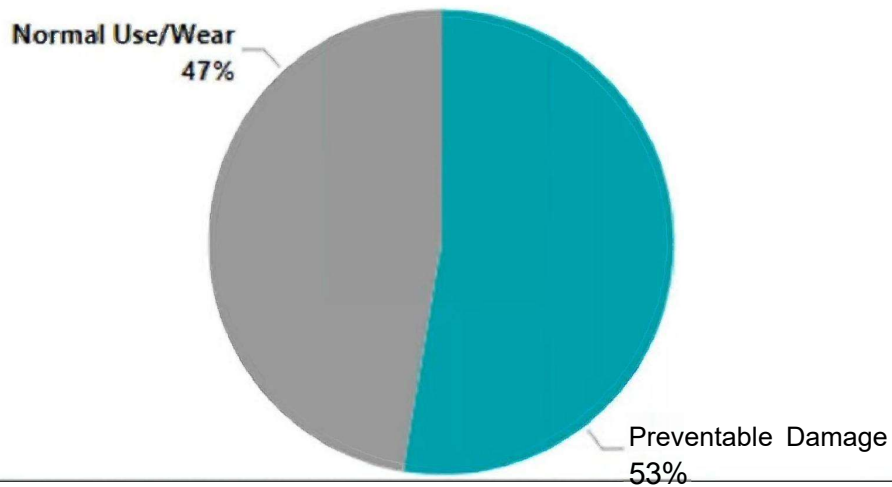
GE 1.5T Express 16E Head Neck Array

Part numbers:5746586,5407991,5420021,M50002HL

>125 Repairs

Most frequent failures

1. Damaged interconnects
2. Intermittent solder connections and physical damage to electrical components
3. Random component failures



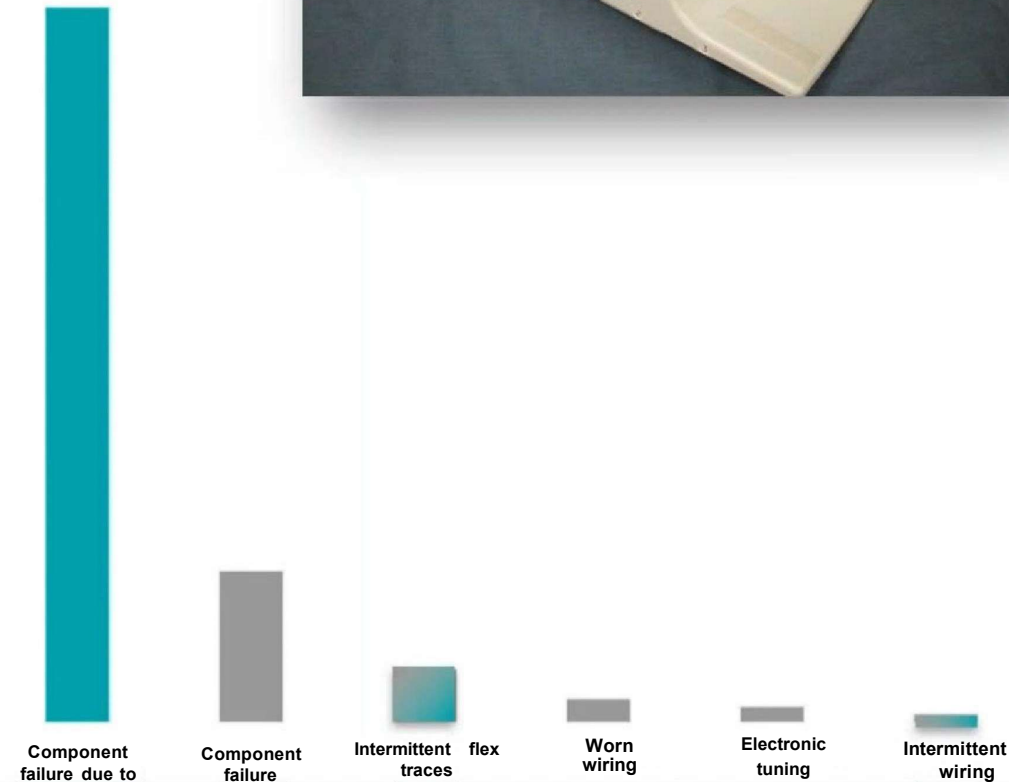
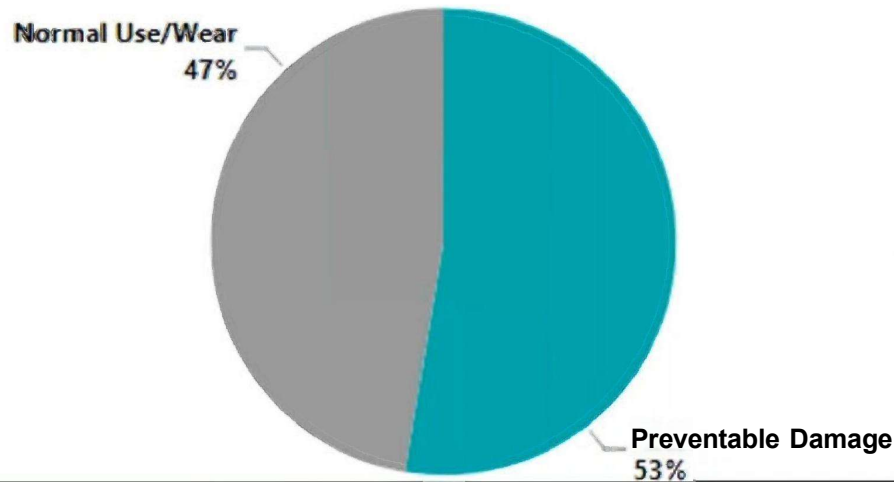
GE 1.5T Express 16E Head Neck Array

Part numbers:5746586,5407991,5420021,M50002HL

> 125 Repairs

Most frequent failures

1. Damaged interconnects
2. Intermittent solder connections and physical damage to electrical components
3. Random component failures



Toshiba 1.5T Shoulder Atlas Coil

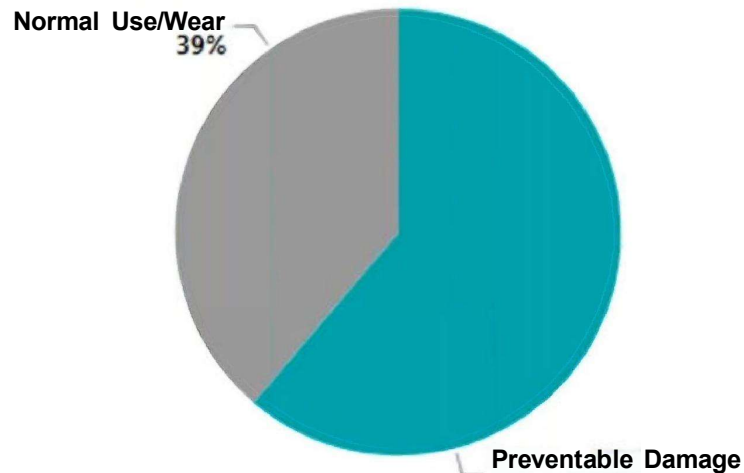
Part numbers: MJAJ-177A, 5464955

Intermittent flex traces

>90 Repairs

Most frequent failures

1. Intermittent flex traces and wiring
2. Bent/damaged pins in connector
3. Intermittent solder connections and physical damage to electrical components



Intermittent flex traces



Connector Trauma



Component Fail due to



Intermittent



Wiring Components fail



Worn Wiring



Cable Trauma



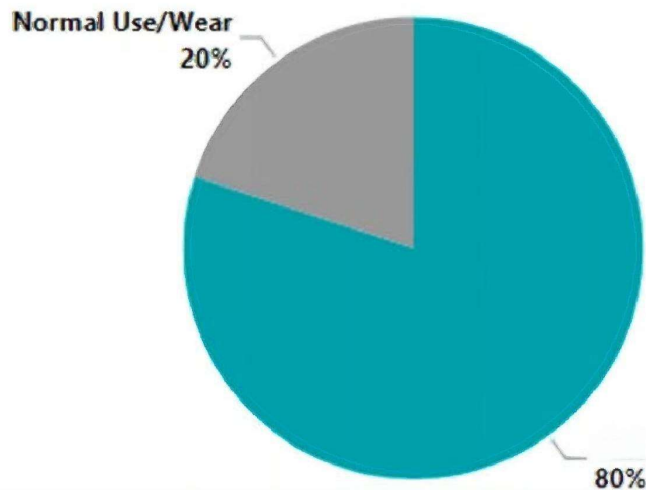
GE 1.5T Express 9E Anterior Array

Part numbers:5407990,5433103,5746587,M50002HM

>80 Repairs

Most frequent failures

1. Intermittent flex traces and wiring
2. Random component failures
3. Bent/damaged pins in connector



Intermittent flex traces



Component Fail due to



Components fail



Cable Trauma



Worn Wiring



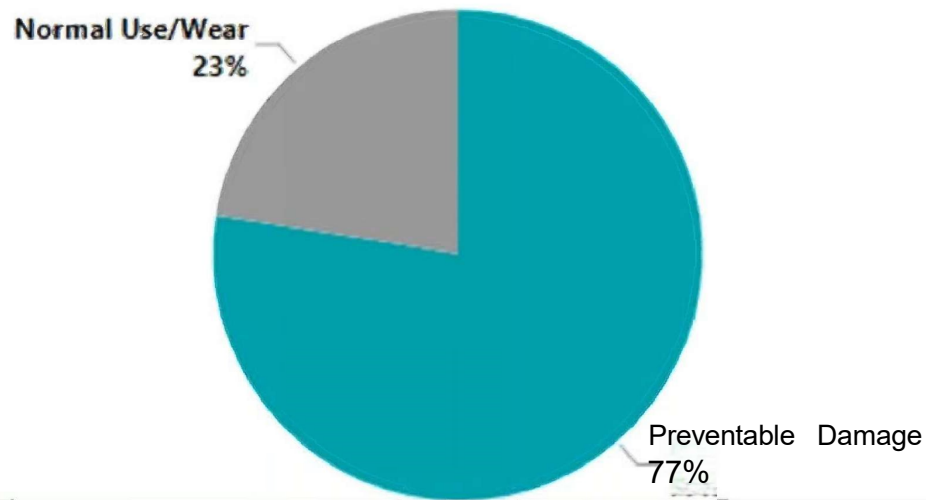
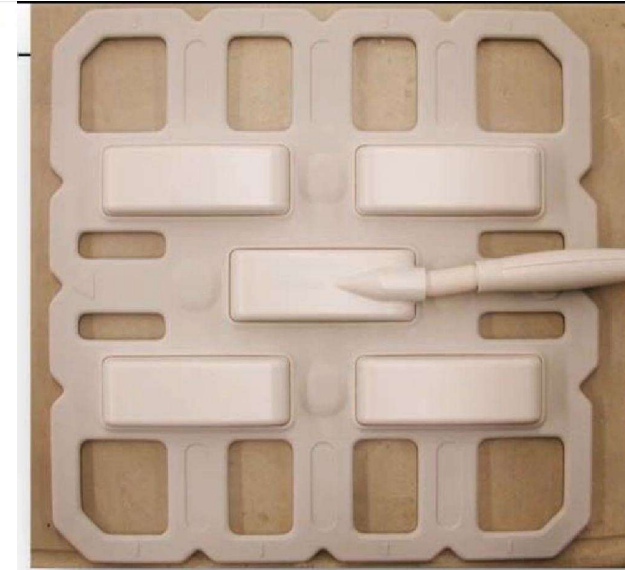
Toshiba 1.5T Body Atlas SPEEDER Coil

Part number: MJAB-167A

>70 Repairs

Most frequent failures

1. Intermittent flex traces and wiring
2. Bent/damaged pins in connector
3. Intermittent solder connections and physical damage to electrical components



Intermittent flex traces



Connector Trauma



Component Fail due to



Components fail



Intermittent Wiring



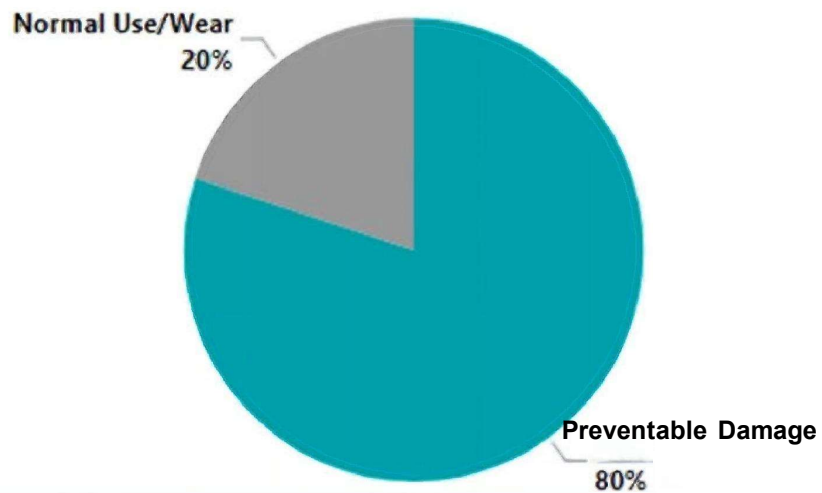
GE 1.5T Express 9E Anterior Array

Part numbers:5407990,5433103,5746587,M50002HM

>80 Repairs

Most frequent failures

1. Intermittent flex traces and wiring
2. Random component failures
3. Bent/damaged pins in connector



Intermittent flex traces



Components fail



Component Fail due to



Cable Trauma



Worn Wiring



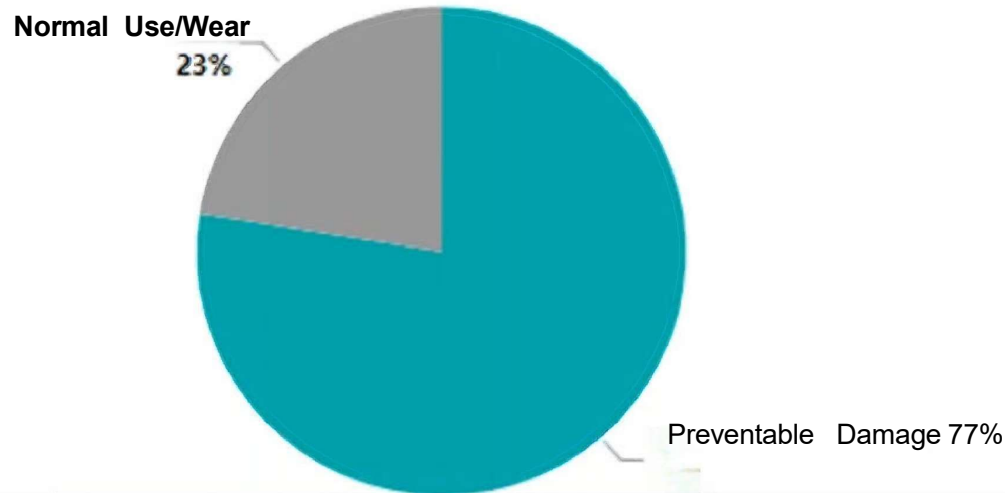
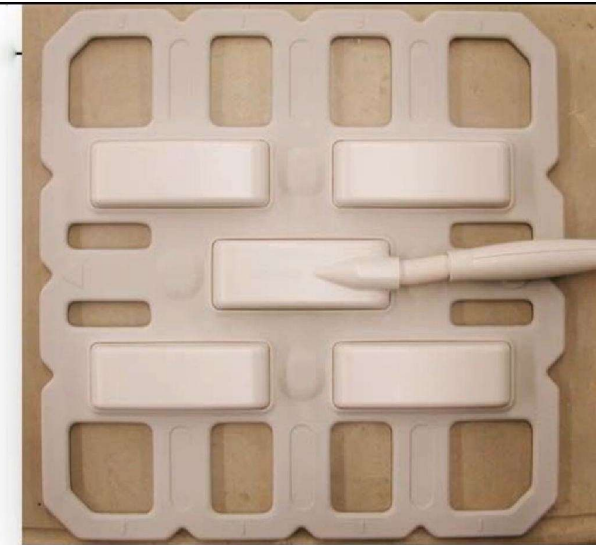
Toshiba 1.5T Body Atlas SPEEDER Coil

Part number: MJAB-167A

>70 Repairs

Most frequent failures

1. Intermittent flex traces and wiring
2. Bent/damaged pins in connector
3. Intermittent solder connections and physical damage to electrical components



Intermittent flex traces



Connector Trauma



Component Fail due to



Components fail



Intermittent Wiring



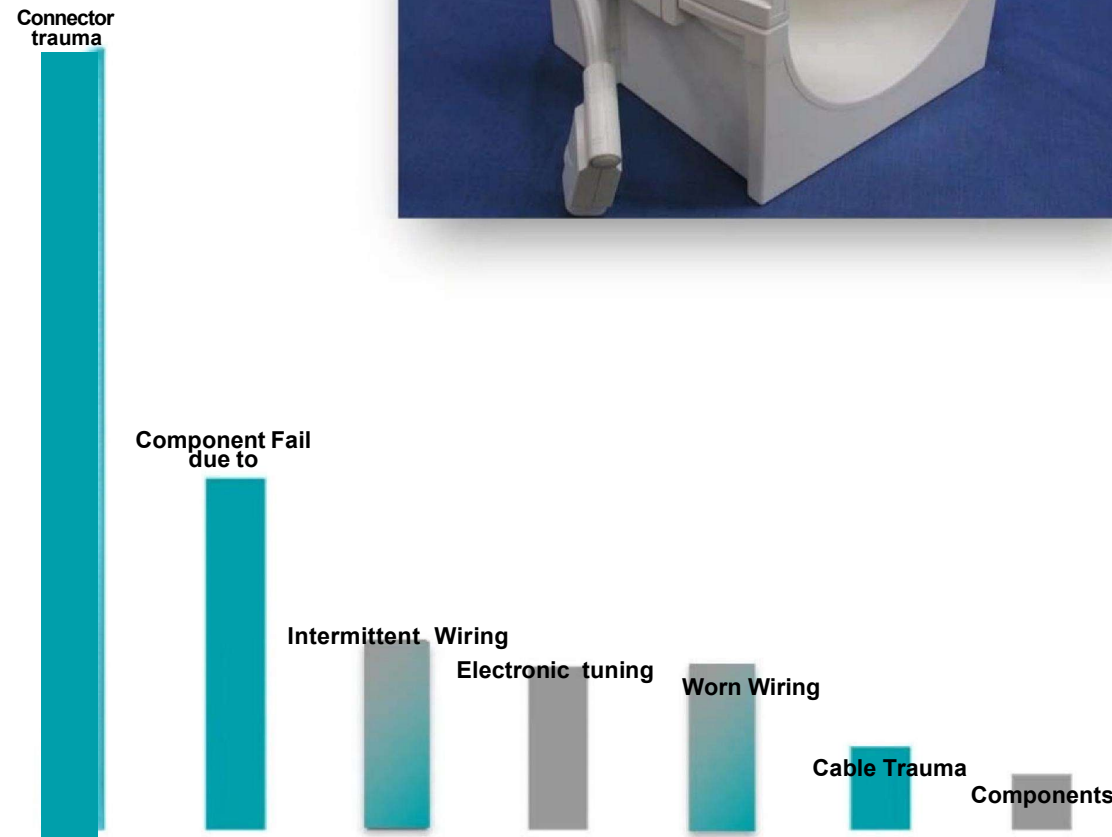
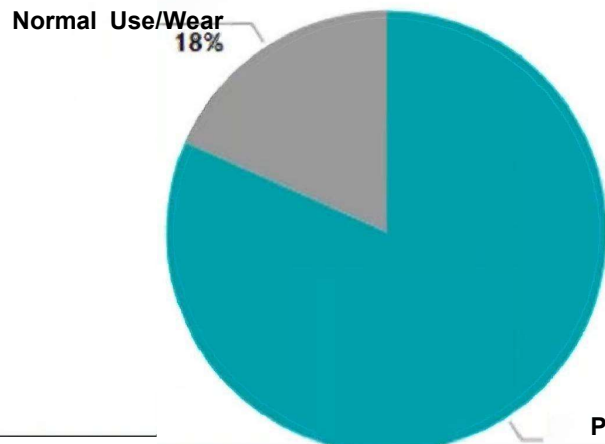
Siemens 1.5T Head Matrix Array

Part numbers:7577732,5319252

>60 Repairs

Most frequent failures

1. Bent/damaged pins and physical damage to connector
2. Intermittent solder connections and physical damage to electrical components
3. Intermittent wiring



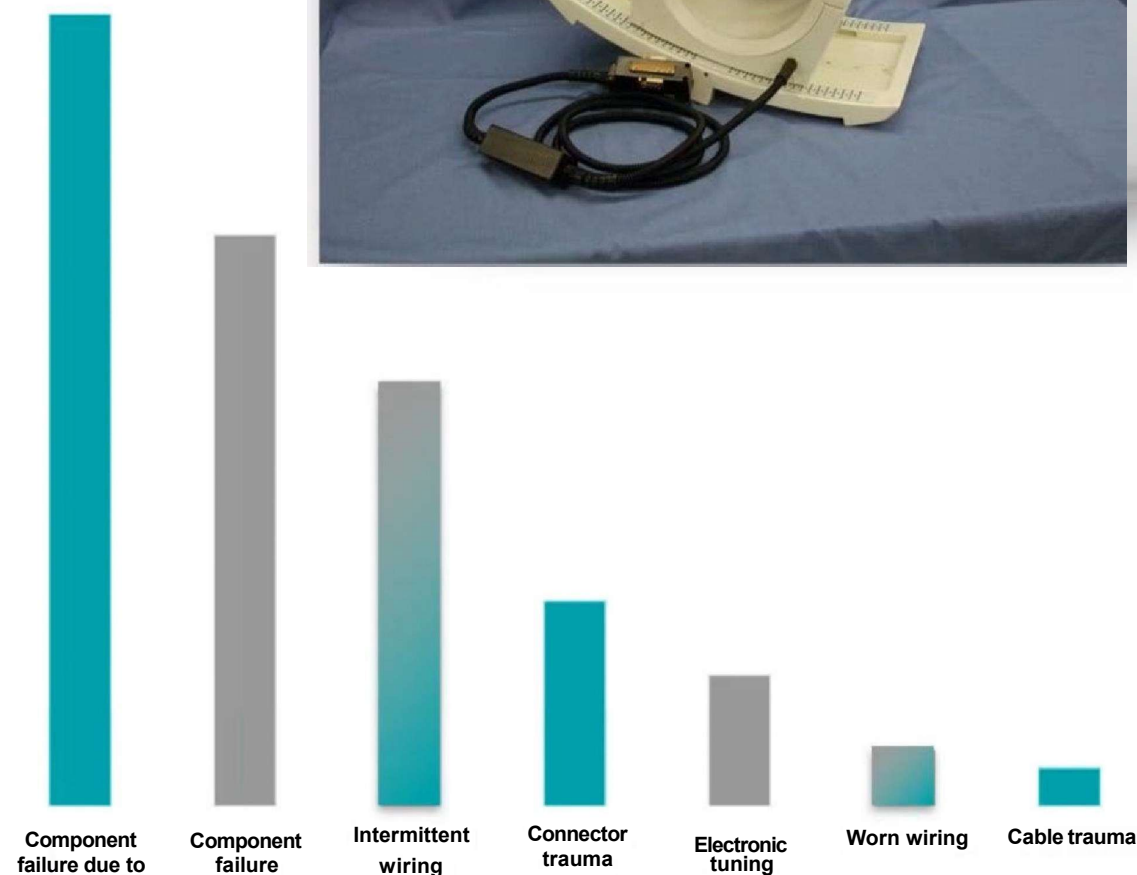
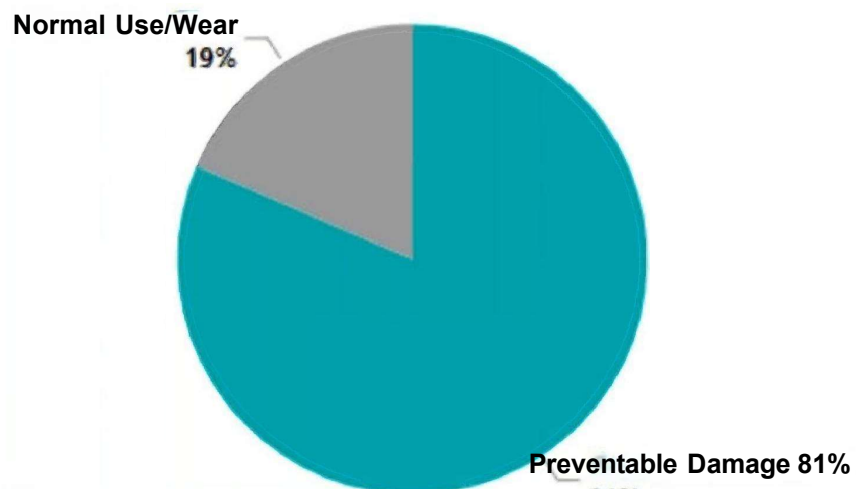
Siemens 1.5T Extremity TR Matrix

Part number:474SI-64F

>60 Repairs

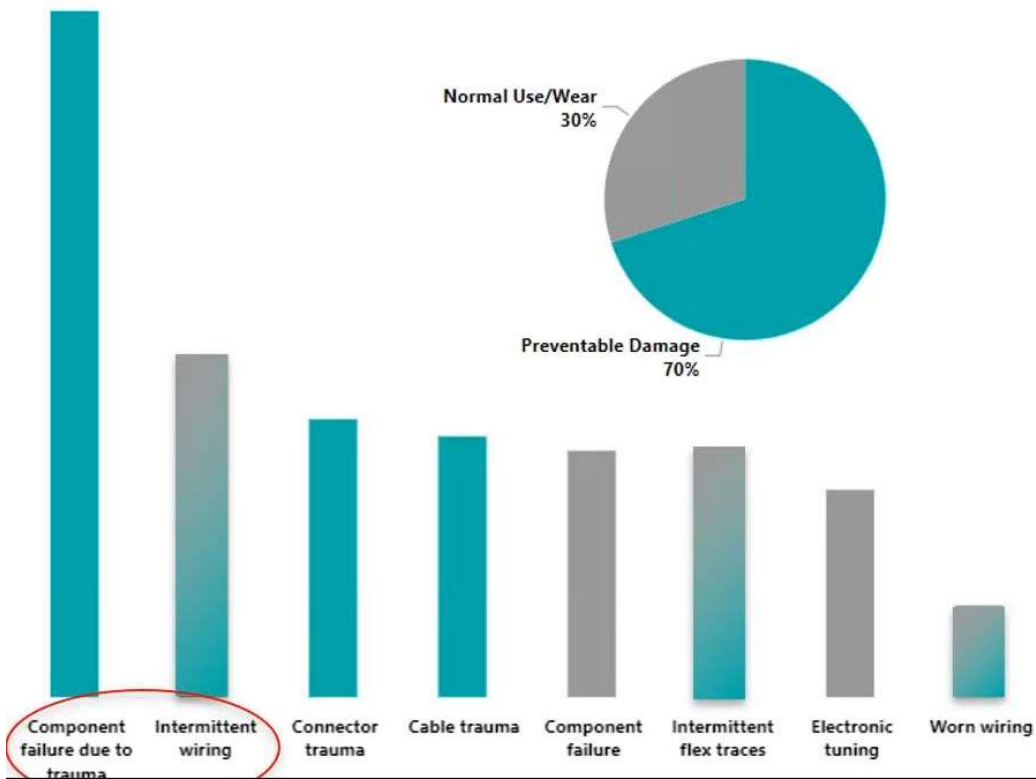
Most frequent failures

1. Intermittent solder connections and physical damage to electrical components
2. Random component failures
3. Intermittent wiring

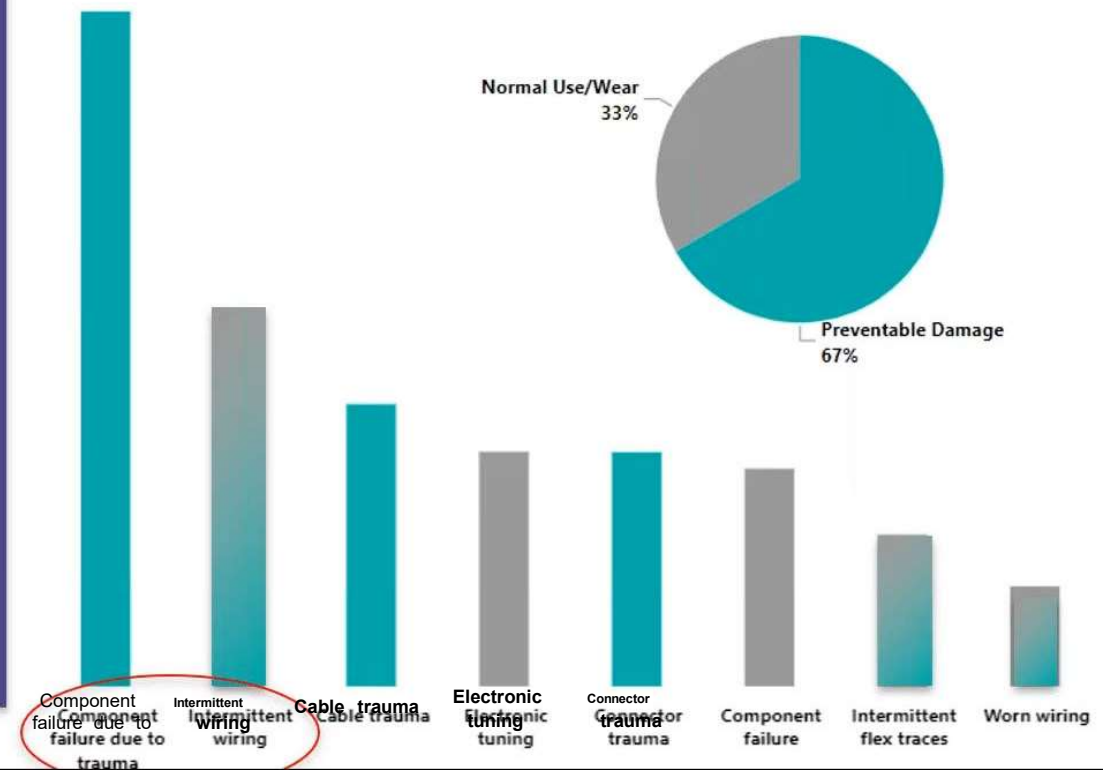


Comparing failures of top-10 to remaining volume

10 coil models
> 1800 repairs



>300 coil models
>1700 repairs



6 Strategies to Minimize Failures and Costs



1. Prevention...Observe usage

- **Transportation practices**
- **Patient placement practices**
- **Cable routing practices**
- **Cleaning practices**



6 Strategies to Minimize Failures and Costs



Transportation Practices

- Transport the coil by gripping and supporting it from the sides
- **NEVER** pick up the coil from a single section (anterior section).
- When transporting between rooms, *ALWAYS use a cart*



6 Strategies to Minimize Failures and Costs



Transportation Practices

- Flex coils **should ALWAYS be cradled** from the bottom, gripped at the center housing or carried by the designated handle
 - The coil should **NEVER** be carried by the flexible portion, as there are sensitive components contained within that can be damaged by doing so
- DO NOT** carry coils by the cable
 - Component damage may occur

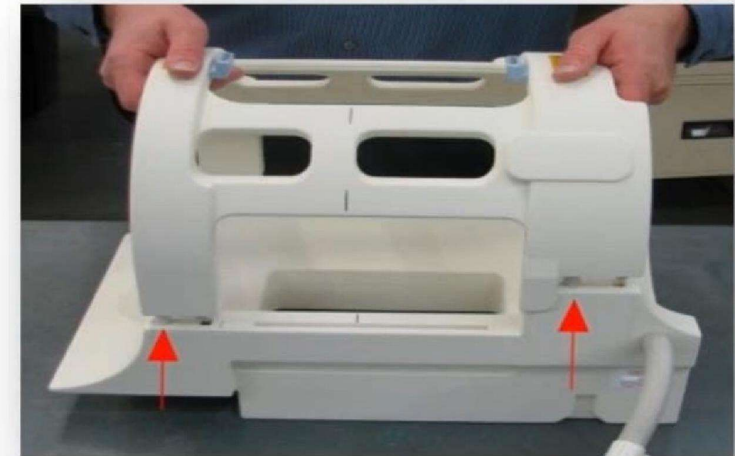


6 Strategies to Minimize Failures and Costs



Patient Placement Practices

- **ALWAYS** remove the anterior portion of a coil by pulling straight-up
 - If the anterior is removed at an angle, the connections between the anterior and posterior sections will be damaged
- With flex coils, **DO NOT** adjust the position of a patient using the coil, as it may cause both physical and electro-mechanical damage

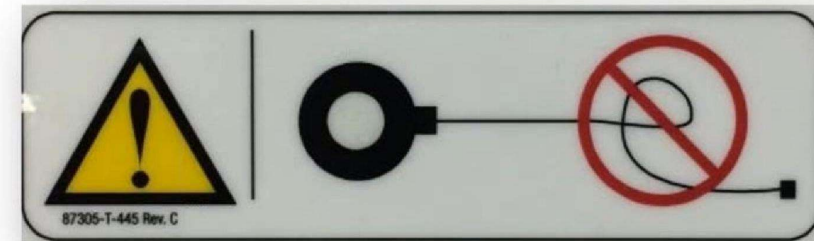


6 Strategies to Minimize Failures and Costs



Cable Routing Practices

- **DO NOT** loop or cross the cable when in use
 - Looped cables may cause RF coupling and may degrade image quality
- **DO NOT** permit the cable to be bent at an extreme angle
 - Route the cable using soft angles
 - Damage can occur if the cable is bent to an extreme degree
- **ALWAYS** unplug the coil prior to lowering the table
 - Failure to do so may damage the coil, cable or connector



6 Strategies to Minimize Failures and Costs



Cleaning Practices

- Clean the coil with a cloth dampened in a solution of:
 - 10%bleach and 90%tap water,or
 - 30%isopropyl alcohol and 70%tap water
- **ALWAYS** consult the OEM or OEM manual for approved chemicals
- ALWAYS detach the coil from the scanner before attempting to clean it
- DO NOT submerge any part of the coil
- DO NOT spray/pour cleaning agent directly on to coil,internal circuitry could be damaged
- Electric shock may occur if the coil is attached to the system during cleaning or when it is still wet





2.External Visual Inspection

- OEMs recommend USERS visually inspect prior to EVERY use
- Realistically, managers should assign one MRI technologist to inspect EVERY coil EVERY week
 - Alternate technologists every week

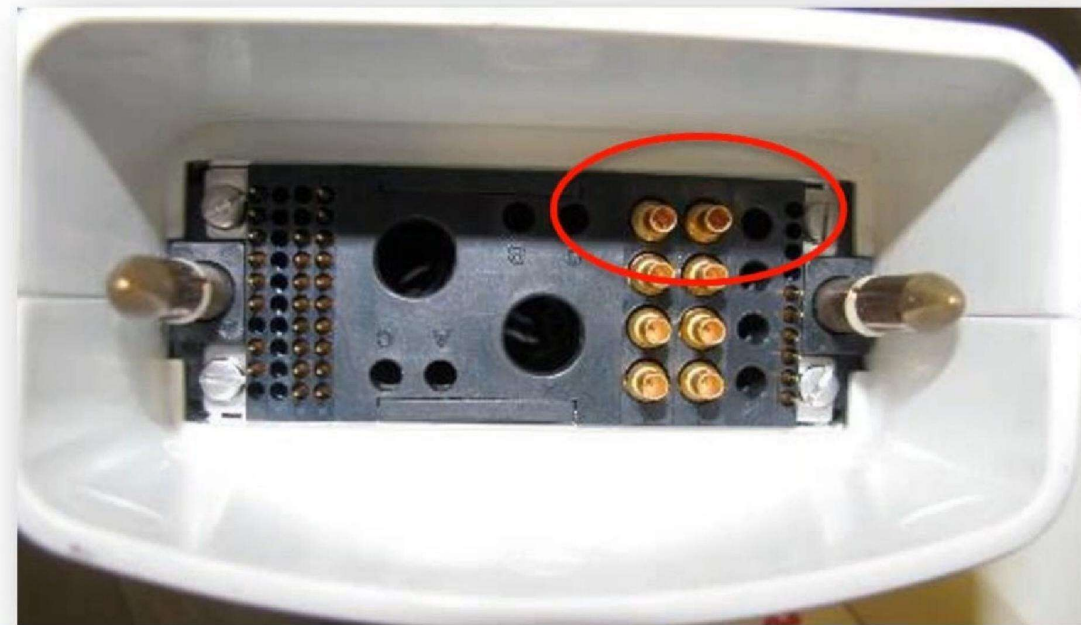
Any concerns would be relayed to a service engineer

6 Tips to Minimize Failures and Costs



Bent pins in connectors

- Connectors should slide together with ease

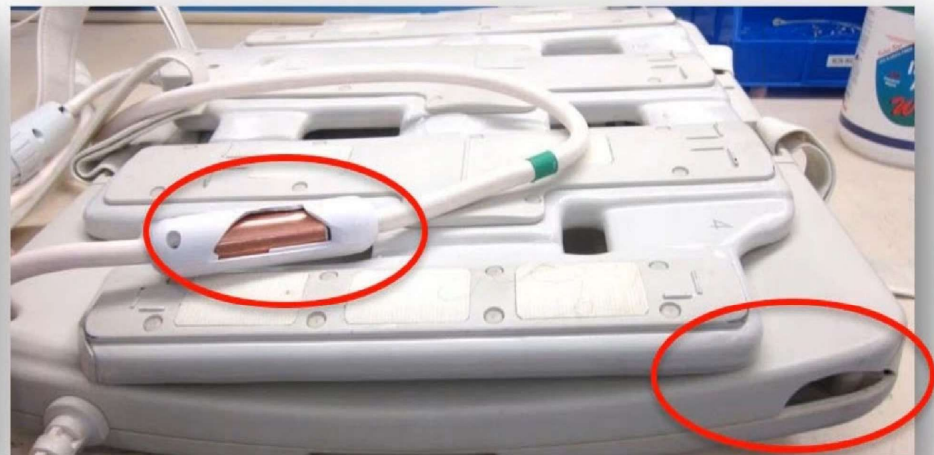


6 Tips to Minimize Failures and Costs



Cracked connectors and housings and damaged foam indicate trauma and:

- Possible internal mechanical damage
- Broken solder joints
- Intermittent connections
- Broken electrical components



6 Tips to Minimize Failures and Costs



3. Early Detection

- Users need to alert service engineers as soon as a visual flaw is identified, NOT wait until a failure OCCurs
- Cost difference may be hundreds versus thousands of dollars



6 Tips to Minimize Failures and Costs



4. Education/Partnership

- **Ask for 15-minutes during a department meeting**
- Educate technologists on
 - Costs associated with repairing/replacing coils
 - Best practices for transport, cable routing and patient manipulation
 - How to visually inspect a coil
 - When to alert you of a finding

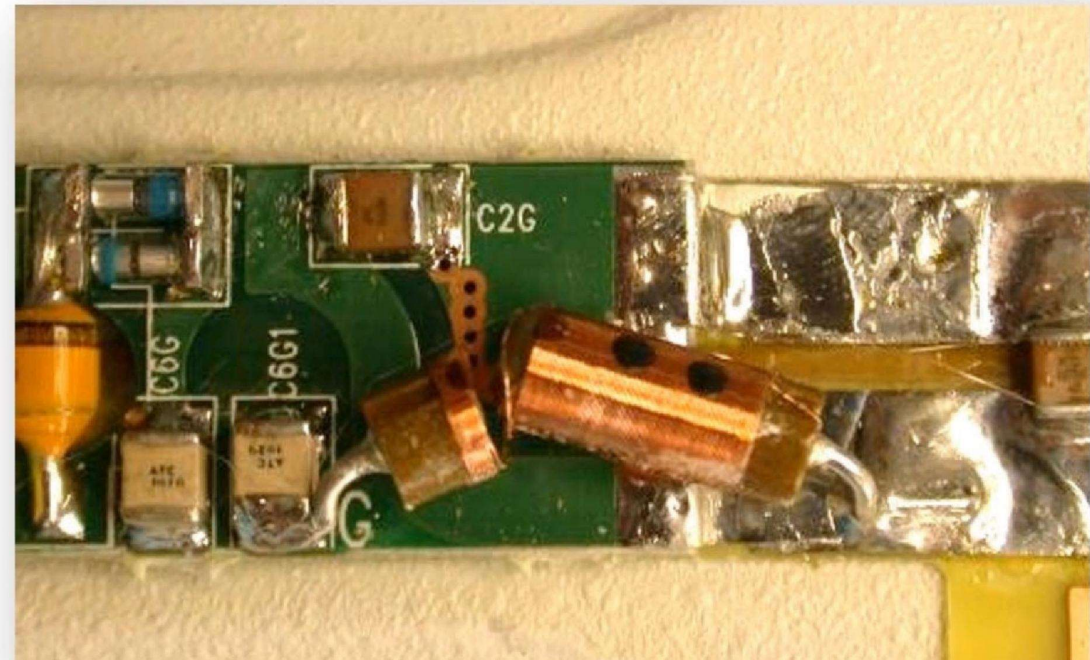


6 Tips to Minimize Failures and Costs



5. Physical manipulation

- Rotate the coil in all directions listening for internal noise, rattling, or creaking

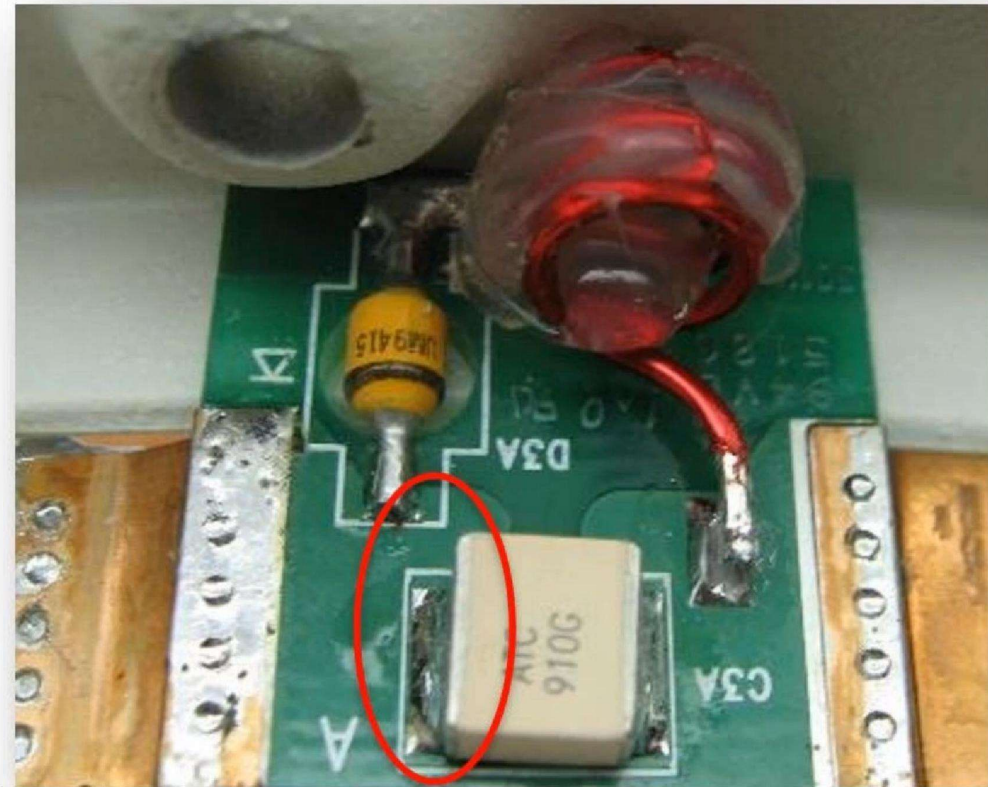


6 Strategies to Minimize Failures and Costs



6. Internal Inspection

- **NOT RECOMMENDED**
 - May induce additional problems
 - Requires significant time
- **Does allow for**
 - Inspection for broken solder joints
 - Perform continuity tests on wiring and cables

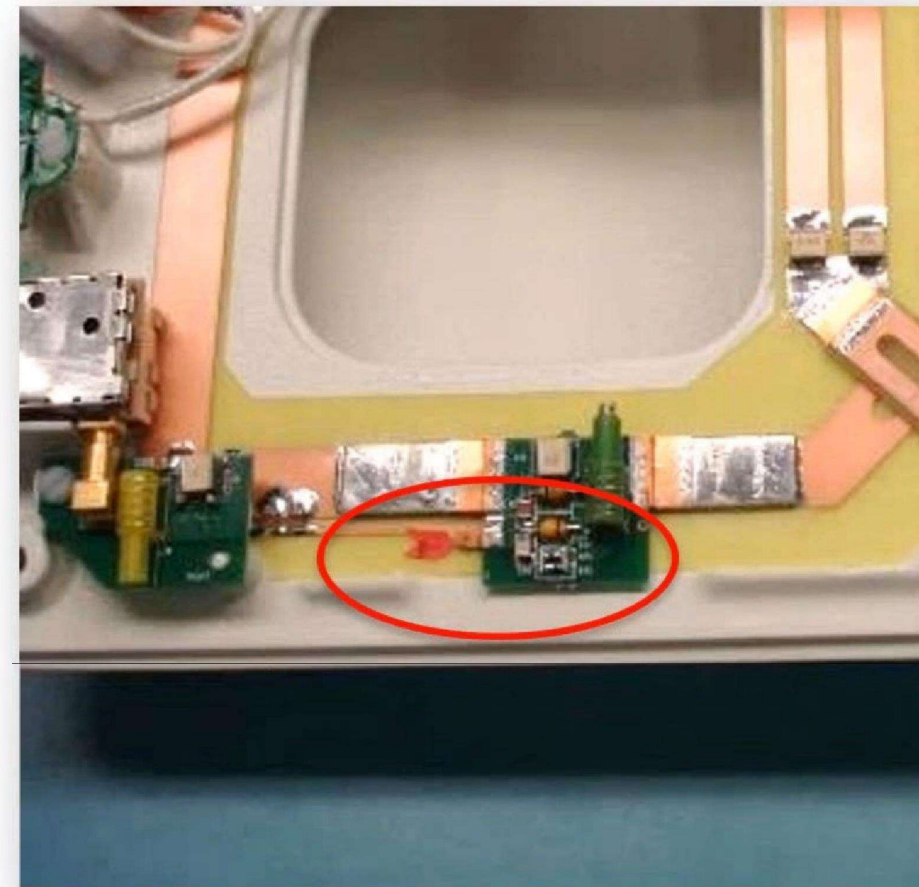


6 Tips to Minimize Failures and Costs



Internal Inspection

Broken solderjoints

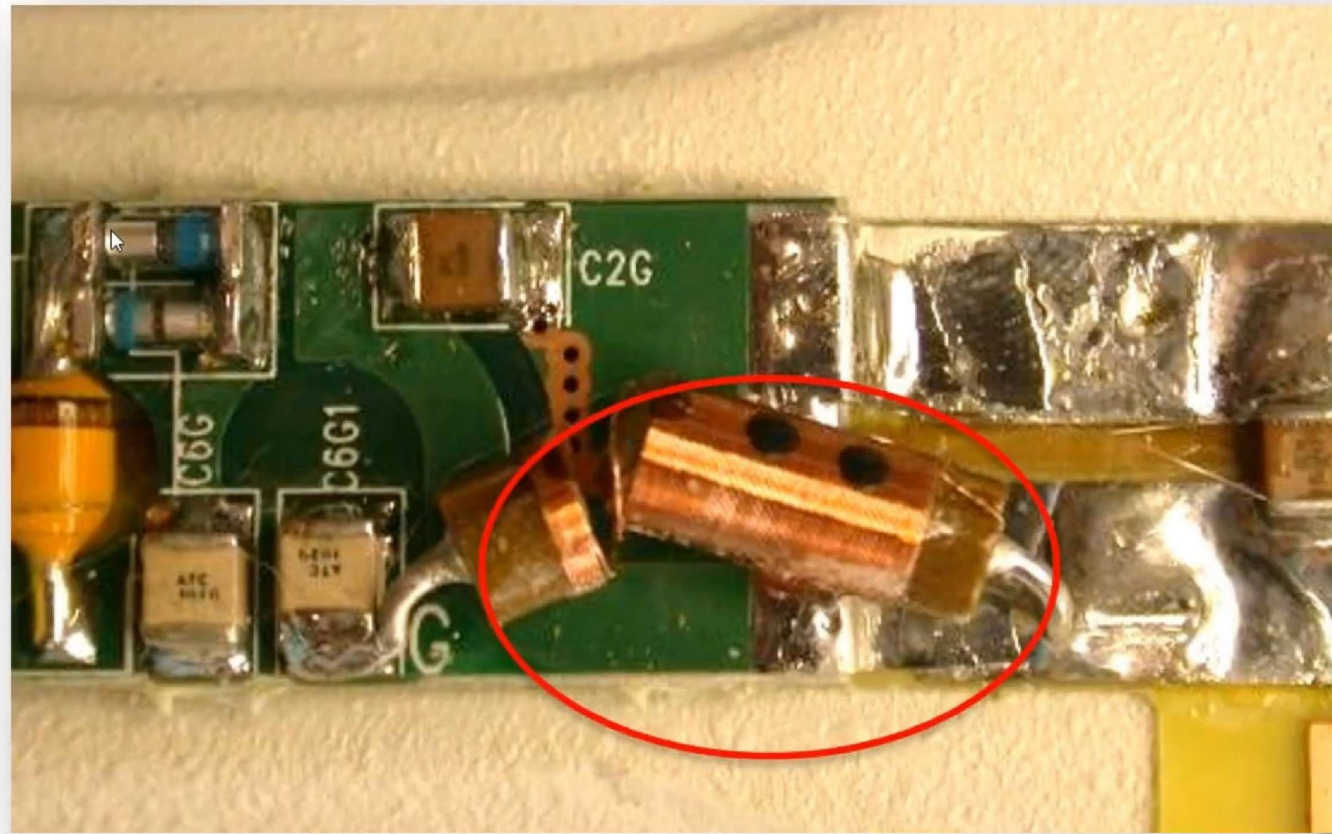


6 Tips to Minimize Failures and Costs



Internal Inspection

- *Broken components*

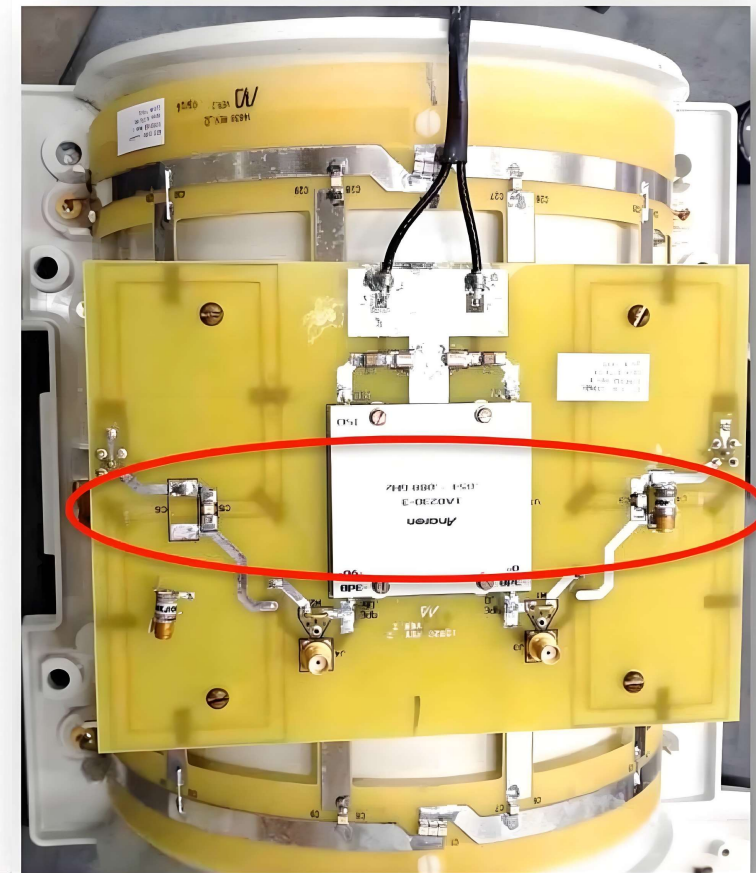


6 Tips to Minimize Failures and Costs



Internal Inspection

- *Missing components*



Summary

- **Based on our data**
 - >50% of coil failures are due to trauma
 - Only 19% are due to actual random electronic failures
- **Focus efforts on prevention, early detection, and education**
- **Base your troubleshooting on visual and functional cues**
- **Let those with expertise, experience, proper testing equipment, and proven procedures restore your coil's performance**

Thank you

Need material for Repair? ? ?

www.rf-coaxial.com