



# Medtronic

## **Eliminating Compressed Air/Gas Leaks Using an Ultrasound Tool**

We recently implemented a reliability program that includes thermography, vibration and ultrasound. We perform an annual infrared route of electrical equipment at all of Medtronic's production facilities. The in-house thermography program we applied in Minnesota was expanded to several other Medtronic facilities around the country, which we now manage by performing the IR routes. We also developed an in-house ultrasound air/gas audit to help identify air and gas leaks in our clean rooms and production areas at our Minnesota facilities and have expanded to other Medtronic production facilities around the country.

Some of the clean rooms and production area at Medtronic use a high volume of compressed air and gases, such as nitrogen, argon and helium. The facilities managers asked if we could help them reduce energy costs and save money by identifying leaks in their gas and compressed air systems.

We started performing ultrasound air/gas audits at our Minnesota facilities, saving thousands of dollars by identifying and repairing leaks as we perform the audit. We also perform a steam trap survey to detect faulty traps using ultrasound and IR. Because we implemented the ultrasound audits two years ago in our Minnesota facilities, the ultrasound program has expanded to include our three Puerto Rico facilities, where we schedule the ultrasound audit on a weekend when we're there completing the thermography route.

The potentially saving resulting from the ultrasound audits is more than hundred thousands dollars in annual savings. We have made a suggestion through a Medtronic innovation program that every Medtronic manufacturing facility have an ultrasound audit performed to help save energy.

Once management saw the results from the ultrasound audits and provided buy-in, the next factor was actually repairing the problems we found. The biggest key for us was having additional help for repairing the leaks and verifying with the ultrasound tool that they were repaired while performing the audit. This gives us better documentation on the repairs and helps our cost avoidance spreadsheet. This meant scheduling a shutdown or, in some cases, performing the ultrasound route during a lunch break with production and clean room staff.

Once management had seen the results from our reports and the cost savings analysis, we had the green light to conduct audits at all our Twin Cities production facilities.

Initially, we didn't have the proper tools or manpower in the clean rooms to repair the leaks we identified. We now have one or two people dedicated to helping repair the issues while we perform the ultrasound audit.

We submitted two ultrasound reports from a recent air/gas ultrasound audit at one of our facilities in Puerto Rico. One is of leaks repaired while conducting the audit and the other is a report of leaks that need follow-up.

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**VILLALBA CRDM CLEAN ROOM**

**COMPRESSED AIR / GAS AUDIT**

**ULTRASOUND ROUTE DEC-09**

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Prepared For:

**VILLALBA CRDM FACILITY**

**REPAIRS MADE ON ISSUES FOUND**

**ARGON LEAK**



**DSCN0178.jpg**  
12/5/2009 7:08:24 AM

Location: Clean Room D

Equipment: Argon line Ceiling plate D11

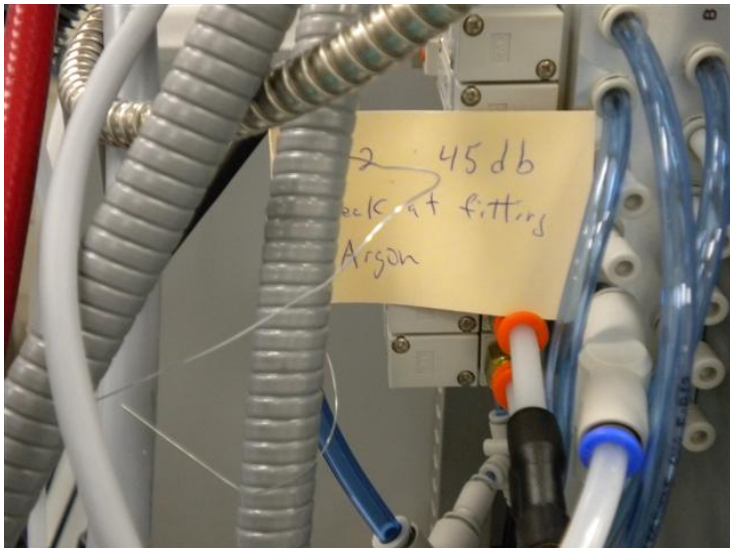
Decibel Level: 60db

Air Pressure: 90psi

Problem Description: Leaking above ceiling around the threads.

Recommended Repairs: Repaired and re-checked

**ARGON LEAK**



**DSCN0179.jpg**  
12/5/2009 7:13:56 AM

Location: Clean Room D

Equipment: Lasag Machine

Decibel Level: 45db

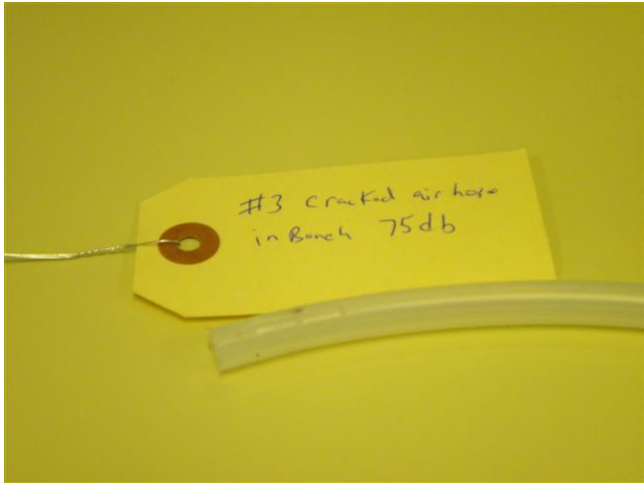
Air Pressure: 42psi

Problem Description: Leaking at the fitting

Recommended Repairs: Repaired and re-checked

Location: Clean Room D

**AIR LEAK IN WORK BENCH**



12/5/2009 7:43:08 AM

Equipment: Work bench

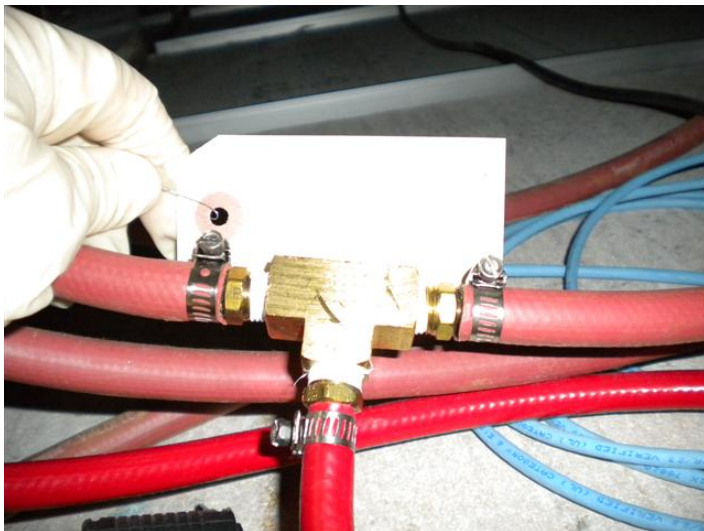
Decibel Level: 75db

Air Pressure: 110psi

Problem Description: Cracked 3/8" hose inside work bench

Recommended Repairs: Repaired and re-checked

**ABOVE CEILING FITTING LEAKING**



DSCN0184.jpg  
12/5/2009 8:20:06 AM

Location: Clean Room E

Equipment: Fitting above ceiling by ceiling plate E-45

Decibel Level: 45db

Air Pressure: 110psi

Problem Description: Leaking around threads

Recommended Repairs: Repaired and re-checked

**ABOVE CEILING INTO CEILING PLATE**

Location: Clean Room E



**DSCN0186.jpg**

12/5/2009 8:27:54 AM

**QUICK CONNECT FITTING**



**DSCN0188.jpg**

12/5/2009 8:38:00 AM

**LEAK ON BLOCK**

Equipment: Ceiling plate E-39

Decibel Level: 50db

Air Pressure: 110psi

Problem Description: leaking at the fitting

Recommended Repairs: Repaired and re-checked

Location: Clean Room E

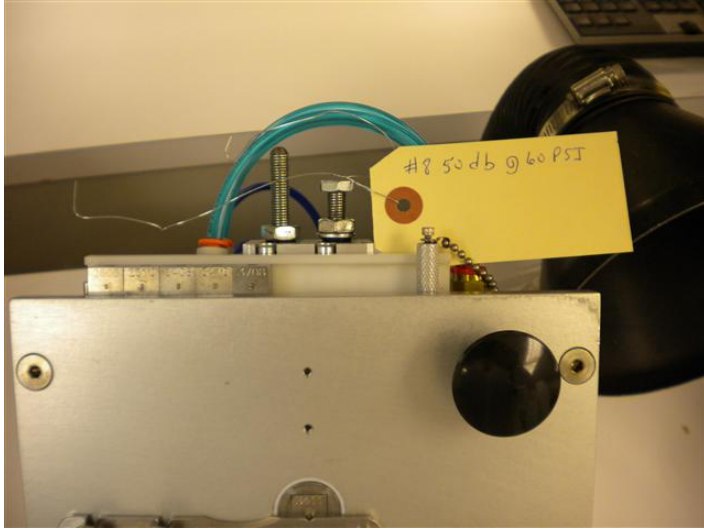
Equipment: Fitting on back of machine by ceiling plate E-17

Decibel Level: 40db

Air Pressure: 110psi

Problem Description: Leaking around the threads

Recommended Repairs: Repaired and re-checked



**DSCN0189.jpg**  
12/5/2009 9:18:26 AM

Location: Clean Room C

Equipment: Machine in Steer Area

Decibel Level: 50db

Air Pressure: 60psi

Problem Description: leaking around the terminal block, tightened

Recommended Repairs: Repaired and re-checked

### LEAKING AIR HOSE



**DSCN0193.jpg**  
12/5/2009 9:46:16 AM

Location: Clean Room C

Equipment: Air hose Tubing leaking

Decibel Level: 50db

Air Pressure: 100psi

Problem Description: Leak in the hose and it was replaced

Recommended Repairs: Repaired and re-checked

### UNION ON DRIER

Location: Air Compressor Room



**DSCN0196.jpg**  
12/5/2009 10:20:02 AM

Equipment: Hydro Bloc Drier

Decibel Level: 70db

Air Pressure: 110psi

Problem Description: Leaking out of the top of the union

Recommended Repairs: Repaired and re-checked

#### FITTING IN ELECTRIC CHASE



**DSCN0199.jpg**  
12/5/2009 10:52:56 AM

Location: Clean Room B

Equipment: Under bench at Quality Flow Improver

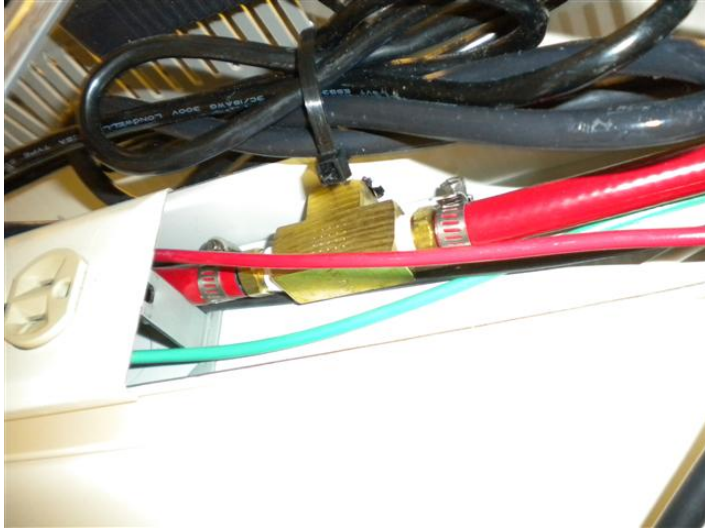
Decibel Level: 65db

Air Pressure: 110psi

Problem Description: Leaking on the fittings of the tee

Recommended Repairs: Repaired and re-checked

#### FITTING IN ELECTRICAL CHASE



**DSCN0200.jpg**  
12/5/2009 11:00:34 AM

Location: Clean Room B

Equipment: Below bench by Inner Coil Start Station

Decibel Level: 65db

Air Pressure: 110psi

Problem Description: Fitting leaking on the threads and hoses clamps

Recommended Repairs: Repaired and re-checked

#### **FITTING IN ELECTRICAL CHASE**



**DSCN0202.jpg**  
12/5/2009 11:15:32 AM

Location: Clean Room B

Equipment: Tee fitting under bench by Inner Coil End

Decibel Level: 45db

Air Pressure: 110psi

Problem Description: leaking at the tee fitting

Recommended Repairs: Repaired and re-checked

#### **FITTING IN ELECTRICAL CHASE**



**DSCN0204.jpg**  
12/5/2009 11:20:16 AM

Location: Clean Room B

Equipment: Below bench by Inner Tub End Station

Decibel Level: 60db

Air Pressure: 110psi

Problem Description: Leaking around threads and quick connect fitting

Recommended Repairs: Repaired and re-checked

### HOSE CONNECTION FITTING



**DSCN0207.jpg**  
12/5/2009 11:29:20 AM

Location: Clean Room B

Equipment: Behind bench by Outer Coil Start Station

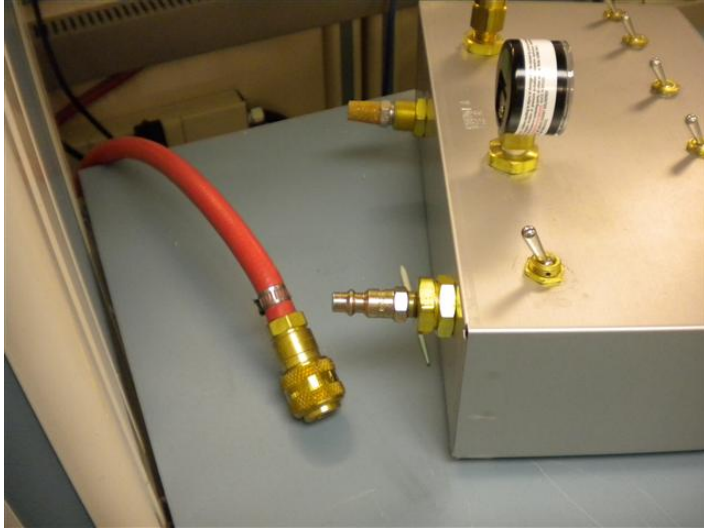
Decibel Level: 50db

Air Pressure: 110psi

Problem Description: Quick connect leaking

Recommended Repairs: Repaired and re-checked

### FITTING TO MACHINE



**DSCN0209.jpg**  
12/5/2009 11:35:58 AM

Location: Clean Room B

Equipment: Machine equipment # MPR 08656

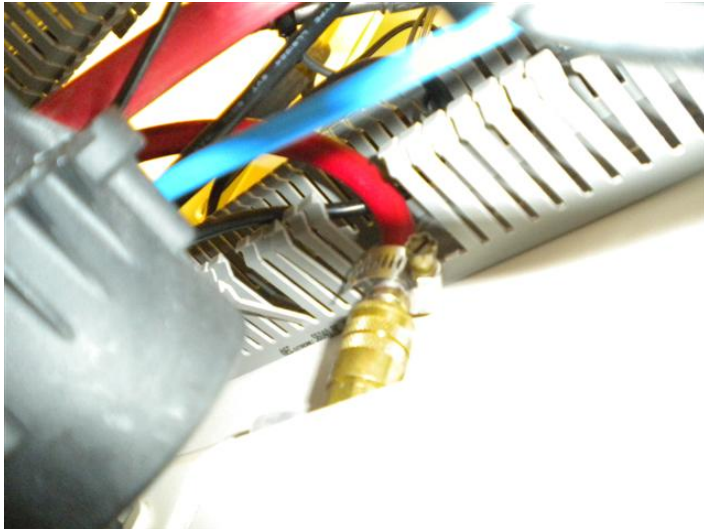
Decibel Level: 45db

Air Pressure: 110psi

Problem Description: Quick connect fitting leaking

Recommended Repairs: Repaired and re-checked

#### **FITTING BELOW BENCH**



**DSCN0210.jpg**  
12/5/2009 11:42:52 AM

Location: Clean Room B

Equipment: Below bench on Final Device Acceptance Station

Decibel Level: 45db

Air Pressure: 1110psi

Problem Description: Hose clamp leaking

Recommended Repairs: Repaired and re-checked

#### **LEAK ABOVE THE CEILING TILE**



**DSCN0211.jpg**  
12/5/2009 11:50:20 AM

Location: clean Room B

Equipment: Connection to main air above ceiling tile

Decibel Level: 45db

Air Pressure: 110psi

Problem Description: Clamp leaking

Recommended Repairs: Repaired and re-checked

### QUICK CONNECT FITTING LEAKING



**DSCN0212.jpg**  
12/5/2009 12:00:54 PM

Location: Clean Room B

Equipment: Adhesive Dispenser  
MPR09764

Decibel Level: 40db

Air Pressure: 110psi

Problem Description: Tubing leaking at the quick connect

Recommended Repairs: Repaired and re-checked

### QUICK CONNECT FITTING



**DSCN0213.jpg**  
12/5/2009 12:05:42 PM

Location: Clean Room B

Equipment: Near Unipolar Cell Station

Decibel Level: 45db

Air Pressure: 110psi

Problem Description: Hose clamp fitting needed to be tightened

Recommended Repairs: Repaired and re-checked

**Summary:**

This report contains 19 of the leaks that were repaired out of the 25 total leaks that were identified during the air/gas ultrasound audit in the CRDM clean rooms.

**VILLALBA CRDM CLEAN ROOM**

**COMPRESSED AIR / GAS AUDIT**

**ULTRASOUND ROUTE DEC-09**

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Prepared For:

VILLALBA FACILITY

**FOLLOW-UP NEEDED ON ISSUES FOUND**

**CLEAN ROOM E**

**REGULATOR LEAKING**



**DSCN0187.jpg**  
12/5/2009 8:31:48 AM

**Location:** Clean Room E by ceiling plate E-27

**Equipment:** Adhesive Dispenser MPR 07099

**Decibel Level:** 50db

**Air Pressure:** 90psi

**Problem Description:** Leaking from the regulator

**Recommended Repairs:** Repair or replace as needed.

**CLEAN ROOM C**

**SYSTEM AIR SWITCH**



DSCN0192.jpg  
12/5/2009 9:43:18 AM

**Location: Clean Room C Sterilizable Area**

**Equipment: Butt Joint Machine**

**Decibel Level: 50db**

**Air Pressure: 60psi**

**Problem Description: Leaking around the system air switch**

**Recommended Repairs: Repair or replace as needed**

**STERILIZATION ROOM**

**FITTING LEAKING**



**DSCN0194.jpg**  
12/5/2009 10:11:00 AM

**Location: Sterilizer room**

**Equipment: Sterilizer 5XLE-53**

**Decibel Level: 35db**

**Air Pressure: 110psi**

**Problem Description: Leaking from around the threads**

**Recommended Repairs: Tighten-up or replace as needed**

**STERILIZATION ROOM**

**VALVE STEM LEAKING**



**DSCN0195.jpg**

12/5/2009 10:12:56 AM

**Location: sterilizer Room**

**Equipment: sterilizer 5XLE-56**

**Decibel Level: 40db**

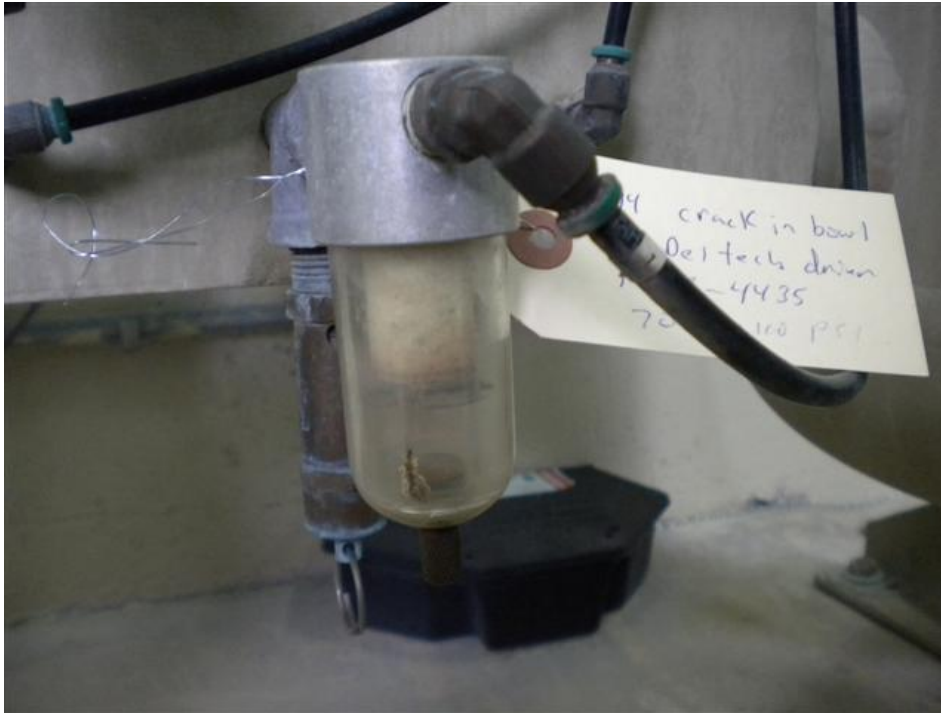
**Air Pressure: 110psi**

**Problem Description: Leaking from the valve stem**

**Recommended Repairs: Tighten-up the packing nut or replace valve**

**AIR COMPRESSOR ROOM**

**CRACK IN THE BOWL**



**DSCN0197.jpg**  
12/5/2009 10:26:12 AM

**Location:** Main air compressor room

**Equipment:** Deltech Drier MPR-4435

**Decibel Level:** 70db

**Air Pressure:** 110psi

**Problem Description:** Crack in the bowl

**Recommended Repairs:** Replace the bowl

**AIR COMPRESSOR ROOM**

**LEAKING VALVES**



**DSCN0198.jpg**  
12/5/2009 10:30:02 AM

**Location: Main air compressor room**

**Equipment: Drier MPR-4436**

**Decibel Level: 70db**

**Air Pressure: 110psi**

**Problem Description: Air leaking from around packing nut**

**Recommended Repairs: Repair as needed**

Summary:

This report contains the results of the items that could not be repaired from the ultrasound air/gas audit that was performed on 5-DEC-09. Follow up action will be needed to repair deficiencies that are described in this report.