

## Case Studies: Leak testing

### Portable Leak Test System - MALT



**Client:** Leading Global Jet Engine Manufacturer

**Part:** Remotely located pipe joints

**Machine supplied:** Fully portable leak test system

**Application:** Field Testing of Assembled Pipework

#### The Challenge

A leading global jet engine manufacturer needed to verify pipe joint integrity in remote locations where fixed leak test equipment couldn't be installed. The test system needed to be:

- Completely portable and transportable via air travel
- Self-contained (no external electrical or pneumatic services)
- Capable of testing various pipe sizes in situ
- Able to perform both positive and negative pressure tests
- Operable by technicians without complex setup

Traditional benchtop leak testers require shop air, electrical power, and fixed infrastructure, making them unsuitable for field testing of installed pipework.

#### The Solution

TQC developed a portable leak test system based on the MALT (Multi-Application Leak Tester) platform with custom integration of field-deployable components. The system includes battery power, manual pressure generation, wireless operation, and a full set of sealing connectors that fit over pipe joints to create test volumes without disconnecting the pipework.

Building on TQC's experience from the TAMI project (Test bench for leakage identification on Aircraft fluid Mechanical Installations) – a three-year Horizon 2020 Clean Sky 2 research program demonstrated at Airbus Defence and Space in Seville – this solution brings validated aerospace leak testing technology to field deployment applications.



## Technical Overview

### MALT Leak Test Instrumentation

The core of the system is TQC's MALT unit, which provides:

- Precision pressure transducers for leak rate measurement
- Automatic test sequencing (fill, stabilization, test, vent)
- Pass/fail determination based on programmable criteria
- Test pressure capability up to 3 bar (positive or negative)
- Internal data logging and result storage
- Wi-Fi communication for remote operation

The MALT platform was selected for its compact form factor and ability to operate without requiring a separate PLC or control system.

## Power and Pneumatics Integration

*Battery Power System: A high-capacity lithium-ion battery (commonly used in e-bikes) provides electrical power for:*

- MALT instrumentation and control electronics
- Pressure transducers and control valves
- Wi-Fi communication module
- Tablet interface charging
- The battery capacity supports a full day of field testing on a single charge.

*Manual Hand Pump: An integrated hand pump generates test pressure without requiring compressed air. The pump provides:*

- Both positive pressure (up to 3 bar) and vacuum generation
- Independent operation from facility services
- Controlled pressurisation by the operator
- Portability without pressure vessels or gas cylinders

## Wireless Operation

**Tablet Interface: A standard tablet device connects to the MALT unit via Wi-Fi and provides:**

- Browser-based interface (no custom app installation required)
- Test parameter setup (pressure, test time, leak rate limits)
- Real-time pressure monitoring during tests
- Pass/fail indication and test result review
- Data export for quality documentation

**Wireless Communication:** Wi-Fi eliminates the need for cables between the operator and the test equipment, allowing the technician to position the MALT near the test point while observing results remotely.

## Sealing Connectors for Pipe Joints

The system includes a set of two-part sealing connectors designed to test pipe joints without disconnection:

**Connector Design:** Each connector consists of two halves that clamp around the pipe joint and seal against the pipework on both sides of the joint. This creates an isolated test volume around the joint that can be pressurized or evacuated.

**Size Range:** Multiple connector sizes accommodate different pipe diameters commonly found in jet engine installations.

**Sealing Technology:** Polyurethane seals compress against the pipe exterior to create a leak-tight test chamber. The connector design allows quick installation and removal without tools.

**Test Principle:** The test volume is pressurized (or evacuated) and monitored for pressure change. Leak rate through the pipe joint is calculated from the pressure decay (or rise) over the test period.

## Portability Features

**Tripod Mount:** The MALT unit includes a tripod fitting that allows stable positioning near the test point. The tripod provides:

- Hands-free operation (technician can work on fitting connectors)
- Adjustable height and angle for optimal viewing
- Secure mounting to prevent damage in field environments

**Protective Transport Case:** All components pack into a ruggedized case for:

- Protection during transport (including air travel)
- Organized storage of connectors and accessories
- Quick deployment at the test site

## System Specifications

- Leak Test Instrument: MALT (Multi-Application Leak Tester)
- Test Pressure Range: -1 to +3 bar (direct testing)
- High Pressure Capability: 20+ bar (via pressure rise from vacuum method)
- Power Source: High-capacity lithium-ion battery (e-bike type)
- Pressure Generation: Manual hand pump (positive and negative)
- Operator Interface: Tablet via Wi-Fi browser connection
- Sealing Connectors: Multiple sizes for various pipe diameters
- Mounting: Tripod for field positioning
- Transport: Protective case for air travel compliance
- Test Methods: Pressure decay, pressure rise from vacuum

## Results

The portable MALT system enables the jet engine manufacturer to perform leak testing on installed pipework in remote locations without requiring facility infrastructure. Technicians can transport the complete system via air travel, deploy it at the test site, and verify pipe joint integrity using the same pressure decay methodology proven in laboratory environments.

The wireless tablet interface allows operators to monitor tests from a safe distance, while the battery power and manual pump eliminate dependence on local services. The sealing connector approach tests joints without disconnection, preserving the integrity of the installed system.

If you have an application that could benefit from TQC's expertise in leak testing, please contact us by email or phone via the contact details



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