



 **Aeronautic & Defense**





THERMOCOAX

AERONAUTIC DEFENSE

IN-house production of MI cable



Applications

➤ **ANTI-ICING AND HEATING FOR :**

- Pitot tube
- Angle of Attack (AoA)
- Total air temperature sensor
- Grey water Drain Mast
- Engine air inlet screen
- Nacelle edge, rudder and elevator horn
- UAV Camera lens

➤ **TEMPERATURE FOR :**

- Brake monitoring
- VF generator oil bearing
- Air cabin heat exchanger
- APU

➤ **OVERHEAT DETECTOR FOR :**

- Bleed air leakage detector

➤ **GROUND EQUIPMENT WITH :**

- Temperature sensors for heat treatment furnaces qualified NADCAP
- Fuel heating systems for missile engine test bed

Our capabilities

Our mission is to develop complete thermal solutions, through advance innovation : from conception to prototype development, all the way through to production.

Our custom thermal systems provide cleaner, cost effective and safer solutions :

- ▶ 3D design development
 - ▶ Brazing (torch, vacuum brazing)
 - ▶ Engineering solutions
 - ▶ High temperature Ceramic/Metal brazing
 - ▶ Temperature measurement
 - ▶ Thermal simulation
 - ▶ Thermal heating systems
 - ▶ Customized development
 - ▶ Welding (Laser, Plasma, TIG)
-
- ▶ Tier 1 supplier of Airbus, Dassault, Eurocopter, Embraer, SAAB, General Atomic
 - ▶ Tier 2 supplier for Bombardier, Boeing, SAAB, Sukhoi, HAL, COMAC



The industry's
most trusted
Mineral
Insulated
Cable



Electrical Anti-Icing Systems

Smart Heating Solutions for sensitive components

For many years THERMOCOAX has offered expertise in heating solutions to aerospace with unique designed systems.

Our solutions are based on the Mineral Insulated Cable technology, developed and manufactured by THERMOCOAX to match the highest standards.

Each anti-iced component is directly linked to the air frame behavior and we offer :

Safety, reliability and durability with all of our equipment.

INCREASE RATIO PERFORMANCE / COST

General Specification

- ▶ Heating cable diameter from 0.25 up to 5 mm
- ▶ Various sheath alloys as Nickel, Inconel 600, SS304...
- ▶ Typical voltage 28 V, 115, 200 or 400 Vac
- ▶ Dielectric test under 1500 V
- ▶ Insulation $10^{12}\Omega$.meter at room temperature

Heated Drain Mast

THERMOCOAX can propose various designs to avoid ice projections against the fuselage or in the engine :

- ▶ Self or non self regulated
- ▶ High power density

- ▶ From 20 to 300 W
- ▶ Size adapted to small or long range aircraft
- ▶ Power supply 28 or 150 V 400 Hz
- ▶ Dielectric 1500 V
- ▶ Molded composite shell
- ▶ Integrated overheat sensor



Angle Of Attack Pitot Tube

AOA and Pitot tubes need to be operational in all weather conditions and free of ice. THERMOCOAX can provide the heater or complete sensor.

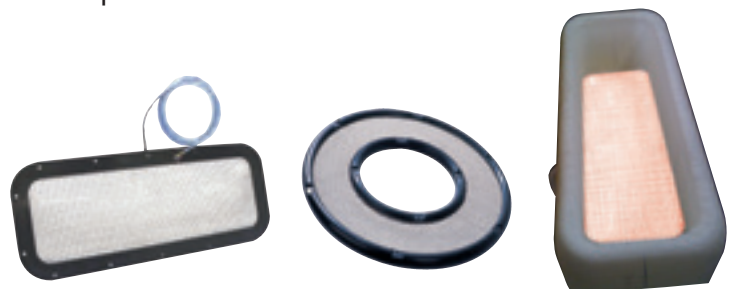
- ▶ Self or non self regulated
- ▶ From 100 to 400 W
- ▶ Power supply 28 or 150 V 400 Hz
- ▶ Dielectric 1500 V



Air Inlet Screen

Rather for rotorcraft or turboprop engine, the design provides heated barrier to protect the engine from debris and ice.

- ▶ From 100 to 300 W
- ▶ 2 or 3 loops of heating system for redundancy
- ▶ Power supply 28 or 150 V or 200 V 3 phases 400 Hz
- ▶ Dielectric 1500 V
- ▶ Impact test \varnothing 60mm foreign objects, 300 km/h, distance of 1 meter
- ▶ Composite or metallic borders



Temperature Probes

Accurate measurement

THERMOCOAX provides Class 1 sensors in accordance with IEC 584.2 standards.

THERMOCOAX is the Mineral Insulated Cable manufacturer ; we have the capability to make a vast array of probes.

- ▶ Cryogenic temperature up to 2 300°C,
- ▶ Smallest Outer Diameter 0.25mm,
- ▶ Single or Multi hot junctions for redundancy,
- ▶ In-house NIST calibration
- ▶ SS304, SS316, INCONEL® Alloy, Platinum, Tantalum, Rhenium and more.

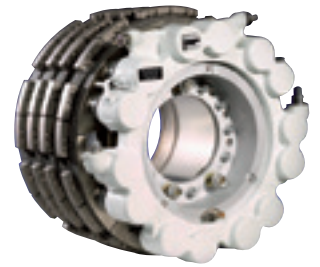


Brake Temperature Sensors

In real time, the sensor gives a «GO/NO GO» signal to the pilot, preparing for take off and gives signal for authorization to retract landing gear.

Design for :

- ▶ Single and twin aisles
- ▶ Regional and business jet
- ▶ Military fighter or trainer



SECURE THE BRAKES WITH PRECISE TEMPERATURE MEASUREMENT

Sensors for Heat exchanger

- ▶ Thermocouple or RTD technology
- ▶ Swagged tip for faster response
- ▶ Single or duplex
- ▶ Robust construction
- ▶ Custom body for better integration



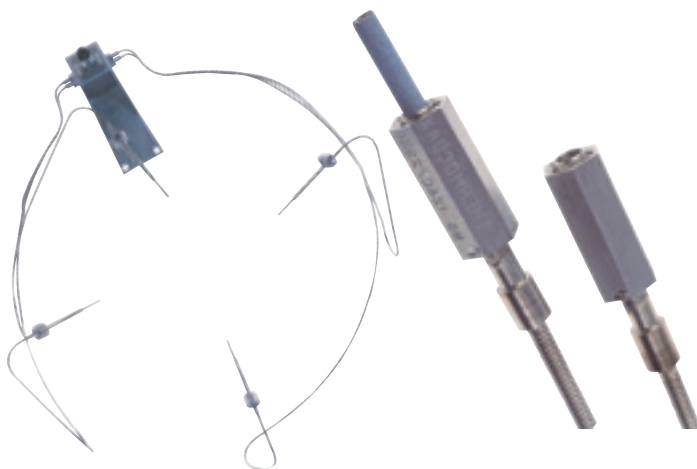
Temperature Harness for Engine and APU

Dedicated for missile, rotorcraft and turboprop engines.

Designed to fit any engine and simplify cabling.

Such component is strategic as it gives the engine temperature to the FADEC for piloting the engine.

- ▶ Up to 1200°C
- ▶ SS304, Inconel 600, Haynes 230
- ▶ Duplex design sensor, up to 12 thermocouples per harness



Total Air Temperature Sensor

Integrated electrical anti-icing system

- ▶ From -60°C up to 80°C ±1 %
- ▶ Recovery factor not under 0.96
- ▶ SS304 body
- ▶ Heating system 28 V or 115 V - 400 Hz



Bleed air leak and overheat detection systems

THERMOCOAX offers a wide range of overheat detectors based on our Mineral Insulated Cables.

Applications for : bleed air leak, Belly Fairing, cabin underfloor, APU duck, Pylon, wings.

- ▶ Alarm 104, 124, 154, 180, 204, 215, 232°C...
- ▶ Temperature range from 100 up to 400°C
- ▶ 100 000 hours flying operation
- ▶ MD90, A340, KC390, F5X

**SECURE DATA
DURING ANALYSIS**

Airborne Temperature

For monitoring gas or other fluids on aircraft :

- ▶ Air conditioning or gearbox oil
- ▶ RTD available : 100, 500, 1 000Ω up to 400°C
- ▶ Single or duplex designs.



Custom Equipment

Heating system for High altitude camera

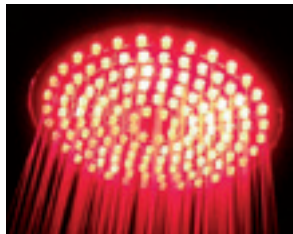
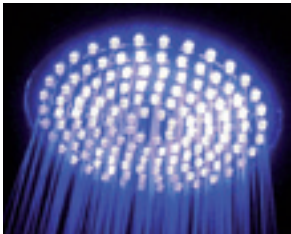
Heating system for High Altitude Camera :



- ▶ Circular gasket on 2 and 3D rotation camera
- ▶ Altitude over 40 000 feet
- ▶ Stable temperature in lens area.

Hot water system for airborne shower

Special equipment for VIP aircraft
Heating system 4 KW under 28 V producing hot water at 45°C



MIL RTCA DO 160
Test
Qualification
Simulation
Analysis

QUALIFICATION

▶ Analyze and draft

Documentation, procedures, standards and specifications

▶ Develop

Test program to comply with specifications

▶ Realize

Running the test program

▶ Establish

Delivery Qualification report



NEW TECHNOLOGY

Concepts, Designs using Soliworks and Computering Model Techniques (CMT) simulating prototype performances

Calibration and testing using COFRAC certified laboratory

R&D department for static and dynamic thermal modeling



OUR COMPANY

With nearly 60 years of experience in heating solutions and temperature measurement, THERMOCOAX has acquired a great deal of skill and expertise. THERMOCOAX products are widely used and endorsed in many industries where the highest quality and utmost reliability are essential. All our mineral insulated cables are manufactured in-house with our proprietary and unique procedures.



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Site Planquignon



Thermocouples
 & Heating Elements
 ATEX
 certified and notified

