# PIEZOELECTRIC MOTORS FOR EXTREME CONDITIONS

› OBJECTIVES

The objective of the PROOFED project is to develop a new piezoelectric motor to be used in extreme conditions. The optronics, the nuclear and the aerospace markets need a «proofed motor» product able to operate continuously under thermal, vacuum, vibrations and magnetic environment. These motors exploit the patented concept of CTEC in inertial stepping piezo actuators.
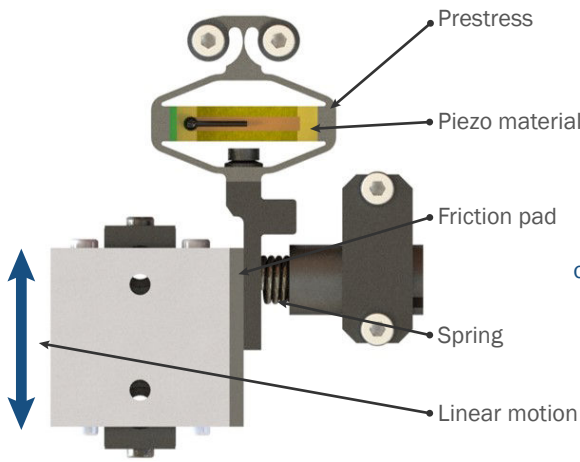

PROOFED

PiezoelectRic mOtOrs For Extreme conDitions

Eurostars Eureka
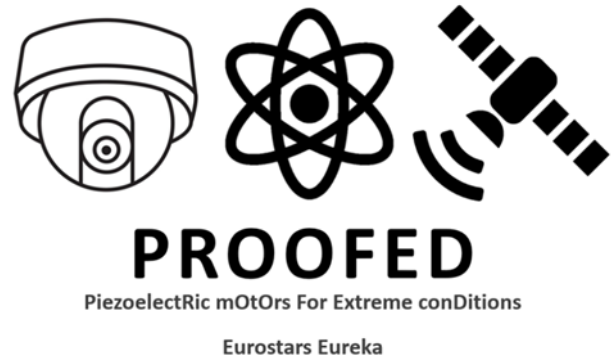
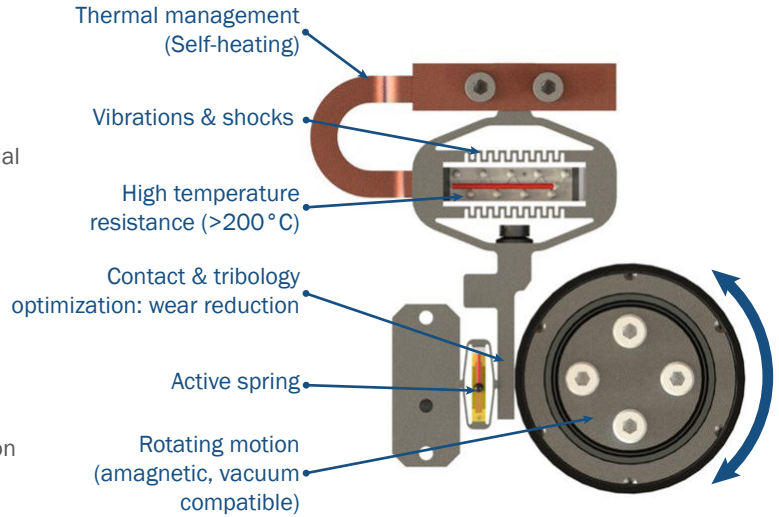| TARGETED MARKETS	INNOVATIONS	APPLICATIONS
Nuclear	• Thermal drain under vacuum • Non-magnetic • Long lifetime • High temperature Piezo >200°C	
Optronics	• Stable operation during vibrations	
Aerospace	• Withstand spacecraft launch vibrations • Designed for thermal and vacuum environments • Minimize exported μvibrations	

› EXPECTED IMPROVEMENTS

The PROOFED Project will introduce necessary **improvements to address these markets**:

- **Heat management to transfer self-heating at high speed**, brought by CSEM
- **New high temperature piezo stacks** to operate at high temperature, brought by CTS
- **High preload piezo motor** to withstand vibrations, brought by CSEM and CTEC
- **New friction pads** to increase the lifetime, brought by CTEC
- **An active clamp** for smooth driving approach brought by CTEC
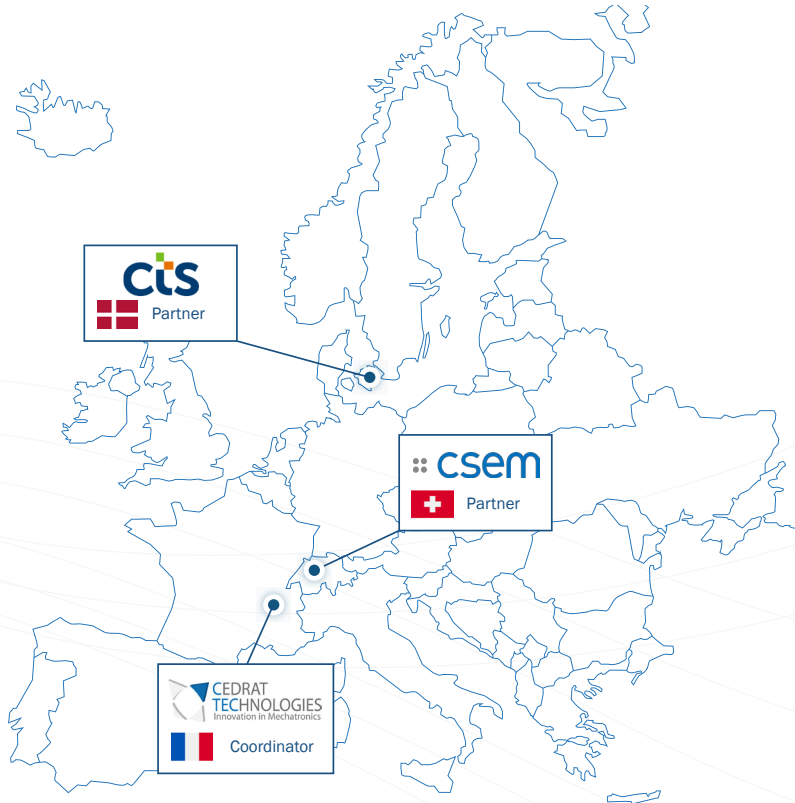
MSPA Motor (Not PROOFED)

- Prestress
- Piezo material
- Friction pad
- Spring
- Linear motion

PROOFED MOTOR

- Thermal management (Self-heating)
- Vibrations & shocks
- High temperature resistance (>200°C)
- Contact & tribology optimization: wear reduction
- Active spring
- Rotating motion (amagnetic, vacuum compatible)

BEFORE PROOFED PROJECT	AFTER PROOFED PROJECT
Overheating of piezo motors	Heat management system New piezo stack
Large motors dimensions	Embedded system for limited volume
Failure under high vibrations	Space qualified motors
Rejected micro-vibrations	Smooth driving approach
Long life in lab	Long life in extreme conditions

› PARTNERS

The proposed consortium consists of three partners: CEDRAT TECHNOLOGIES (CTEC) as a Coordinator working on the piezo motor design, CSEM working on thermal drain and vibration resistance and CTS developing high temperature piezo stacks.

CtS — Partner
csem — Partner
CEDRAT TECHNOLOGIES — Innovation in Mechatronics — Coordinator

CEDRAT TECHNOLOGIES • 59 Chemin du Vieux Chêne • Inovallée • 38246 MEYLAN Cedex France • Tel. : +33 (0)4 56 58 04 00