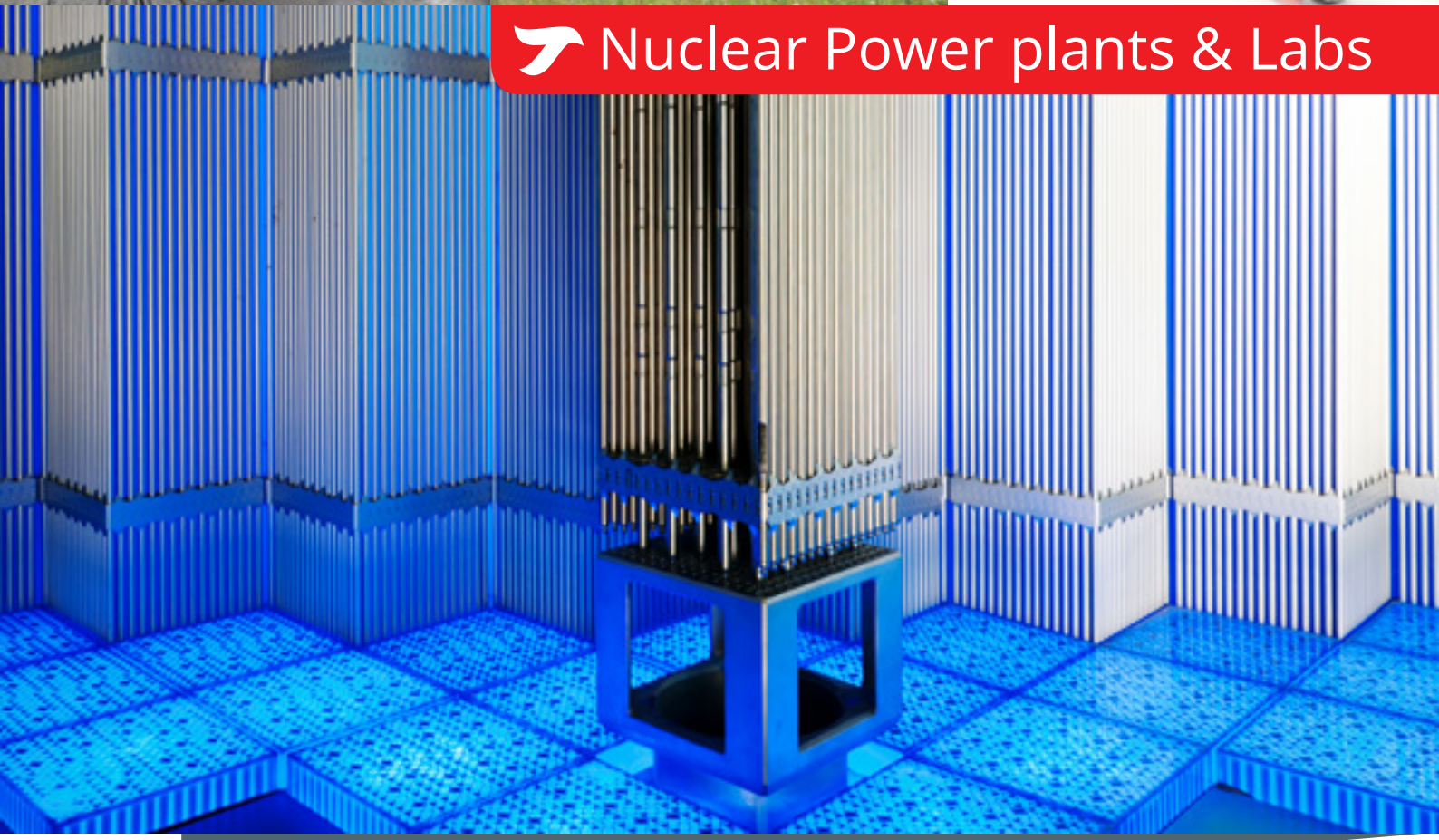
CABLING SYSTEMS, SENSORS AND HEATING SOLUTIONS

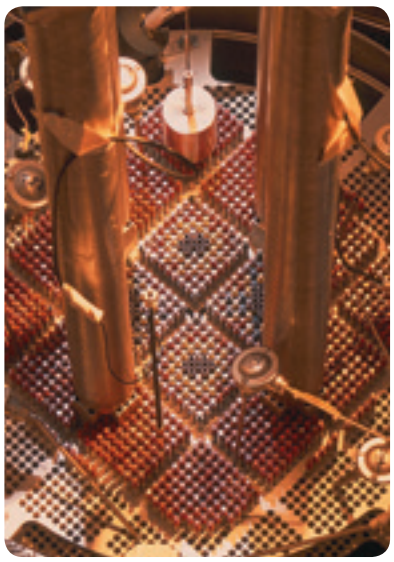
Nuclear Power plants & Labs



THERMOCOAX
NUCLEAR

THERMOCOAX
NUCLEAR

IN-house production of MI cable



Crédit : P.Stroppa/CEA

Applications

CABLING SYSTEMS:

- Transmission cable
- Connectors qualified severe accident
- Organic coated MI cable

SENSORS:

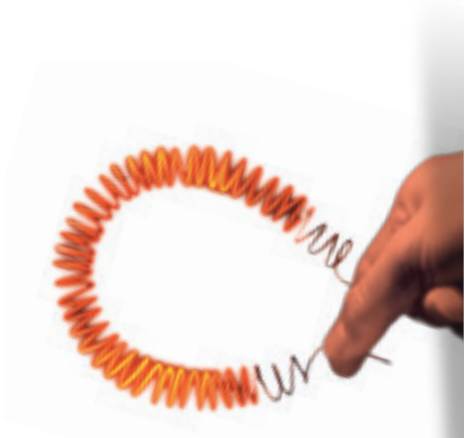
- In-core thermocouples
- Resistance thermometers Rtds
- Self Powered Neutron Detectors
- Gamma thermometers
- Level sensors

HEATING SOLUTIONS:

- Pressurizer heaters
- Fuel pin simulators
- Trace heating
- Customized ovens

Our capabilities

THERMOCOAX has supported the players in the civil nuclear market throughout the cycle: from fuel design, plant components to reprocessing.



The industry's most trusted Mineral Insulated Cable

OUR MISSION

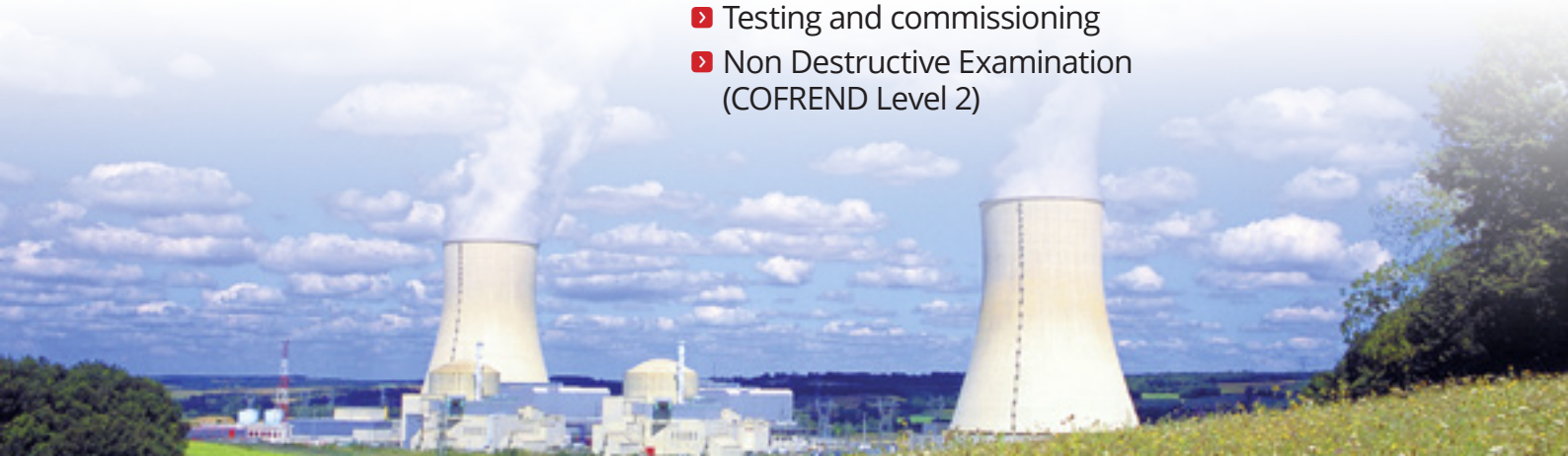
THERMOCOAX **offers** complete **solutions based on MI cables** through advanced innovation. From conception, prototype development to **qualification**, all the way through to production.
Our custom systems provide cleaner, cost effective and safer solutions.

OUR OFFERS

- Feasibility studies
- Project management
- Reengineering
- Transfer of Technology
- Quality Assurance System (NQA-1, ISO 9001 v 2008, ISO 14001 v 2004)
- Dedicated Nuclear work shop
- On site service

OUR EXPERTISE

- 3D Design / thermal modeling
- MI cable design
- Connector design resin or Ceramic metal seals
- Construction codes KTA, RCC-M, ASME
- High temperature brazing
- Welding (Laser, Plasma, TIG)
- Testing and commissioning
- Non Destructive Examination (COFREND Level 2)



THERMOCOAX

Cable connector assemblies

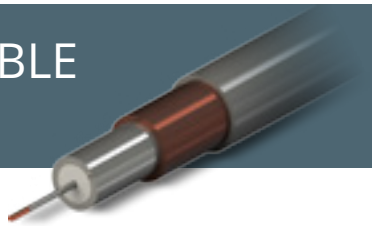
- Best solution for high radiation, high temperature, high pressure or high vacuum
- Unlike organic cables, no thermal and radiation ageing
- Cost effective solution for organic cable replacement
- Class 1E cable application, Qualified for LOCA, Post LOCA & accident conditions
- Enhanced electrical performance at elevated temperature for Gen IV reactors

- Non organic construction only: cable and ceramic seals
- Proprietary manufacturing process resulting in unique electrical parameters
- Outer dimensions from 15.9 mm (0.625") down to 0.25 mm (0.010")
- Very high insulation resistance: up to 1E13 Ohms.m @ room temperature

Twist of conductors without impact on external sheath metallurgy

EX-CORE & IN-CORE CABLING SYSTEMS

PRECISION MI CABLE



In-house production of MI cable

Example of specific cable development: very small outer diameter but high ElectroMagnetic Immunity

- Low ALARA
- Easy routing, tight bending radius

High electromagnetic **immunity MI cable**

Patent CEA FR 2 909 217, Thermocoax exclusive licence

SOLUTIONS FOR NUCLEAR RESEARCH CENTERS SOLUTIONS FOR PWR, BWR AND GEN IV REACTORS

Neutron and Gamma
Self Powered Detectors

- Built on years of proven design experience, performance and reliability
- In-core flux measurement
- Wide range of emitter available

Gamma detector

Patent CEA / SCK FR 2 943 142,
Manufactured under licence of the CEA – SCK CEN laboratory

Radiation resistant thermocouples

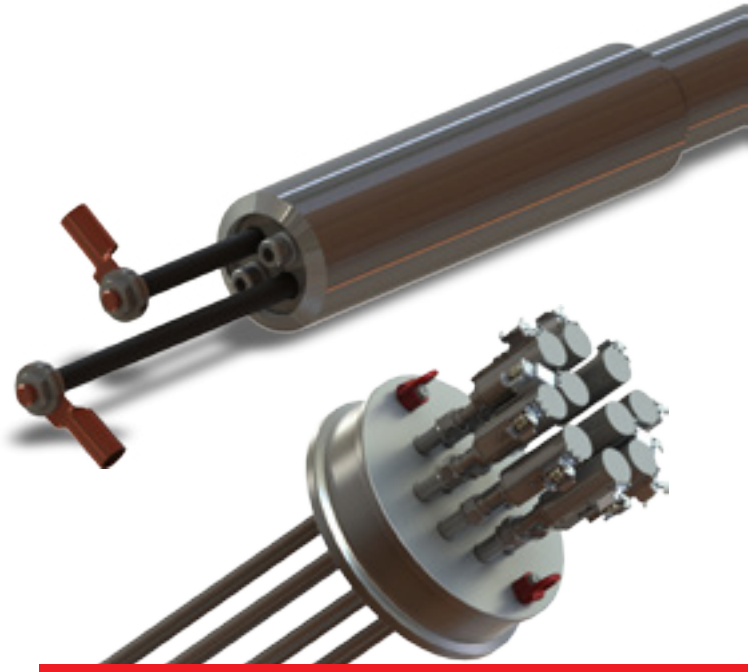
- Highest operational experience in nuclear industry
- Individual thermocouples or assemblies
- Fuel assembly outlet temperatures measurement
- Compliance with ASTM E235 if required
- New thermoelectric materials

IN-CORE SENSORS

Pressurizer Heaters
FOR NUCLEAR POWER PLANT AND TEST LOOP

Unique proprietary manufacturing process

- Highest operational experience in nuclear industry
- Contrary to others existing technologies, no swelling in case of water ingress
- Epoxy receptacle or high temperature ceramic receptacle
- Superior temperature uniformity
- Low thermal stress
- Thermal flux up to 40 W/cm²
- Length from 0.5 m up to 11 meters
- Outer diameter from few mm up to 31.7 mm



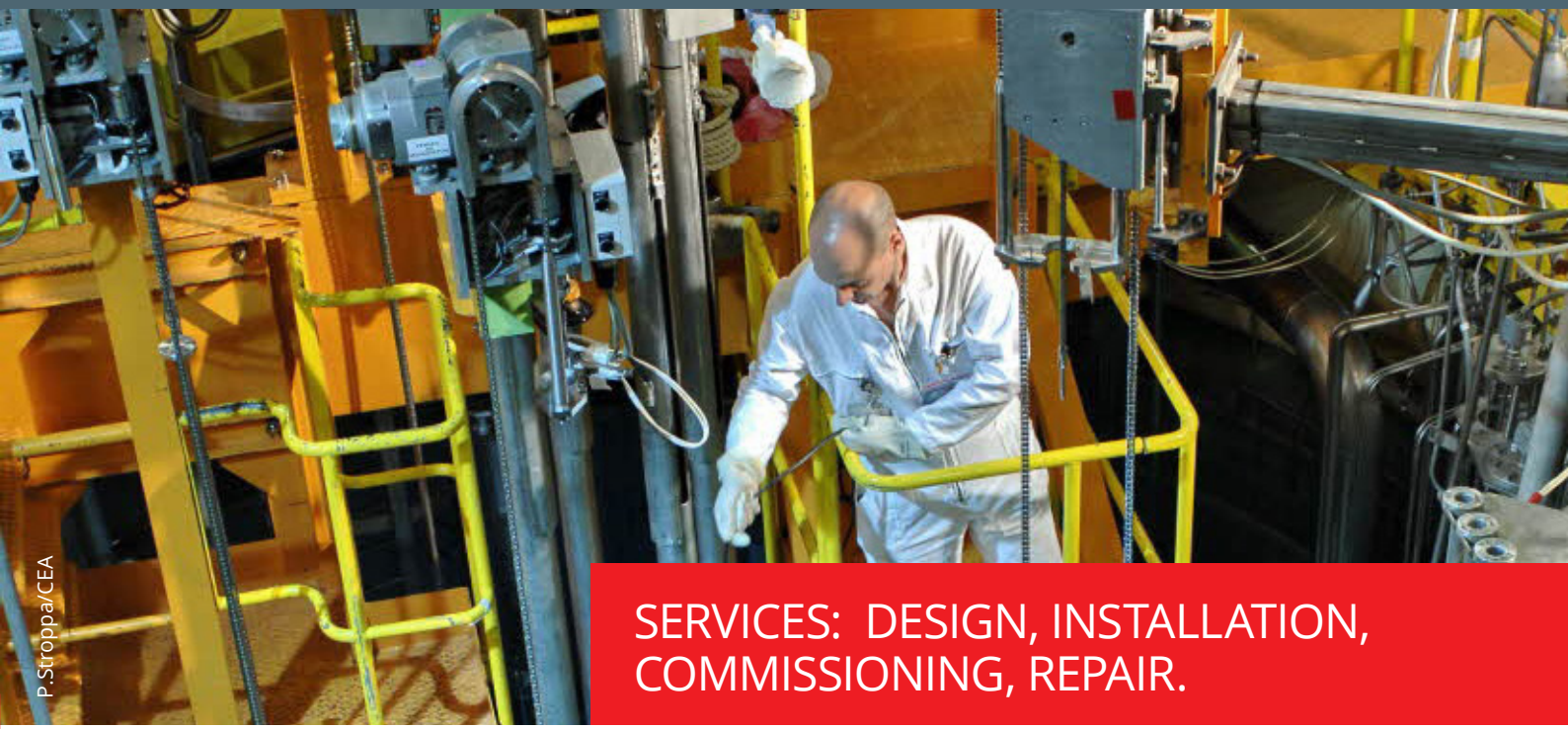
HIGH WATT DENSITY HEATERS

Treatment against stress corrosion

Patent EDF WO 2011/ 124846
Thermocoax exclusive licence

Fuel pin simulators

- Electrically isolated
- Thermal flux up to 240W/cm²
- High temperature connectors

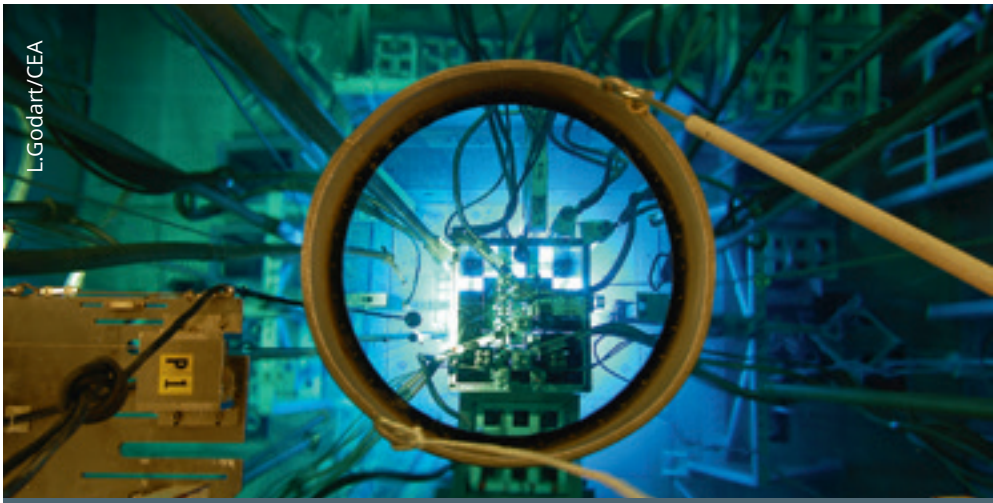


SERVICES: DESIGN, INSTALLATION, COMMISSIONING, REPAIR.

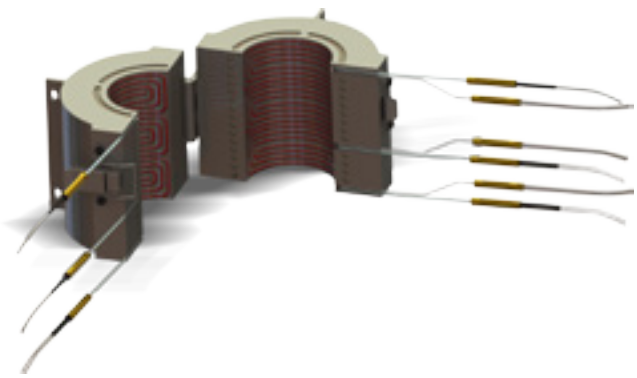
Instrumented mechanical assemblies

Construction according to the code: ASME, KTA, RCC-M or RCC-MRx

Welding qualification



PRECISION MECHANICS WITH INSTRUMENTATION



R&D department for static and dynamic 3D thermal modeling

Concept, Design using SolidWorks and computering model techniques (CMT) simulating prototype performances.

Calibration and testing using COFRAC certified laboratory

THERMOCOAX

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 Planquivon

Thermocouples
& Heating Elements
ATEX
certified and notified