



ermes

ELECTROTECHNICS AND MECHANICS OF STRUCTURES
R&D EXPERTISE AT THE SERVICE OF INDUSTRY

FIELD EXPERTISE

TESTING AND MEASUREMENTS

NUMERICAL SIMULATIONS

PROTOTYPED PRODUCT

MARKET-READY PRODUCT

OPERATIONS & MAINTENANCE SUPPORT

Performing diagnosis on damaged transformers

YOUR STAKES

- Understand transformer failure
- Ensure that a defect is non-generic

OUR OFFER

The offer consists in:

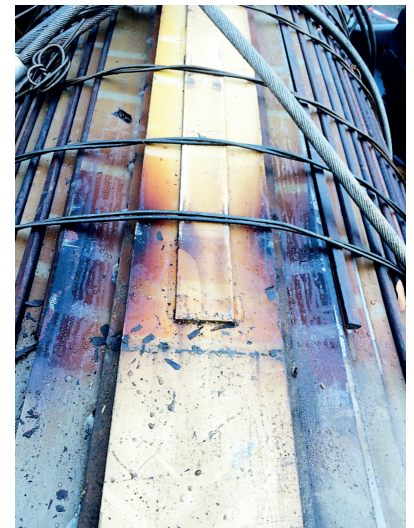
- Analysis of damages occurring on power, transmission or distribution transformers installed on your industrial sites

The offer can be detailed as follows:

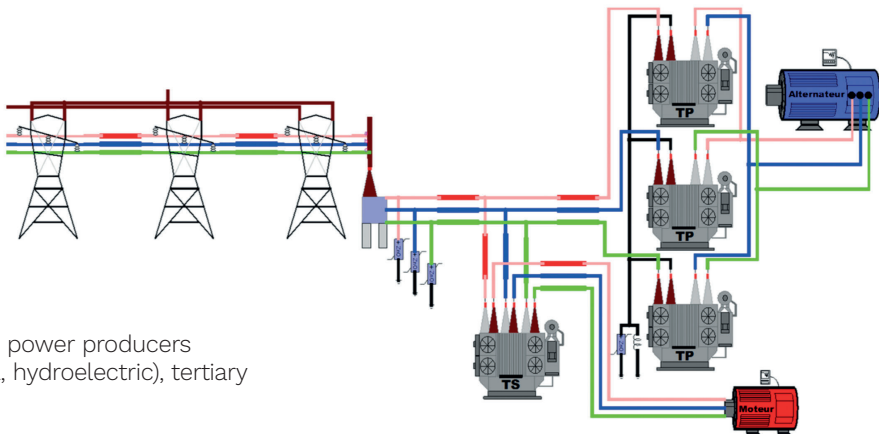
- Advanced studies
 - Search for the operative event
 - Simulation of electrical transients of the industrial installation in order to identify those likely to cause damage to the equipment during normal or degraded operation

A unique expertise:

- Poly-disciplinary aptitudes
 - Thermal (hot spots...)
 - Electric (primers, partial discharges, secondary voltage drops...)
 - Mechanical (bad electrical contacts, vibrations, dynamic short-circuit resistance...)
- Numerical simulation tools
 - Finite element calculation of hot spots
 - EMTP_RV software for power transients



Example of damage



SECTORS OF APPLICATION

- General industry, power producers (nuclear, thermal, hydroelectric), tertiary

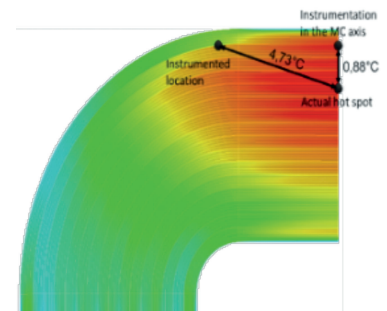
Performing diagnosis on damaged transformers

KEY FIGURES:

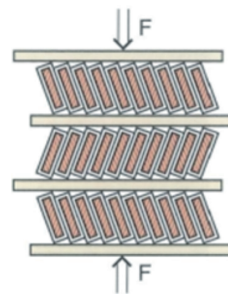
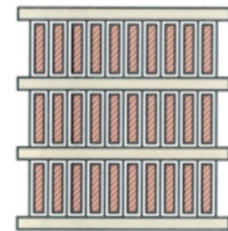
- EDF R&D has in-depth knowledge of the thousands of transformers installed on electricity production and distribution sites
- EMTF software sold to several thousand users for more than 20 years

OUR ASSETS

- A recognized expertise in electrical engineering, knowledge of the industrial fabric and mastery of the rules of the art.
- Technical know-how proven by the industrial studies carried out for EDF's generating fleet over the past 30 years.
- Assistance in the establishment of a specific investigation program, based on the experience of our experts.
- Interpretation of the analysis of dissolved gases and ageing tracers (power transformers).
- Advanced numerical simulation tools:
 - finite element calculation code, in-house developed software.
 - EMTF_RV is a suitable tool for conducting most electrical system studies, regardless of their power and voltage levels, it can be used by all actors in the electricity network: conventional or renewable producers and transmission and distribution system operators, but also industrial customers and suppliers. At EDF, EMTF is used by about 90 people, in R&D and increasingly by engineering units in a wide range of studies.



Hot spot calculation



Stresses exerted on the coils

SATISFIED CLIENTS

- EDF nuclear, thermal and hydraulic engineering departments

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A RICH HISTORY

- An expert opinion recognized by French and foreign industrialists.
- EMTF-RV embodies 30 years of experience in electrical systems simulation, a community of several thousand users around the world, micro-second to minute simulations, and about thirty studies per year at EDF alone