Business from technology

Thermal NDT & E of Composites

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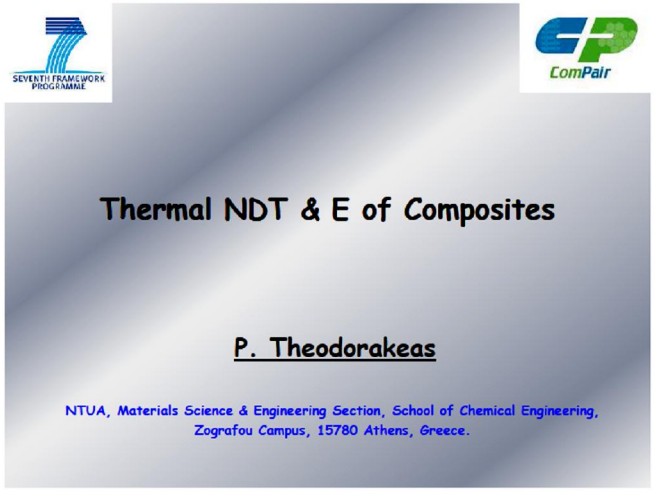

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Technologies and services for buildings

Some milestones (V.Vavilov,TNDT Handbook)

- the first attempts to detect human beings and animals by their infrared (IR) radiation were undertaken in the XIXth century
- In 1914, Parker received a patent for detecting icebergs
- Barker proposed using IR sensors for monitoring forest fires (1934).
- One of the first industrial applications of IR radiation measurement was related to analysis of hot rolled metal (Nichols, 1935).
- Contemporary analysis of material thermal properties goes back to the work by Vernotte published in 1937
- In the 1960s, IR thermography began to be used in inspecting electrical installations and radio electronic components (AGA, Sweden)
- One of the first implementations of the active TNDT process proposed by Beller in 1965 was the inspection of Polaris rocket motor cases
- By the end of the 1970s, applications of IR thermography were still rather qualitative, preventing the successful competition of TNDT with other inspection techniques

Background

- TNDT is typically classified for passive and active, as well as for steady-state (stationary) and transient (non-stationary or dynamic).
- In a passive mode, tested objects are characterized by temperature distributions

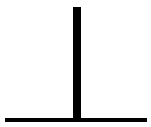
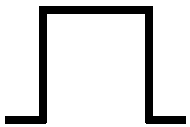
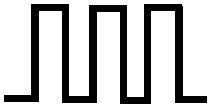
which appear naturally due to object functioning or because of technological reasons

- active inspection requires external thermal stimulation.
- defects can be active and passive
- Active defects generate or absorb thermal energy
- Passive defects = the same temperature as the environment - test object must be heated or cooled to produce recordable temperature signals in defective area
- In transient TNDT, results significantly depend on inspection time.
- active TNDT requires using advanced data processing algorithms.

Background

- Models of active TNDT can be classified by:
- 1) the type of thermal stimulation (Fig. 1.2),
- 2) the arrangement of a sample and a thermal stimulation source (Fig. 1.3), and
- 3) the size and shape of stimulated area (Fig. 1.4).

Heat pulse shape accepted in TNDT

Dirac pulse	Square pulse	Gaussian pulse	Thermal waves (square or harmonic)
			

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