



ΣΕΜΙΝΑΡΙΟ

ΙΤΕ/ΕΙΧΗΜΥΘ

ΟΜΙΛΗΤΗΣ: Dr. Rudy Stalmans
Department of Metallurgy and Material Engineering
KULeuven
Heverlee
Belgium

ΘΕΜΑ: Adaptive Hybrid Composites with a Focus on the Integration of Shape Memory Elements

ΗΜΕΡΟΜΗΝΙΑ: 29 Σεπτεμβρίου 1999

ΤΟΠΟΣ : Αίθουσα Σεμιναρίων ΕΙΧΗΜΥΘ

ΩΡΑ: 19:00

ABSTRACT:

The increased demands on the performance of materials and systems used in engineering applications, as well as, the necessity of lightweight constructions in various applications can no longer be fulfilled by improving the characteristics of conventional structural materials but requires the development of so-called adaptive, multifunctional, smart, and intelligent systems. The properties of those material systems may be varied in response to external or internal stimuli. This opens new perspective with respect to the development of engineering components, which are capable of reacting in a manner which, will improve performance, efficiency and reliability of the overall structure.

Generally speaking, adaptive material systems integrate actuating and sensing technologies into structural materials. The approach discussed here is the integration of thin shape memory alloy (SMA) wires, strips or films as actuating elements in fibre reinforced polymer composites, further indicated as SMA-composites. Fibre reinforced polymers have already gained large interest and increased application in diverse fields. This is mainly due to their inherent high stiffness-to-weight ratio, corrosion resistance and controlled anisotropic properties. Shape memory alloys (SMA) are commercially in use since many years for a variety of actuator, clamping and fixing devices. Since some years SMA-wires are commercially available with diameters below 200 micron. SMA-strips became recently commercially available with thicknesses down to 25 micron. Even SMA-films with thicknesses of a few micron can be produced. These small diameters and thicknesses allow the direct integration of SMA-elements into fibre reinforced polymer composites without losing the structural integrity of the matrix material.

The development of polymer composites with embedded SMA's can open new perspectives with respect to the development of engineering structures with adaptive shape, stiffness, damping and other properties.