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ANALYSIS AND APPLICATION OF DIEL-ALDER AND SILICONE BASED SELF-HEALING
MATERIALS (SHM) IN AEROSPACE SECTOR.**Abstract**

In recent years, research in self-healing materials has been fueled by the increasing need for sustainable materials with extended life spans and functionality. Self-healing materials are substances that have the ability to repair the damage to the material with or without external stimuli. Self-healing composites could be used in place of conventional material to heal cracks and damages to increase the lifespan of the composite material. A material or composite approaches the failure point with time due to the formation of microcracks or micro voids in the material. When the given material is subjected to the action of loading and unloading, microvoids are formed in the material. These microvoids coalesce to form a crack which decreases the endurance of the material and the cracks can not be repaired at remote locations of the material. Corrosion-resistive composites are used in SHM, coating of this has excellent corrosion resistance under mechanical loads and temperature resistivity which is suitable for jet engine combustion chambers. Corrosion-resistive composites are used in SHM, coating of this has excellent corrosion resistance under mechanical loads and temperature resistivity which is suitable for jet engine combustion chambers. Self-healing materials can be widely used in load-carrying structural parts and inlet propeller blades where high strength-to-weight ratio, corrosion resistance, and low temperatures are of primary importance. This paper attempts to provide a study on Diels-Alder(DA) epoxy-based self-healing composite and Silicone based self-healing composite. A comparative study on the parameters such as the size of voids formed on the action of load, self-healing time, for a given concentration of self-healing material, and boundary conditions. Fatigue load analysis is performed for the same to get the respective S-N curve(stress amplitude vs number cycle to failure). Further in this paper, a complete stress and microvoid analysis of Diels-Alder-based epoxy self-healing composite and silicone-based self-healing composite is done using Ansys static structure software. Based on the analysis, the applications of the above-mentioned materials in different composites are suggested in various domains of the aerospace industry.