



DEPARTMENT OF MECHANICAL ENGINEERING
Purdue School of Engineering and Technology

SPRING 2005 SEMINAR SERIES

Date: Tuesday, March 22, 2005

Time: 10:45 am - 11:45 am

Room: SL 165

Everyone is invited

Adjusted Kinetics for Improved Autonomic Crack Healing During Fatigue

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Abstract. The resistance of thermosetting polymers to fatigue crack propagation is significantly improved with the use of autonomic crack healing technology. Autonomic healing is accomplished using a combination of catalyst particles and microcapsules of healing agent embedded in the thermosetting polymer matrix. As a fatigue crack propagates through the polymer matrix, catalyst particles are exposed and the microcapsules of healing agent are ruptured, releasing healing agent into the crack plane. Polymerization of the healing agent is triggered by contact with the exposed catalyst particles. The fatigue crack growth rate is dependent on the mechanical kinetics (stress ranges, frequency etc.) and the *in situ* cure kinetics of the healing agent. By adjusting the cure kinetics of the healing agent the fatigue crack growth rate can be significantly retarded or arrested. Work is in progress to characterize autonomic healing epoxy and to better understand the complex relationship between loading parameters, healing cure kinetics and crack growth rate.