CE 8930

Group Assignment #9

Assigned: Saturday, March 15, 2014

Due: Saturday, March 22, 2014 (midnight)

Students are asked to design a long-term monitoring campaign using control charts for a beam that is being continuously damaged over an approximately 2-hour period. In this assignment, damage is simulated through the loss of mass at the tip of a cantilever beam.

Students are asked to design and execute vibration testing, select appropriate features and monitor these features over the life-span of the beam. When the bottle attached to the tip of the cantilever is full, the beam will be considered 100% healthy. When 25%, 50% and 75% of the water is lost, the beam will be considered to have minor, moderate and severe damage, respectively. The long-term monitoring campaign should ideally be able to distinguish between these severity levels through the definition of appropriate thresholds.

Figure 1: The cantilever beam with mass loading.

Grades will be given considering the following:

1. The success of the selected feature in identifying damage,
2. The success of defined thresholds in identifying damage and distinguishing various damage severity levels.

Each group is asked to submit an all-inclusive report (including references) of no more than 5-pages. The report should present the details of the completed work from the design of experiments to the detection of damage.