ISYE 6501 HW9

12.1)

Design of Experiments is a frequently used technique in the field of Materials Science. In my undergraduate mat-sci lab, I was tasked with setting up a set of fatigue tests to determine several performance characteristics of a new nickel super-alloy. The alloy test samples were extremely expensive to acquire, so the number of tests that could be run was limited to 8. Of those 8, two were required for calibrating the test cell. With only 6 samples to test with and temperature level, corrosion level, and fatigue cycle tuning parameters to vary, the DOE approach was best suited for determining the parameter levels to use. Each of the three parameters was partitioned into discrete ranges and a fractional factorial DOE was used to determine the optimal set of parameter settings to best cover the entire design space of temperature, corrosion, and fatigue cycle tuning. Ideally, we would have had more samples to use because that would have provided better coverage of the design space, but using a DOE helped us maximize the usefulness of the testing period with only 6 samples to use.