2.830J / 6.780J / ESD.63J Control of Manufacturing Processes (SMA 6303)
Spring 2008

Massachusetts Institute of Technology

Department of Mechanical Engineering
Department of Electrical Engineering and Computer Science

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Assignment 6
Out 3/22/2008; due Thursday 4/3/2008

Problem 1

In the injection molding experiments described in class, two input variables were changed: injection speed and hold time. Here we address the question of whether the change in either or both of these inputs caused a significant change in the output.

(a)   Perform a two-way ANOVA on the injection molding data, and draw conclusions.

The ANOVA test is not the only method we can use to test the hypothesis that the inputs did or did not have any effect. Accordingly for this problem:

(b)   Formulate a hypothesis and a test statistic that will get at the same question "did anything happen?" when each input was changed.
(c)   Apply that test to the injection molding data and compare the results to those you have obtained using ANOVA.
(d)   Comment on how the results compare and explain the differences and/or similarities between the two methods.

The experimental data are posted with this assignment in an Excel file, `6-1.xls'.

Problem 2

Montgomery 12–2
Montgomery 12–3

Problem 3

It was stated in class (and in Montgomery section 12–5.1) that the sum of squares for an effect A is given by:

$$SS_A = \frac{\text{contrast}_A^2}{n\Sigma(\text{contrast coefficients})^2}$$

where "contrast coefficients" refers to the values used for the inputs (–1 and +1 for our coded system). Show why this relationship is correct.

Problem 4

May and Spanos problem 7.5