Using DOE to Spend Less Time in Traffic: Part Two

A recent editorial in *Quality Engineering*, a very fine journal published by American society of Quality Control, laments the increasing pressures of time - to get product to market, to solve problems, to get your news from the media, etc. I decided to take control of my time via the tools of DOE. My objective: reduce the duration of my daily commute. In a previously reported study I used a one-way analysis of variance to find the best route from four alternatives. In a followup study, reported below, I used response surface methods (RSM) to determine the optimum time of departure.

Based on two decades of commuting around the Twin Cities, I believe that traffic comes in waves within waves. Obviously there are big waves during the morning and afternoon rush hours, but within these surges I believe you can find lulls at half hour intervals. For example, if you get away at 4:55 pm as opposed to 5:05 pm, you can avoid a big rush of shift-workers hitting the roads at 5 pm.

I told my DESIGN-EXPERT software to give me departure times between 6:20 am and 7:00 am (coded as 20 to 60) in a way that would fit a cubic equation. I hoped to find a trough in the hypothesized waves of traffic. The program gave me 10 runs, which included 3 sets of repeats for measurement of pure error. I clocked my times for each run and also counted the cars lined up in the metered ramp. (See my first report for background on this ramp, which became a trap after the *#%! highway engineers installed a metering light.) The response surface plots can be seen below.

As you can see from Figure 1, I did see the expected waviness in the lineup of cars at the metered on ramp. There is a definite lull just prior to 7 am. (Due to a faulty alarm clock, or maybe it was just my reluctance to get up, I did leave later than planned on one occasion, hence the data point beyond the 60 minute mark.) Unfortunately, the overall travel time followed a monotonic curve through my departure window (see Figure 2). Savings due to the reduced lineup of cars in the ramp were lost due to congestion on the main road.

Based on this data, I try to leave home at or before 6:20 am. In fact, I've found that if I leave at 6:19 am, I can get to the ramp before they turn on the metering light. We do have. I expect that after reading this, our clients in the Minnesota State Department of Transportation (MN-DOT) will now make the necessary adjustments to slow me down again. They're driving me crazy! I will just have to keep doing DOE to stay one jump ahead of them. If anyone asks me what I'm doing with the data sheet and stop watch, I just say MN DOT is making me drive crazy.

Mark J. Anderson

Raw Data

Departure time (minutes past 6 am)	Travel time (min.)	Ramp delay (# cars)
20.00	26	0
22.00	28	20
27.00	30	26
33.00	27	20
40.00	27	26
40.00	28	18
67.30	32	58
53.00	28	15
60.00	31	3
60.00	33	22

Figure 1: Ramp delay

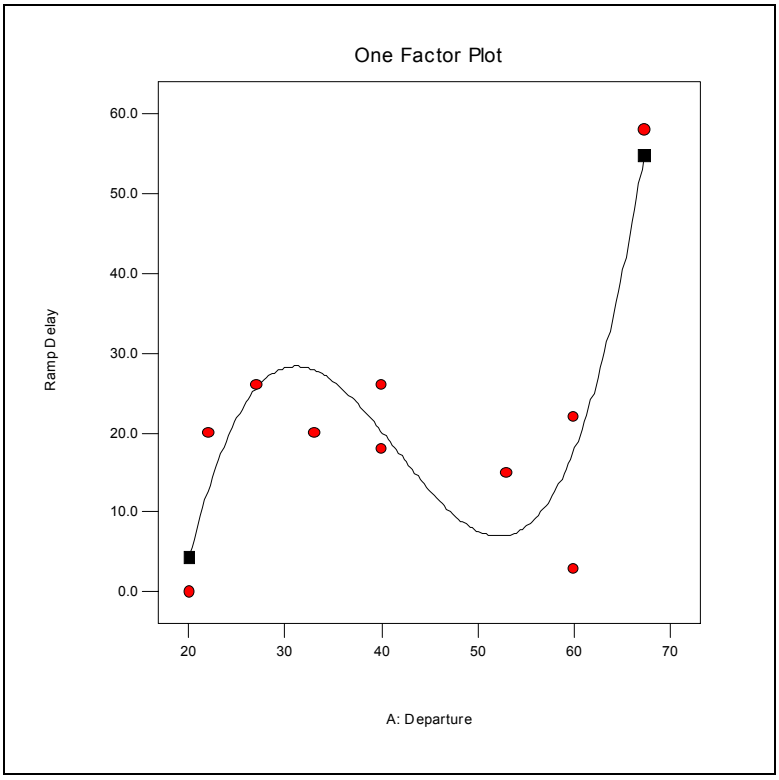

Figure 2: Travel Time