Minitab Project Report

HCH2 Test - C.R.Haeger

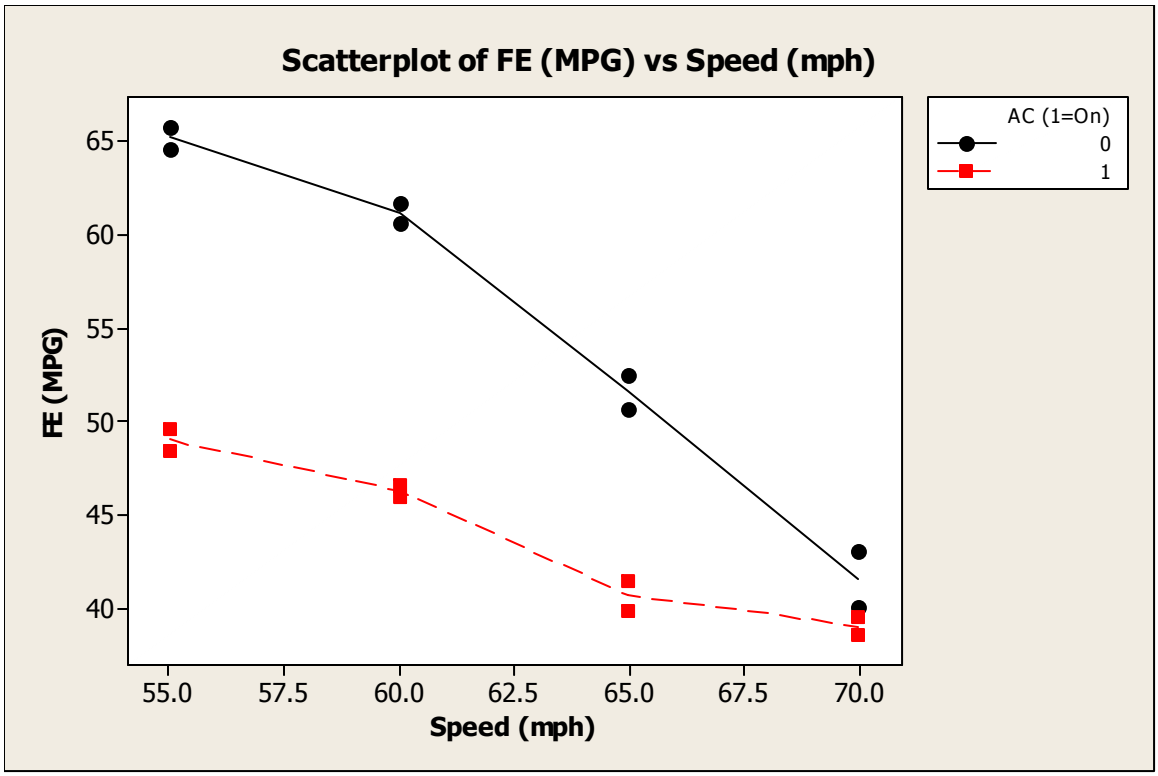
Date:	7/22/07
Test Time:	3pm-430pm
Location:	Columbus, Ohio Area, 2 mile NS section of freeway ("level" - Elevations TBD)
Tires:	OEM at 44psi cold
Vehicle:	HCH2 wiit 8900 miles/5 months on it
Oil:	Mobil 1 Synth 0w20, changed at 8000 miles
Weather:	84F, NE wind at 7mph

Test Method:
- Enter freeway (say Northbound), accelerate to condition Speed, set CC then reset B trip FE meter at set start points (mile marker xx)
- Travel 0.8 mile by trip B ODO then read FE for the 0.8 mile segment.
- Exit freeway, turn around and begin segment going South direction for same 0.8 miles.
- For AC = On conditions, set AC on, control to 58F, once thru air and Fan on MAX. For AC=Off, set Fan at 2 bars. Windows up in all cases.
- Avoided drafting vehicles
- Remained in right hand lane
- Did not see SOC do any forced regen during test - bars at 507 throughout test. Did however try to avoid three conditions or more with AC on to help preserve SOC.

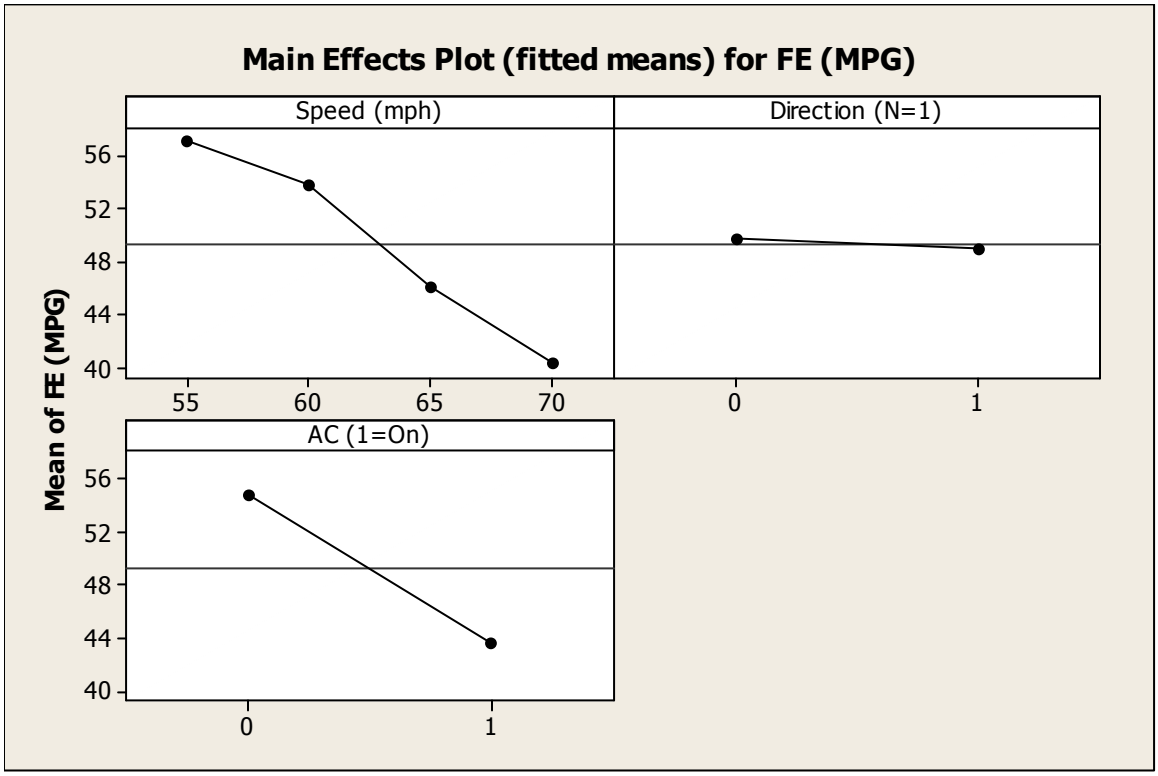
Test conditions and response (FE)

Speed (mph)	Direction (N=1)	AC (1=On)	FE (MPG)
65	1	0	50.7
60	0	0	61.7
70	1	1	38.6
65	0	1	41.5
aborted N run due to drafing semi in way....			
55	0	1	49.6
60	1	1	46.0
65	0	0	52.5
60	1	0	60.6
60	0	1	46.6
65	1	1	39.9
70	0	0	40.1
55	1	0	64.6
70	0	1	39.5
55	1	1	48.4
55	0	0	65.7
70	1	0	43.1

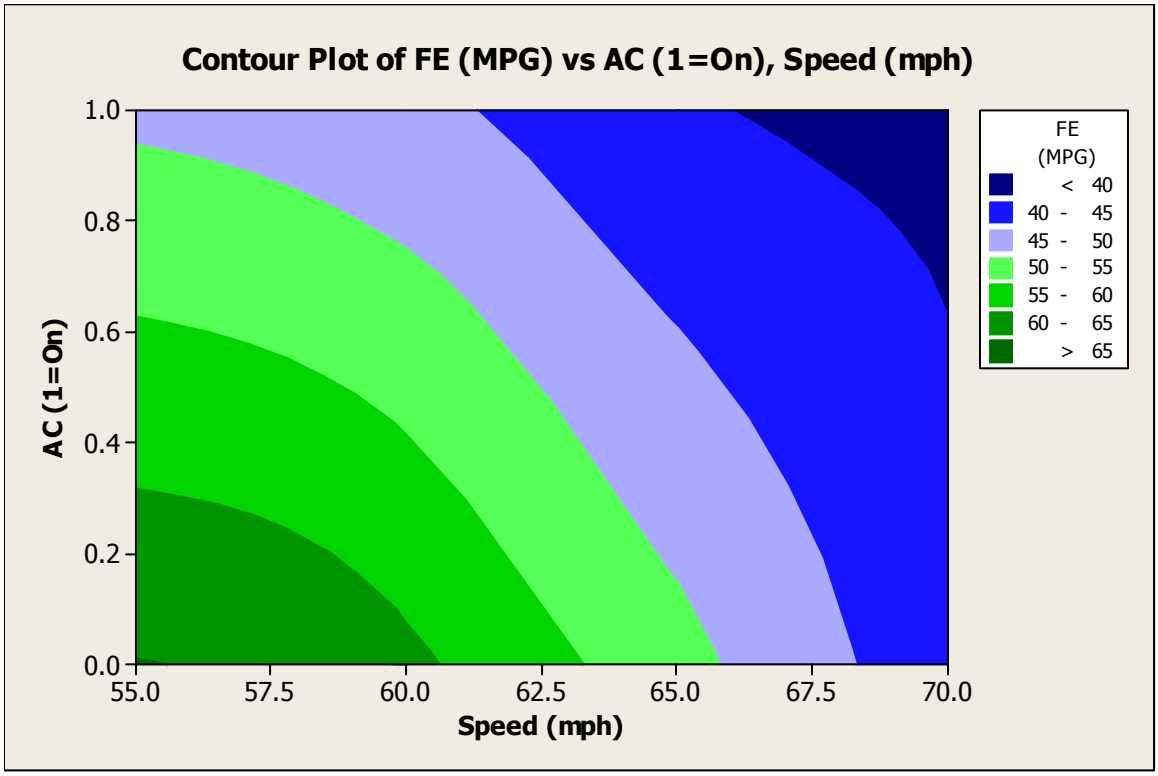
Appears that both speed and AC on (RED) reduce FE at speeds exceeding 55mph. Appears that reduced FE at 70mph impacted less by AC than at 55mph.



Speed and AC lower FE by 17mpg and 11mpg respectively in this test. Appears that direction had little impact on average FE.



Not suprisingly, lower speed and no AC provide the highest FE (65mpg+) while high speed, coupled with AC use gave lowest FE (40mpg or less). From this you might get similar FE (50mpg) at say 55mph/with ACor 67mph/no AC.



From the model, both speed, AC and the speed x AC interaction are significant. The test model appears to capture almost all (99%) of the FE variation seen - a decent model. The variation in FE seems to get smaller for high FE (55, 60mph with AC off).

General Linear Model: FE (MPG) versus Speed (mph), AC (1=On)

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Factor          Type   Levels  Values
Speed (mph)     fixed       4  55, 60, 65, 70
AC (1=On)       fixed       2  0, 1


Analysis of Variance for FE (MPG), using Adjusted SS for Tests

Source                  DF   Seq SS  Adj SS  Adj MS       F      P
Speed (mph)              3   682.01  682.01  227.34  183.43  0.000
AC (1=On)                1   493.95  493.95  493.95  398.55  0.000
Speed (mph)*AC (1=On)    3   112.71  112.71   37.57   30.31  0.000
Error                    8     9.92    9.92    1.24
Total                   15  1298.58


S = 1.11327   R-Sq = 99.24%   R-Sq(adj) = 98.57%
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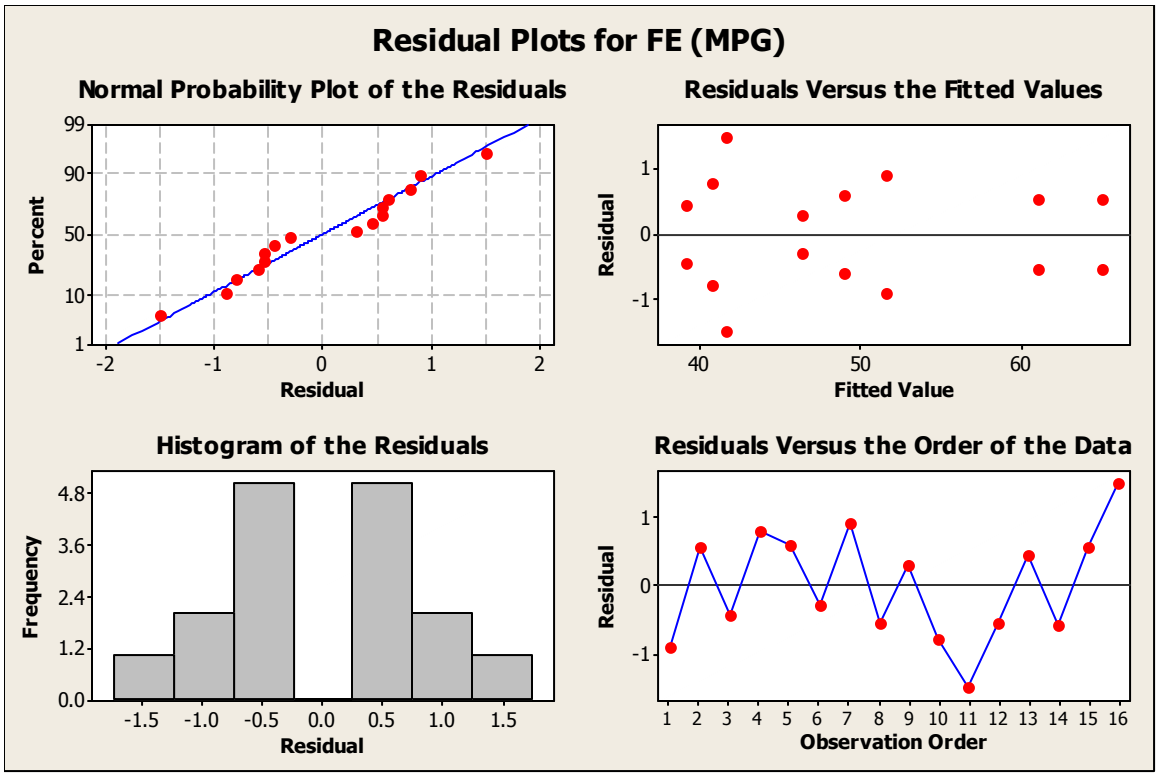
Residual Plots for FE (MPG)
Normal Probability Plot of the Residuals
Percent
99
90
50
10
1
-2
-1
0
1
2
Residual
Residuals Versus the Fitted Values
Residual
1
0
-1
40
50
60
Fitted Value
Histogram of the Residuals
Frequency
4.8
3.6
2.4
1.2
0.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
Residual
Residuals Versus the Order of the Data
Residual
1
0
-1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Observation Order