APPENDIX C

Analysis of Results from Minitab

Taguchi Analysis: SF versus OV, ON, WF, WA

Linear Model Analysis: SN ratios versus OV, ON, WF, WA

Estimated Model Coefficients for SN ratios

Term	Coef	SE Coef	T	P
Constant	-7.28194	0.2557	-28.475	0.000
OV 4.00	-0.07184	0.2557	-0.281	0.784
ON 4.00	0.55099	0.2557	2.155	0.054
WF 2.00	-0.57300	0.2557	-2.241	0.047
WA 4.00	-0.05259	0.2557	-0.206	0.841

S = 1.023 R-Sq = 47.1% R-Sq(adj) = 27.8%

Analysis of Variance for SN ratios

Source	DF	Seq SS	Adj SS	Adj MS	F	P
OV	1	0.0826	0.0826	0.08259	0.08	0.784
ON	1	4.8575	4.8575	4.85750	4.64	0.054
WF	1	5.2533	5.2533	5.25327	5.02	0.047
WA	1	0.0442	0.0442	0.04424	0.04	0.841
Residual Error	11	11.5103	11.5103	1.04639		
Total	15	21.7479				

Unusual Observations for SN ratios

Observation	SN ratios	Fit	SE Fit	Residual	St Resid
7	-9.097	-7.384	0.572	-1.713	-2.02 R

R denotes an observation with a large standardized residual.

Response Table for Signal to Noise Ratios
Smaller is better

Level	OV	ON	WF	WA
1	-7.354	-6.731	-7.855	-7.335
2	-7.210	-7.833	-6.709	-7.229
Delta	0.144	1.102	1.146	0.105
Rank	3	2	1	4

Taguchi Analysis: MRR versus OV, ON, WF, WA

Linear Model Analysis: SN ratios versus OV, ON, WF, WA

Estimated Model Coefficients for SN ratios

Term	Coef	SE Coef	T	P
Constant	-54.0837	1.579	-34.261	0.000
OV 4.00	3.1790	1.579	2.014	0.069
ON 4.00	-7.4914	1.579	-4.746	0.001
WF 2.00	-5.3894	1.579	-3.414	0.006
WA 4.00	0.6526	1.579	0.413	0.687

S = 6.314 R-Sq = 77.7% R-Sq(adj) = 69.6%

Analysis of Variance for SN ratios

Source	DF	Seq SS	Adj SS	Adj MS	F	P
OV	1	161.70	161.700	161.700	4.06	0.069
ON	1	897.94	897.943	897.943	22.52	0.001
WF	1	464.72	464.723	464.723	11.66	0.006
WA	1	6.82	6.815	6.815	0.17	0.687
Residual Error	11	438.58	438.575	39.870		
Total	15	1969.76				

Response Table for Signal to Noise Ratios
Larger is better

Level	OV	ON	WF	WA
1	-50.90	-61.58	-59.47	-53.43
2	-57.26	-46.59	-48.69	-54.74
Delta	6.36	14.98	10.78	1.31
Rank	3	1	2	4

Regression Analysis: SF versus OV, ON, WF, WA

The regression equation is
SF = 2.41 - 0.00321 OV + 0.0206 ON - 0.0226 WF - 0.0106 WA

Predictor	Coef	SE Coef	T	P
Constant	2.4072	0.2773	8.68	0.000
OV	-0.003208	0.006902	-0.46	0.651
ON	0.020595	0.009860	2.09	0.061
WF	-0.02256	0.01062	-2.13	0.057
WA	-0.01063	0.03451	-0.31	0.764

S = 0.276077 R-Sq = 45.5% R-Sq(adj) = 25.7%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	0.70042	0.17510	2.30	0.124
Residual Error	11	0.83841	0.07622		
Total	15	1.53882			

Regression Analysis: MRR versus OV, ON, WF, WA

The regression equation is
MRR = 0.00021 - 0.000156 OV + 0.000382 ON + 0.000200 WF - 0.000019 WA

Predictor	Coef	SE Coef	T	P
Constant	0.000215	0.002306	0.09	0.927
OV	-0.00015558	0.00005741	-2.71	0.020
ON	0.00038225	0.00008202	4.66	0.001
WF	0.00019985	0.00008832	2.26	0.045
WA	-0.0000185	0.0002871	-0.06	0.950

S = 0.00229645 R-Sq = 75.7% R-Sq(adj) = 66.8%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	0.000180302	0.000045076	8.55	0.002
Residual Error	11	0.000058010	0.000005274		
Total	15	0.000238313			