JMP Output for Warping of Copper Plates

Response Warp - Full Quadratic Model using orthogonal coded terms

Summary of Fit

RSquare	0.770174
RSquare Adj	0.715454
Root Mean Square Error	2.629956
Mean of Response	17
Observations (or Sum Wgts)	27

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	486.75000	97.3500	14.0747
Error	21	145.25000	6.9167	Prob > F
C. Total	26	632.00000		<.0001

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	3	29.25000	9.75000	1.5129
Pure Error	18	116.00000	6.44444	Prob > F
Total Error	21	145.25000		0.2452
				Max RSq
				0.8165

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	17	0.506135	33.59	<.0001
X1,Cu	2.5	0.619886	4.03	0.0006
X2,Cu	-0.5	0.357892	-1.40	0.1770
X1,T	0.5	0.619886	0.81	0.4289
X2,T	2.5	0.357892	6.99	<.0001
X1,Cu*X1,T	1.25	0.759203	1.65	0.1146

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
X1,Cu	1	1	112.50000	16.2651	0.0006
X2,Cu	1	1	13.50000	1.9518	0.1770
X1,T	1	1	4.50000	0.6506	0.4289
X2,T	1	1	337.50000	48.7952	<.0001
X1,Cu*X1,T	1	1	18.75000	2.7108	0.1146

Response Warp - Response Surface Model in Temp and Copper

Summary of Fit

RSquare	0.770174
RSquare Adj	0.715454
Root Mean Square Error	2.629956
Mean of Response	17
Observations (or Sum Wgts)	27

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	486.75000	97.3500	14.0747
Error	21	145.25000	6.9167	Prob > F
C. Total	26	632.00000		<.0001

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	3	29.25000	9.75000	1.5129
Pure Error	18	116.00000	6.44444	Prob > F
Total Error	21	145.25000		0.2452
				Max RSq
				0.8165

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	4	2.863133	1.40	0.1770
Temp&RS	0.02	0.024795	0.81	0.4289
Copper&RS	0.125	0.030994	4.03	0.0006
(Temp-75)*(Temp-75)	0.012	0.001718	6.99	<.0001
(Copper-60)*(Temp-75)	0.0025	0.001518	1.65	0.1146
(Copper-60)*(Copper-60)	-0.00375	0.002684	-1.40	0.1770

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Temp&RS	1	1	4.50000	0.6506	0.4289
Copper&RS	1	1	112.50000	16.2651	0.0006
Temp*Temp	1	1	337.50000	48.7952	<.0001
Copper*Temp	1	1	18.75000	2.7108	0.1146
Copper*Copper	1	1	13.50000	1.9518	0.1770

Response Warp

Contour Profiler

Horiz	Vert	Factor	Current X
○	⦿	Temp	75
⦿	○	Copper	60

Response	Contour	Current Y	Lo Limit	Hi Limit
Warp	15	13	12.5	17.5