

Final Exam

Take Home Portion

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The full model using all the second-order term is given in Table @ref{tab:strength-raw}. Many of the p -values are not significant, so we look at all possible models and choose the one with the best $C(p)$. The resulting model is given in 2.

Table 1: Strength Second-Order Model

term	estimate	std.error	statistic	p.value
(Intercept)	169020.28	13571.35	12.454	0.000
Force	-1119.35	72.02	-15.541	0.000
Power	42.88	220.82	0.194	0.847
Temp	-447.78	74.31	-6.026	0.000
Minutes	158.74	92.63	1.714	0.093
I(Force^2)	1.88	0.12	15.166	0.000
I(Power^2)	-2.11	1.51	-1.400	0.168
I(Temp^2)	0.65	0.16	3.942	0.000
I(Minutes^2)	-0.06	0.22	-0.247	0.806
Force:Power	0.13	0.64	0.207	0.837
Force:Temp	1.16	0.18	6.369	0.000
Force:Minutes	-0.14	0.27	-0.503	0.617
Power:Temp	0.80	0.93	0.856	0.396
Power:Minutes	-0.98	0.87	-1.125	0.266
Temp:Minutes	-0.67	0.31	-2.135	0.038

Table 2: Final Strength Model

term	estimate	std.error	statistic	p.value
(Intercept)	122950.054	12072.841	10.184	0.000
I(Force^2)	1.773	0.175	10.103	0.000
Force	-940.643	93.229	-10.090	0.000
Power	-2.169	19.740	-0.110	0.913
I(Minutes^2)	-0.670	0.246	-2.728	0.008
Temp:Minutes	-0.153	0.077	-1.981	0.052
Force:Minutes	0.417	0.131	3.189	0.002

Based on this model, we can predict the highest strength using inputs from our data. Table @ref{tab:predict-strength} gives the first few rows of the input data sorted by highest predicted strength. The first row of the table gives the approximate values of the predictors that will give the highest strength, along with the predicted highest strength.

Force	Power	Temp	Minutes	Strength	PredictStrength
311	31	136	63	6129	5994
301	19	129	74	3877	4537
215	23	137	71	3994	4102
300	33	155	72	4965	4050
300	25	155	59	5035	3890
217	22	147	71	3329	3705