FREE ADVICE: *"It should be noted that rules of thumb do not represent a precise set of decision criteria. Neither rules of thumb nor rigorous statistical tests should ever replace common sense, size of effects, and prior knowledge. Ideally, a blend of all these approaches works best."*

1. Does anything affect the variability? If no P(2 Tail) for 2-level designs, an approximate rule of thumb for significance is to look for coefficients (absolute value) that are bigger than (roughly) ½ the constant.

2. If P(2 Tail) values are available include inputs in the model if the P(2 Tail) values are < 0.05. If they are between 0.05 and 0.1 we would generally include them but use common sense. Remember the rule of hierarchy when building models.

3. Delete the X's for the inputs that you don't want to consider. You should now also get P(2 Tail) values to help guide you when you analyze the design again.

4. Is orthogonality an issue? This is the % of orthogonality. We want all bigger than 0.5 with at least half above 0.7. If orthogonality is an issue you may need to code the data. If coding/ standardizing does not help, try dropping terms from the model.

5. Does anything affect the mean? If the P(2 Tail) values are < 0.05 include the input (term) in the model. If they are between 0.05 and 0.1 we would generally include them but use common sense! {1-P(2 Tail)]}*100% is the % confidence we have that the input belongs in the model. Remember the rule of hierarchy when building models.

6. Use this to delete the X's for the inputs (terms) that you want to remove from the model. Follow the rule of hierarchy . Re-run regression after removing terms.

7. How good is this model? You want a model that contains important inputs and is as simple as possible. R^2 is the proportion of variability in the output that can be explained by the model inputs (the strength of the model) . Some think of 1-R^2 as the % of unexplained variation. What constitutes a good R^2 is situational dependent. Psychologists may be happy with 0.3 while engineers like to see above 0.9. Adjusted R^2 adjusts for sample size and/or too many terms in the model ("overfit"). Ideally, we'd like to see R^2 and adjusted R^2 values high, and close to each other.

8. These are the coefficients for each term used to build the prediction equations. *(Example: y-hat = 90.792 + 12.458A - 0.54C – 7.875AC and s-hat = 1.853 + 1.039C)*

9. (Std Error) This is another estimate for sigma. Use it when you have nothing important in the s-hat model.

10. Uses these input settings in the prediction equations for s-hat and y-hat. It always defaults to the center but you can change them manually.

11. Gives the predicted values for y-hat and s-hat based on the input settings in the EXPER column. 99% of all confirmation runs should fall into the prediction interval.

Y-hat Model

		Y			
Factor	Name	Coeff	P(2 Tail)	Tol	Active
Const		90.792	0.0000		
A	Flow Rate	12.458	0.0000	1	X
B	Vendor	-0.20833	0.6473	1	
C	Temp	-0.54167	0.2430	1	X
AB		-0.04167	0.9269	1	
AC		-7.875	0.0000	1	X
BC		0.12500	0.7833	1	
ABC		0.62500	0.1810	1	
	R^2	0.9856			
	Adj R^2	0.9792			
	Std Error	2.1890			
	F	155.9640			
	Sig F	0.0000			
	F_{LOF}	NA			
	Sig F_{LOF}	NA			

Source	SS	df	MS
Regressior	5231.3	7	747.3
Error	76.7	16	4.8
$Error_{Pure}$	76.7	16	4.8
$Error_{LOF}$	0.0	0	NA
Total	5308.0	23	

Factor	Name	Low	High	Exper	
A	Flow Rate	15	40	27.5	
B	Vendor	1	2	1.5	C
C	Temp	100	140	120	C

Multiple Response Prediction

			99% Confidence Interval	
	Y-hat	S-hat	Lower Bound	Upper Bound
Y	90.7917	1.8535	85.231	96.352

S-hat Model

		Y			
Factor	Name	Coeff	P(2 Tail)	Tol	Active
Const		1.853	NA		
A	Flow Rate	-0.04310	NA	1	
B	Vendor	-0.38297	NA	1	
C	Temp	1.039	NA	1	X
AB		-0.09792	NA	1	
AC		-0.28064	NA	1	
BC		-0.14542	NA	1	
ABC		0.13962	NA	1	
	R^2	1.0000			
	Adj R^2	NA			
	Std Error	NA			
	F	NA			
	Sig F	NA			
	F_{LOF}	NA			
	Sig F_{LOF}	NA			

Source	SS	df	MS
Regressior	10.8	7	1.5
Error	0.0	0	NA
$Error_{Pure}$	NA	0	NA
$Error_{LOF}$	NA	0	NA
Total	10.8	7	

"All models are wrong, however some are useful." G.E. Box