

GR&R Study (Crossed ANOVA) Report For Gage ID: Demo_01

Gage ID	Demo_01	Parts	10	Part No./Name	-	Tolerance	-	Study Date	19/02/2016
Gage Type	Micrometer	Appraiser(s)	3	Characteristic	-	Pro. Std. Dev. (1 Sigma)	1.8	Target Pp / Ppk	2
Resolution	0.001	Trials	3	Study By	-	Confidence	95 %	Coverage	99.73% (6 * Sigma)
Lower Specification	-	Upper Specification		GR&R Method	Crossed ANOVA				

Crossed ANOVA Data

ANOVA Analysis								
Source	Variance	St.Dev	6.* St.Dev	% Study	% Contrib	% Tol	% Proc	Pp/Ppk
Equipment	0.039973	0.199933	1.199599	18.42	3.39	-	11.11	-
Appraiser	0.051455	0.226838	1.361025	20.90	4.37	-	12.60	-
GRR	0.091429	0.302372	1.814229	27.86	7.76	-	16.80	-
Parts	1.086447	1.042327	6.253965	96.04	92.24	-	57.91	-
Total	1.177875	1.085300	6.511797	100.00	100	-	60.29	-
nDC Calculation								
	Based On Study Variation		Based On Process Tolerance		Based On Process Variation		Based On Target Pp/Ppk	
Value(TV)	1.085300		-		1.800000		-	
PV	1.042327		-		1.774421		-	
nDC	4.860516 [~ 4]		-		8.274371 [~ 8]		-	
S/N Ratio	3.447175		-		5.870000		-	

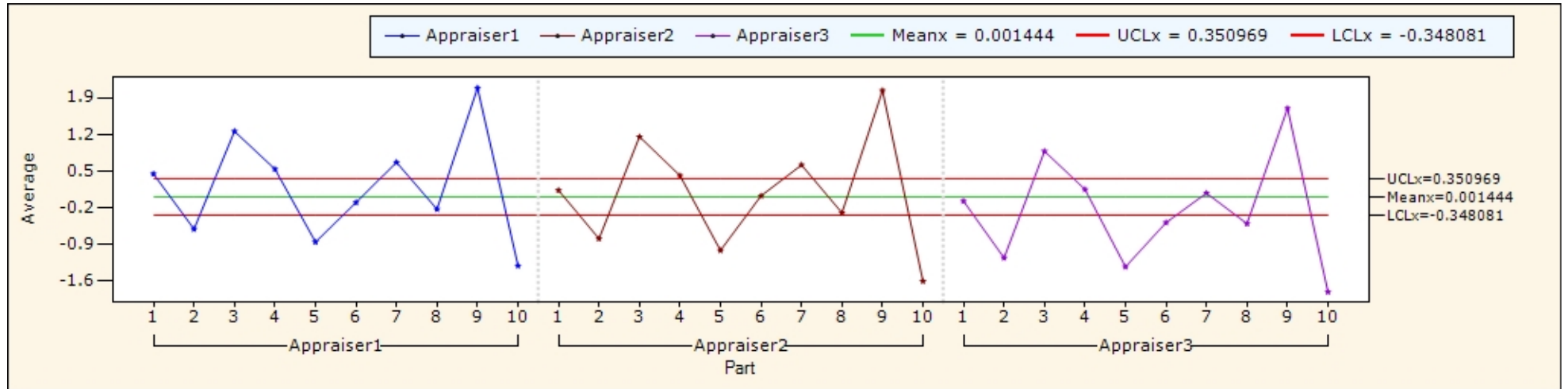
Crossed ANOVA Result

ANOVA Table With Interaction					
Source	DF	Sum Square	Mean Square	F-Value	p-Value
Appraiser	2	3.167262	1.583631	79.406*	0.000
Parts	9	88.361934	9.817993	492.291*	0.000
App x Part	18	0.358982	0.019943	0.434	0.974
Equipment	60	2.758933	0.045982		
Total	89	94.647112			
ANOVA Table Without Interaction					
Source	DF	Sum Square	Mean Square	F-Value	p-Value
Appraiser	2	3.167262	1.583631	39.617*	0.000
Parts	9	88.361934	9.817993	245.614*	0.000
Equipment	78	3.117916	0.039973		
Total	89	94.647112			

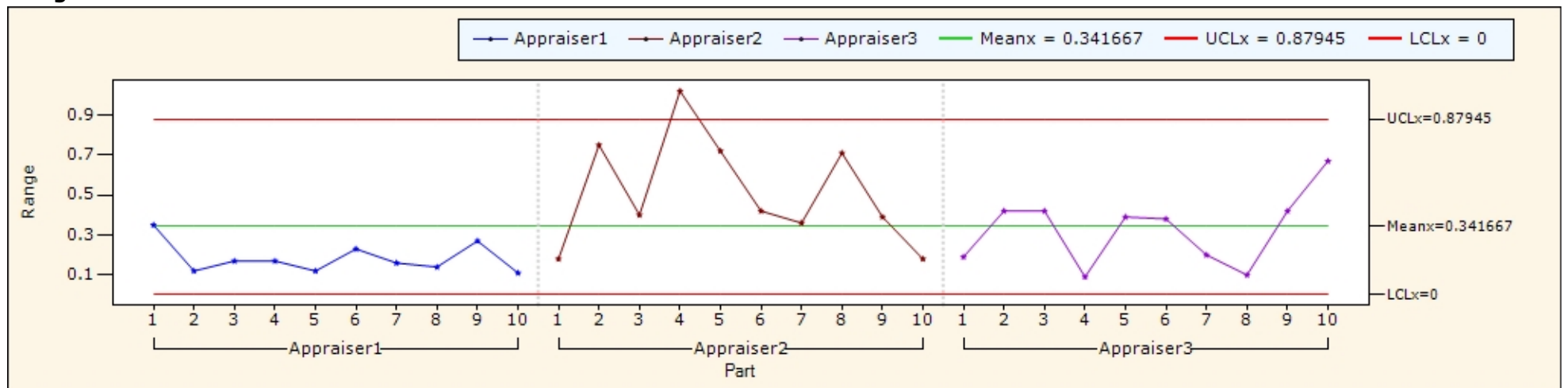
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XBar Chart



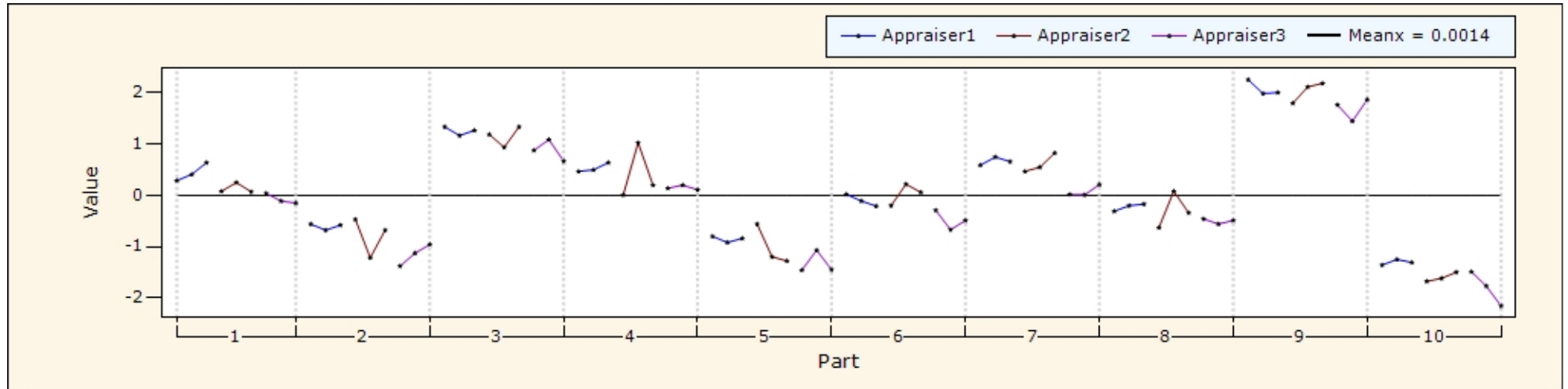
Range Chart



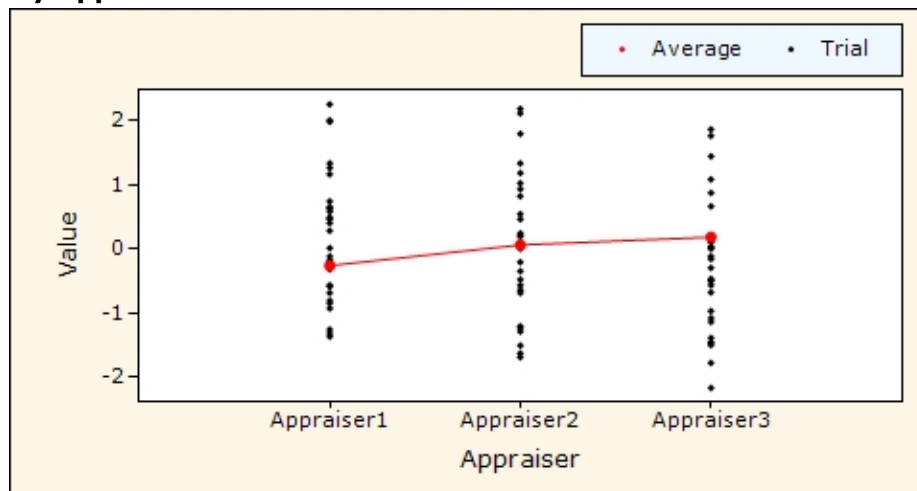
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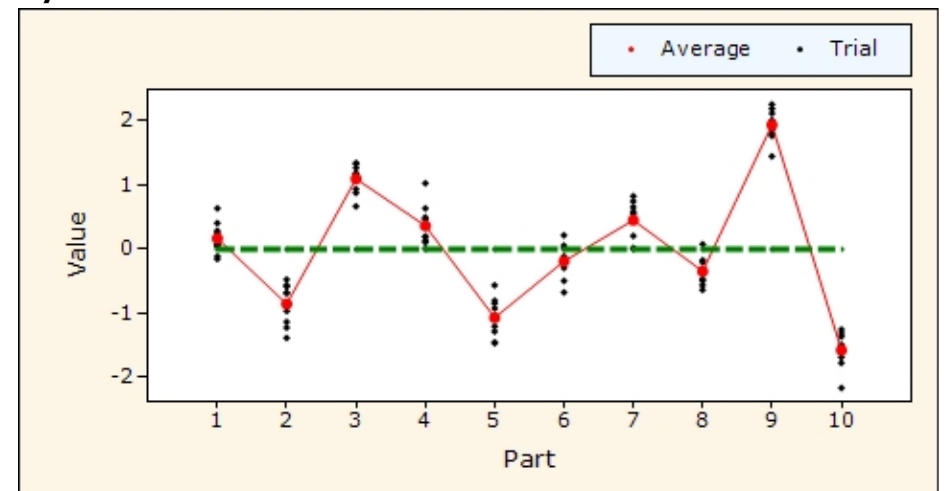
Scatter Chart



By Appraiser Chart



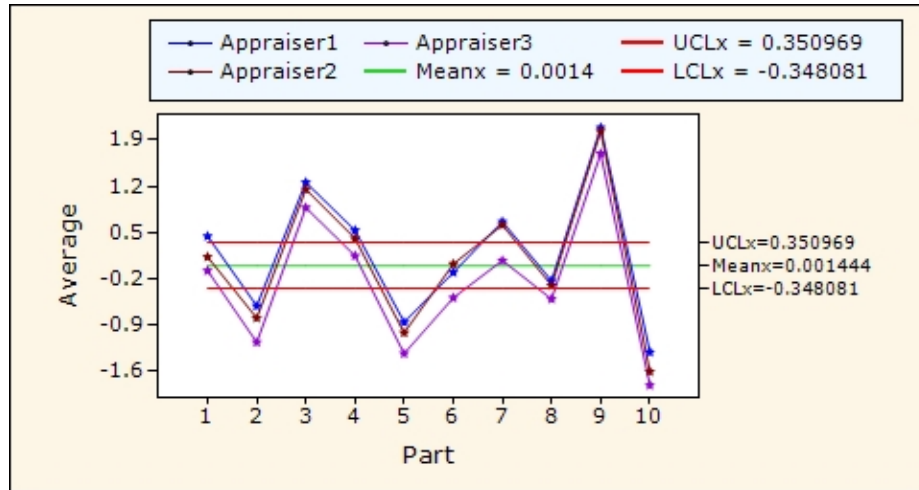
By Part Chart



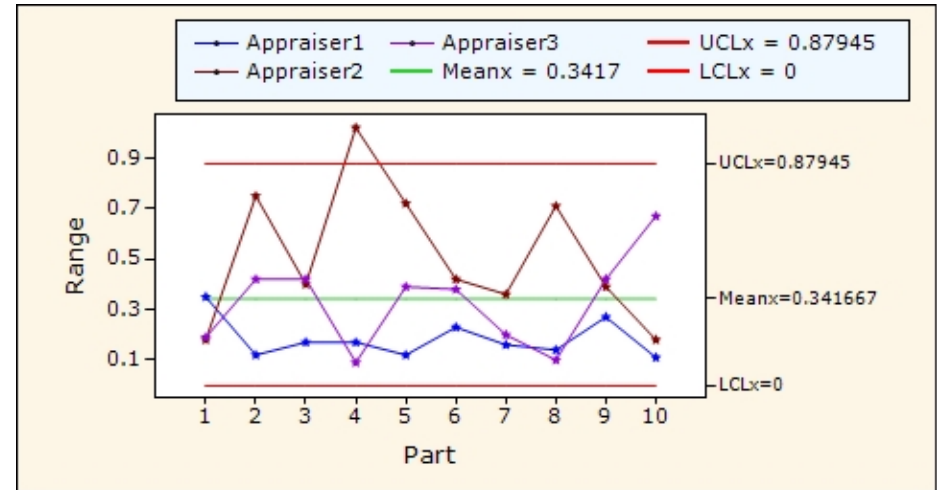
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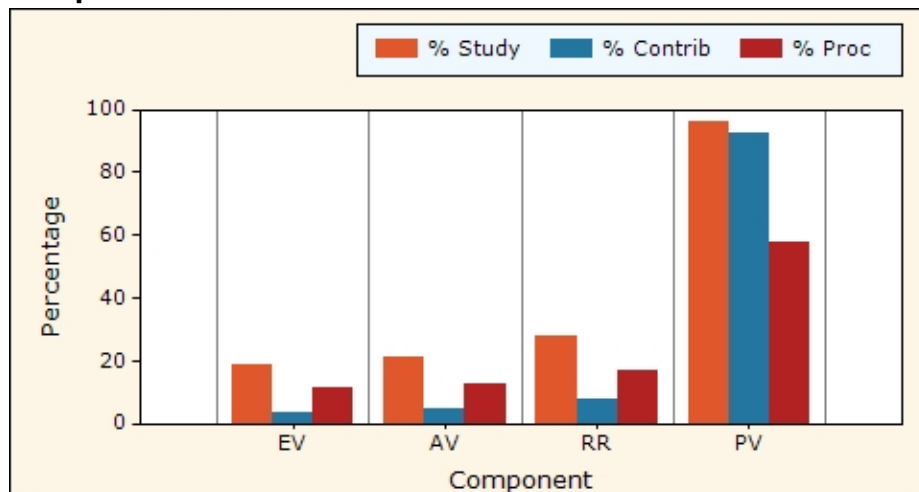
Xbar Stacked Chart



Range Stacked Chart



Components of Variation



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Crossed ANOVA Data

Appraiser	Trials	Part									
		1	2	3	4	5	6	7	8	9	10
Appraiser1	1	0.29	-0.56	1.34	0.47	-0.8	0.02	0.59	-0.31	2.26	-1.36
	2	0.41	-0.68	1.17	0.5	-0.92	-0.11	0.75	-0.2	1.99	-1.25
	3	0.64	-0.58	1.27	0.64	-0.84	-0.21	0.66	-0.17	2.01	-1.31
Appraiser2	1	0.08	-0.47	1.19	0.01	-0.56	-0.2	0.47	-0.63	1.8	-1.68
	2	0.25	-1.22	0.94	1.03	-1.2	0.22	0.55	0.08	2.12	-1.62
	3	0.07	-0.68	1.34	0.2	-1.28	0.06	0.83	-0.34	2.19	-1.5
Appraiser3	1	0.04	-1.38	0.88	0.14	-1.46	-0.29	0.02	-0.46	1.77	-1.49
	2	-0.11	-1.13	1.09	0.2	-1.07	-0.67	0.01	-0.56	1.45	-1.77
	3	-0.15	-0.96	0.67	0.11	-1.45	-0.49	0.21	-0.49	1.87	-2.16