

## GR&amp;R Study (Crossed ANOVA) Report For Gage ID: Demo\_01

Gage ID	Demo_01	Parts	10	Part No./Name	-	Tolerance	2	Study Date	19/02/2016
Gage Type	Micrometer	Appraiser(s)	3	Characteristic	-	Pro. Std. Dev. (1 Sigma)	-	Target Pp / Ppk	-
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	0.000592	0.024336	0.146018	8.64	0.75	7.30	-	-
Appraiser	0.000161	0.012674	0.076044	4.50	0.20	3.80	-	-
GRR	0.000753	0.027439	0.164632	9.74	0.95	8.23	-	-
Parts	0.078657	0.280459	1.682753	99.52	99.05	84.14	-	-
Total	0.079410	0.281798	1.690787	100.00	100	84.54	-	-
nDC Calculation								
	Based On Study Variation		Based On Process Tolerance		Based On Process Variation		Based On Target Pp/Ppk	
Value(TV)	0.281798		0.333333		-		-	
PV	0.280459		0.332202		-		-	
nDC	14.411997 [~ 14]		17.070936 [~ 17]		-		-	
S/N Ratio	10.221274		12.110000		-		-	

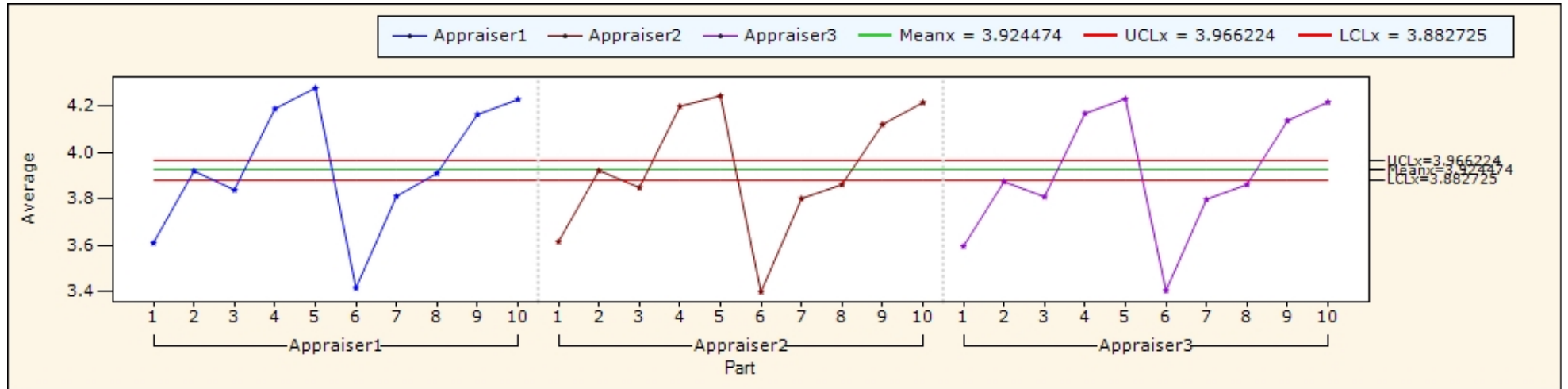
## Crossed ANOVA Result

ANOVA Table With Interaction					
Source	DF	Sum Square	Mean Square	F-Value	p-Value
Appraiser	2	0.010822	0.005411	9.416*	0.002
Parts	9	6.376561	0.708507	1232.870*	0.000
App x Part	18	0.010344	0.000575	0.962	0.513
Equipment	60	0.035851	0.000598		
Total	89	6.433579			
ANOVA Table Without Interaction					
Source	DF	Sum Square	Mean Square	F-Value	p-Value
Appraiser	2	0.010822	0.005411	9.137*	0.000
Parts	9	6.376561	0.708507	1196.291*	0.000
Equipment	78	0.046196	0.000592		
Total	89	6.433579			

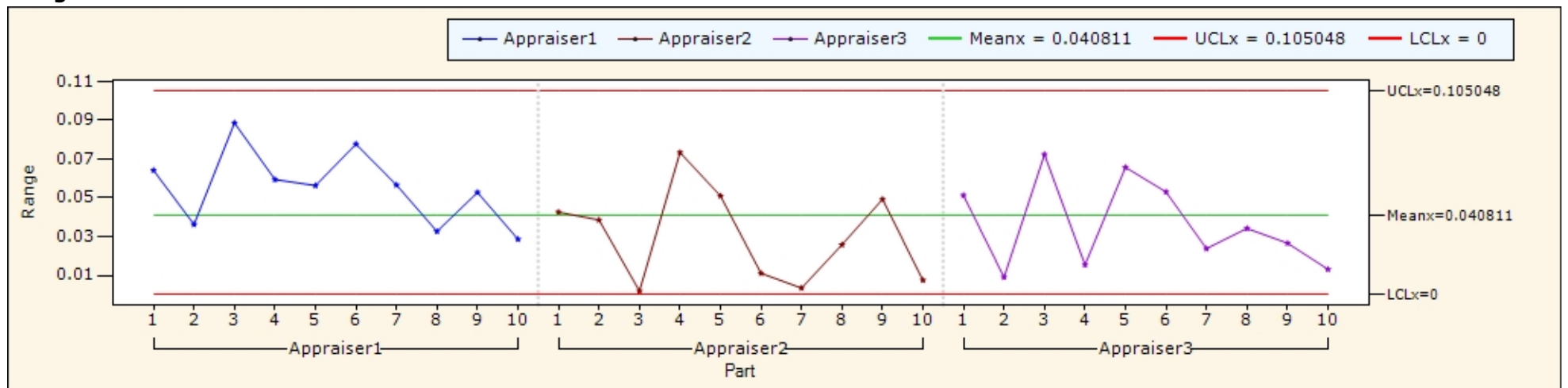
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## XBar Chart



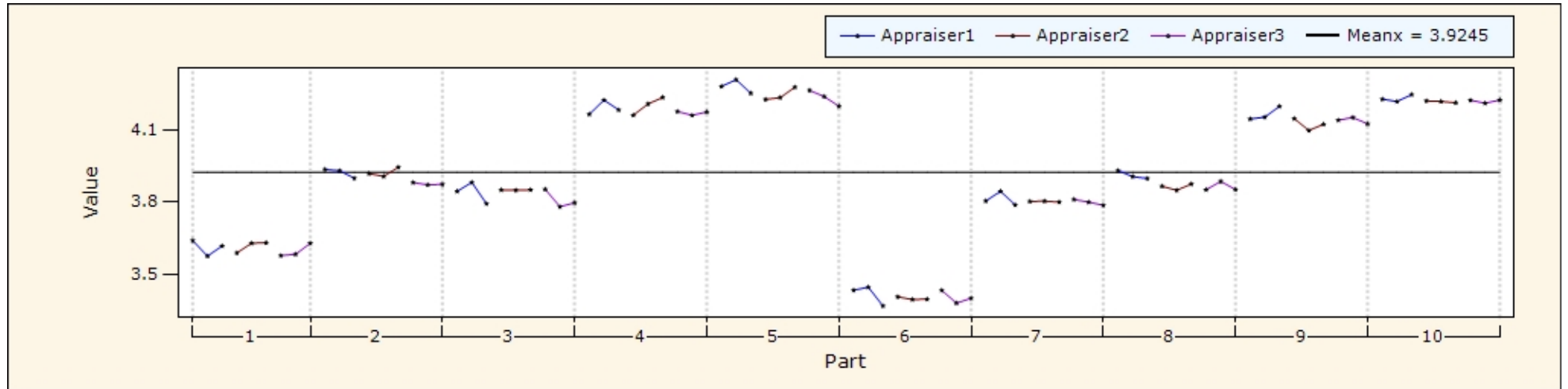
## Range Chart



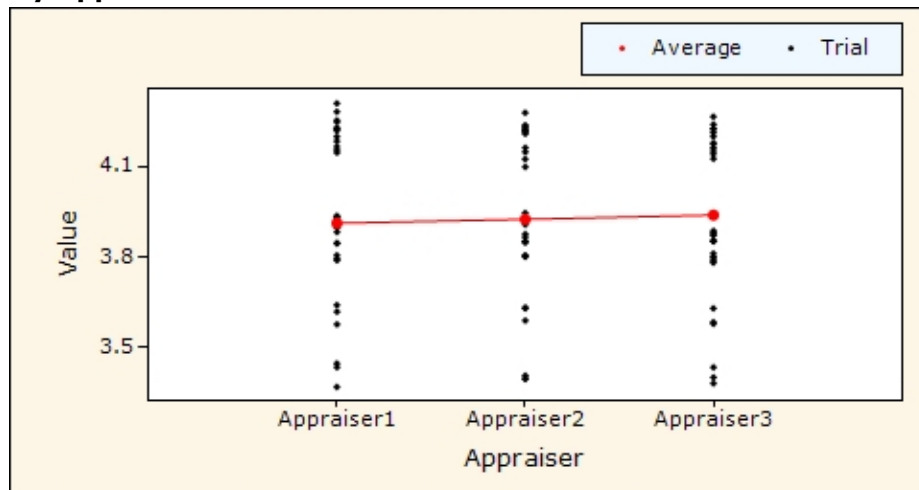
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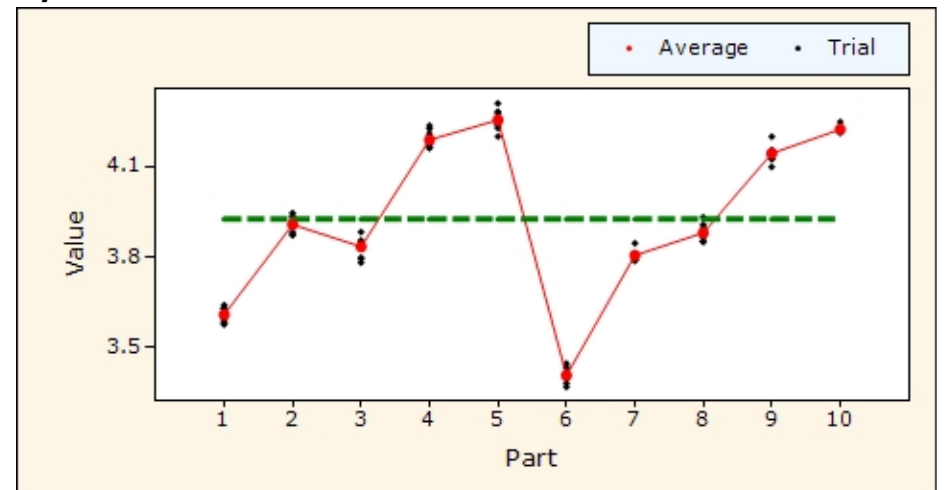
## Scatter Chart



## By Appraiser Chart



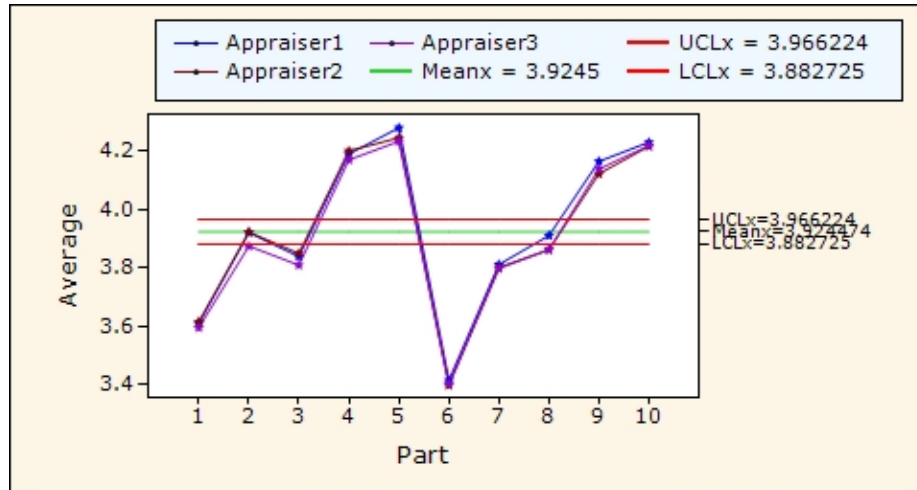
## By Part Chart



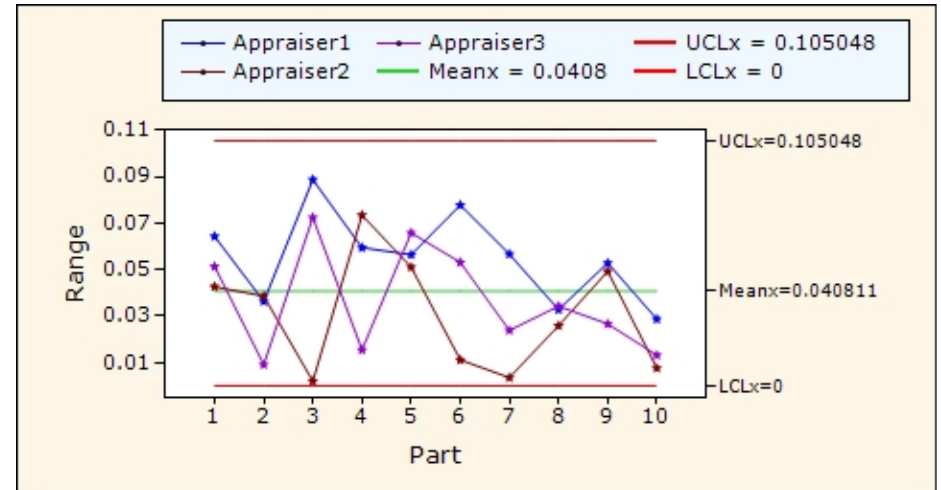
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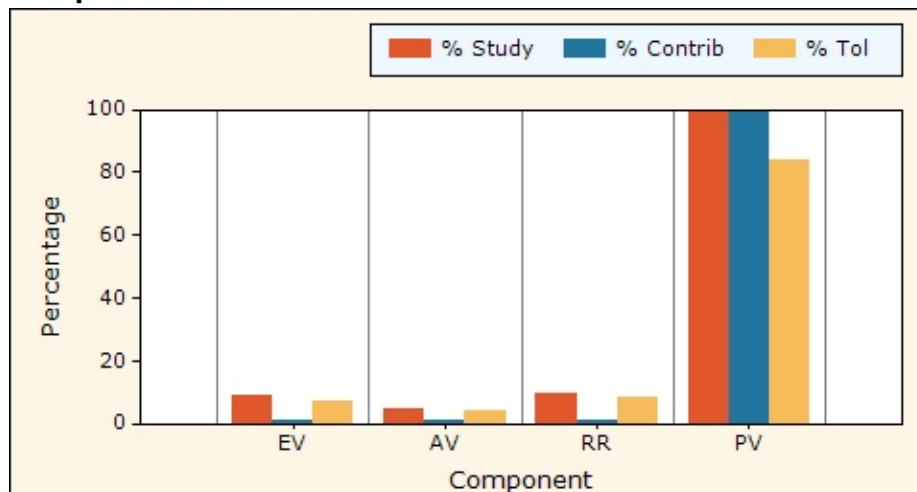
Xbar Stacked Chart



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	3.63957	3.93548	3.84455	4.1651	4.28118	3.43333	3.80442	3.93066	4.14554	4.22784
	2	3.57531	3.93015	3.88189	4.22454	4.30886	3.44552	3.84481	3.90602	4.15316	4.21844
	3	3.61748	3.89916	3.79324	4.18314	4.25248	3.36779	3.78816	3.89789	4.19837	4.24714
Appraiser2	1	3.58826	3.91847	3.85039	4.16154	4.22682	3.40564	3.80264	3.86563	4.14732	4.22073
	2	3.62865	3.90653	3.84887	4.20828	4.23444	3.39446	3.80366	3.84912	4.09804	4.2187
	3	3.63094	3.94514	3.8509	4.23495	4.27788	3.39599	3.8001	3.87503	4.1237	4.21311
Appraiser3	1	3.57734	3.88087	3.85293	4.17678	4.26467	3.43282	3.81052	3.85141	4.14072	4.22352
	2	3.58268	3.87173	3.78054	4.16129	4.23876	3.37973	3.79959	3.8857	4.15189	4.21133
	3	3.62865	3.87351	3.7968	4.1745	4.19888	3.3998	3.78664	3.85217	4.12522	4.22454