

TRI-STAR Inspection

- Tarus 96" x 60" x 50"



GRR Study

Gage Repeatability and Reproducibility Spreadsheet (Using Average and Range Method)

Part Number & Name : BEZEL I/P CTR UPR / FC00AA35851					Gage Name :					Date : 09/16/11				
Characteristics : 1					Gage No. : 11047					Performed By : J.F.				
Specification Limits :					Gage Type :									

Part Number	Appraiser 1 (SCOTT)				Appraiser 2 (JEFF)				Appraiser 3 ()				Part Average				
	1	2	3	\bar{X}	R	1	2	3	\bar{X}	R	1	2		3	\bar{X}	R	
1	-0.34	-0.39		-0.365	0.050	-0.38	-0.38		-0.380	0.000							-0.373
2	-0.41	-0.39		-0.400	0.020	-0.41	-0.42		-0.415	0.010							-0.406
3	-0.35	-0.36		-0.355	0.010	-0.39	-0.39		-0.390	0.000							-0.373
4	-0.38	-0.4		-0.390	0.020	-0.42	-0.43		-0.425	0.010							-0.408
5	-0.43	-0.39		-0.410	0.040	-0.45	-0.44		-0.445	0.010							-0.428
6																	
7																	
8																	
9																	
10																	

Average	$X_1 = -0.3840$	$X_2 = -0.4110$	$X_3 =$	$\bar{X} = -0.3975$
Range	$R_1 = 0.0280$	$R_2 = 0.0060$	$R_3 =$	$R_0 = 0.0550$
$R = (R_1 + R_2 + R_3) / \text{No. of Appraisers} =$	0.0170			
$X_{\text{avg}} = (\text{Max. of } X_1, X_2, X_3 - \text{Min. of } X_1, X_2, X_3) =$	0.0270			
$UCL_R = R * D_4$ ($D_4 = 3.27$ OR 2.58 for 2 and 3 measurements) =	0.0556			
$LCL_R = R * D_3$ ($D_3 = 0$ for up to 7 trials) =	0.000			

If R & R as % of Tolerance is required, enter Tolerance Range --> **1.0000**

Repeatability - Equipment Variation (EV) = (R * K₁) = **0.0151**
 (K₁ = 0.8862 OR 0.5908 for 2 and 3 Measurements respectively)

Reproducibility - Appraiser (AV) = $\sqrt{[(X_{\text{avg}} * K_2)^2 - (EV^2 / n * r)]}$
 Variation AV = **0.0185**
 (K₂ = 0.7071 OR 0.52 for 2 or 3 Appraisers)
 n = Number of Parts, r = Number of Measurements

Total Process Variation, TPV is determined from Sample Values
 $TPV = \sqrt{(R^2 + PV^2)}$
 TPV = **0.0326**

Parts	K ₃
5	0.403
6	0.3742
7	0.3534
8	0.3375
9	0.3249
10	0.3146

Repeatability & Reproducibility, $R \& R = \sqrt{(EV^2 + AV^2)}$
R & R = 0.0238

Part Variation (PV) = R₀ * K₃ = **0.0222**
 (Value of K₃ taken from the given table)

% Gage R & R :		
	% of Tolerance	% of Total Process Variation (TPV)
EV =	9.04	46.27
AV =	11.09	56.78
PV =	13.30	68.08
R & R =	14.31	73.25

Note 1 : Data can be entered only in the columns marked 1, 2, 3 and Cell for Tolerance Range and top header section. (All those cells which are shaded light blue)

Note 2 : Study require any combination of 2 or 3 Appraisers, 2 or 3 Measurements and any parts from 5 to 10 .

Note 3 : (% R & R Interpretation - Lower of % Tolerance and % Total Process Variation-TPV)
 Under 10% error - Measurement system is acceptable;
 Between 10 - 30 % error - Marginal (May be acceptable based upon importance of application, cost of gage, cost of repairs, etc.;
 More than 30% error - Needs improvement. Make every effort to identify the problems and have them corrected

Results of this Gage R & R : **MEASUREMENT SYSTEM IS MARGINAL**

Inspection Report



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Inspection Report Cover Sheet

Inspection Date: March 28, 2011
Customer Name:
Customer Address:

Tri-Star Job Number: #11030

Customer Job Number: N/A

Part Name:

Part Number:

Type of Inspection: CMM CERT

Tool Description: Checking Fixture

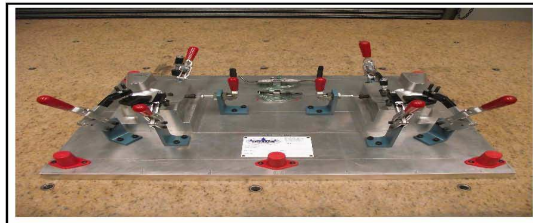
E/C Level & Date: 003 8/13/10

Condition of Test Item: Acceptable Other *

Date of Initiation: March 25, 2011

Certified To: X= 2075.10 Y= 949.95 Z= -50.00

Temperature "Degree" Humidity %



Results Met Inspection Criteria Results Did Not Meet Inspection Criteria

Comments: _____

Inspector: Jeff Farr

Signature:

Part layout

