Gage R&R Study: Measurement versus Part, Operator, WIV

Factor Information

Factor	Type	Levels	Values
Part	random	5	1, 2, 3, 4, 5
Operator	random	3	A, B, C
WIV	random	2	1, 2

ANOVA Table with All Terms

Source	DF	Seq SS	Adj SS	Adj MS	F	P	
Part	4	2.29791	2.29791	0.57448	61.58	0.000	x
Operator	2	0.04489	0.04489	0.02245	5.23	0.035	x
WIV	1	0.23940	0.23940	0.23940	46.54	0.002	x
Part*Operator	8	0.03417	0.03417	0.00427	61.41	0.000	
Part*WIV	4	0.02051	0.02051	0.00513	73.70	0.000	
Operator*WIV	2	0.00017	0.00017	0.00009	1.25	0.299	
Repeatability	38	0.00264	0.00264	0.00007			
Total	59	2.63970					

x Not an exact F-test.

Alpha to remove interaction term = 0.25

ANOVA Table with Terms Used for Gage R&R Calculations

Source	DF	Seq SS	Adj SS	Adj MS	F	P	
Part	4	2.29791	2.29791	0.57448	61.59	0.000	x
Operator	2	0.04489	0.04489	0.02245	5.25	0.035	
WIV	1	0.23940	0.23940	0.23940	46.70	0.002	
Part*Operator	8	0.03417	0.03417	0.00427	60.66	0.000	
Part*WIV	4	0.02051	0.02051	0.00513	72.80	0.000	
Repeatability	40	0.00282	0.00282	0.00007			
Total	59	2.63970					

x Not an exact F-test.

Variance Components

Source	VarComp	%Contribution (of VarComp)
Total Gage R&R	0.0106814	18.49
Repeatability	0.0000704	0.12
Reproducibility	0.0106109	18.37
Operator	0.0009088	1.57
WIV	0.0078092	13.52
Part*Operator	0.0010503	1.82
Part*WIV	0.0008427	1.46
Part-To-Part	0.0470957	81.51
Part	0.0470957	81.51
Total Variation	0.0577771	100.00

Gage Evaluation

Source	StdDev (SD)	Study Var (6 * SD)	%Study Var (%SV)
Total Gage R&R	0.103351	0.62010	43.00
Repeatability	0.008391	0.05035	3.49
Reproducibility	0.103009	0.61806	42.85

Operator	0.030145	0.18087	12.54
WIV	0.088369	0.53022	36.76
Part*Operator	0.032409	0.19445	13.48
Part*WIV	0.029029	0.17418	12.08
Part-To-Part	0.217016	1.30209	90.28
Part	0.217016	1.30209	90.28
Total Variation	0.240369	1.44221	100.00

Number of Distinct Categories = 2

Gage R&R Study for Measurement