

Gauge R&R Evaluation

Part Number: 20104756		Supplier: Hansin Precision Engines		OPERATOR		NAME		DATE				Number of Operators		3	
Part Name: ASSY, TOP COVER		Date: 31-May-2024		1		Yao Lixia		31-May-2024				Number of Trials		3	
Part Revision: C		Prepared By: Chu Libo		2		Tian Yuanhui		31-May-2024							
				3		Zhou Liujian		31-May-2024							

SPECIFICATION:		12.98		+ TOL:		0.1		- TOL:		0.1		TOTAL TOLERANCE:		0.2		UNITS:		mm		INSPECTION METHOD:		SS	
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MEASUREMENT	OPERATOR 1						OPERATOR 2						OPERATOR 3															
	Trial 1	Trial 2	Trial 3	Min	Max	Range	Trial 1	Trial 2	Trial 3	Min	Max	Range	Trial 1	Trial 2	Trial 3	Min	Max	Range										
1	13.050	13.050	13.050	13.050	13.050	0.000	13.050	13.050	13.060	13.050	13.060	0.010	13.050	13.050	13.040	13.050	13.050	0.000										
2	13.060	13.060	13.070	13.060	13.070	0.010	13.060	13.060	13.040	13.040	13.060	0.020	13.070	13.060	13.060	13.060	13.070	0.010										
3	13.060	13.060	13.060	13.060	13.060	0.000	13.060	13.070	13.060	13.060	13.070	0.010	13.060	13.060	13.060	13.060	13.060	0.000										
4	13.070	13.080	13.080	13.070	13.080	0.010	13.080	13.080	13.080	13.080	13.080	0.000	13.080	13.080	13.080	13.080	13.080	0.000										
5	13.060	13.060	13.060	13.060	13.060	0.000	13.060	13.060	13.060	13.060	13.060	0.000	13.060	13.060	13.060	13.060	13.060	0.000										
6	13.050	13.050	13.050	13.050	13.050	0.000	13.050	13.050	13.050	13.050	13.050	0.000	13.050	13.050	13.050	13.050	13.050	0.000										
7	13.060	13.070	13.060	13.060	13.070	0.010	13.070	13.070	13.070	13.070	13.070	0.000	13.060	13.060	13.050	13.050	13.060	0.010										
8	13.040	13.040	13.040	13.070	13.050	-0.020	13.050	13.040	13.040	13.040	13.050	0.010	13.040	13.040	13.040	13.040	13.040	0.000										
9	13.060	13.070	13.040	13.040	13.070	0.030	13.040	13.040	13.050	13.040	13.050	0.010	13.050	13.050	13.050	13.050	13.050	0.000										
10	13.050	13.060	13.050	13.050	13.060	0.010	13.050	13.050	13.050	13.050	13.050	0.000	13.050	13.050	13.060	13.050	13.060	0.010										
TOTALS	130.560	130.600	130.560			0.050	130.570	130.570	130.560			0.060	130.570	130.560	130.550			0.030										
X _{MIN} : 13.0560	Operator						R _A	0.005						R _B	0.006						R _C	0.003						
X _{MAX} : 13.0573	2						3	SUM	391.720						SUM	391.700						SUM	391.680					
X _{diff} : 0.0013	(K2*Xdiff) ²						X _A	13.057						X _B	13.057						X _C	13.056						
	(EV) ² /nxt																											
	Diff																											

TEST FOR CONTROL

Upper Control Limit, UCLr = D4R D4: 2.570 x R: 0.005 = 0.012

If any individual range exceeds this limit, the measurement or reading should be reviewed, repeated, corrected, or discarded and new averages and ranges should be computed

MEASUREMENT SYSTEM ANALYSIS

STATISTICAL CONSTANT VALUE						QUALITY GOAL		
# Trials	2.00	3.00	# Oprs	2	3	ACCEPTABLE: LESS THAN 10%		
K1	4.56	3.05	K2	3.65	2.70	CONDITIONALLY ACCEPTABLE: BETWEEN 10% to 30%		
D4	3.27	2.57	n = # of parts	m = # of trials		NOT ACCEPTABLE: GREATER THAN 30%		

Repeatability - Equipment Variation (E.V)
E.V. = K₁R 3.050 x 0.005 = 0.014 % E.V. = 7.1

Reproducibility - Appraiser Variation (A.V)
A.V. = [(X_{diff}) x (K₂)]² - [(E.V.)²/(n x m)] 1.296E-05 - 6.75E-06 = 0.002491 % A.V. = 1.2

Repeatability and Reproducibility (R & R)
R&R = [(E.V.)² + (A.V.)²] 0.0002026 + 6.21E-06 = 0.01445 % R&R = 7.2

COMMENTS

RESULT: Acceptable
