

Gage R&R Study - ANOVA Method

**\* NOTE \* There are no operator values, or they are all the same. The operator factor will be  
omitted from the analysis.**

One-Way ANOVA Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | SS | MS | F | P |
| Part | 9 | 0.0004306 | 0.0000478 | 11.8803 | 0.000 |
| Repeatability | 20 | 0.0000805 | 0.0000040 |  |  |
| Total | 29 | 0.0005111 |  |  |  |

*α to remove interaction term = 0.05*

Gage R&R

Variance Components

|  |  |  |
| --- | --- | --- |
| Source | VarComp | %Contribution (of VarComp) |
| Total Gage R&R | 0.0000040 | 21.61 |
| Repeatability | 0.0000040 | 21.61 |
| Part-To-Part | 0.0000146 | 78.39 |
| Total Variation | 0.0000186 | 100.00 |

Process tolerance = 20

Gage Evaluation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source | StdDev (SD) | Study Var (6 × SD) | %Study Var (%SV) | %Tolerance (SV/Toler) |
| Total Gage R&R | 0.0020068 | 0.0120406 | 46.49 | 0.06 |
| Repeatability | 0.0020068 | 0.0120406 | 46.49 | 0.06 |
| Part-To-Part | 0.0038217 | 0.0229301 | 88.54 | 0.11 |
| Total Variation | 0.0043165 | 0.0258992 | 100.00 | 0.13 |

Number of Distinct Categories = 2

Probabilities of Misclassification

Joint Probability

|  |  |
| --- | --- |
| Description | Probability |
| A randomly selected part is bad but accepted | 0.000 |
| A randomly selected part is good but rejected | 0.000 |

Conditional Probability

|  |  |
| --- | --- |
| Description | Probability |
| A part from a group of bad products is accepted | 0.000 |
| A part from a group of good products is rejected | \* |

*Probability of part within spec limits = 0.*



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One-Way ANOVA Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | SS | MS | F | P |
| Part | 9 | 0.607956 | 0.0675506 | 40.2976 | 0.000 |
| Repeatability | 20 | 0.033526 | 0.0016763 |  |  |
| Total | 29 | 0.641481 |  |  |  |

*α to remove interaction term = 0.05*

Gage R&R

Variance Components

|  |  |  |
| --- | --- | --- |
| Source | VarComp | %Contribution (of VarComp) |
| Total Gage R&R | 0.0016763 | 7.09 |
| Repeatability | 0.0016763 | 7.09 |
| Part-To-Part | 0.0219581 | 92.91 |
| Total Variation | 0.0236344 | 100.00 |

Process tolerance = 25

Gage Evaluation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source | StdDev (SD) | Study Var (6 × SD) | %Study Var (%SV) | %Tolerance (SV/Toler) |
| Total Gage R&R | 0.040943 | 0.245655 | 26.63 | 0.98 |
| Repeatability | 0.040943 | 0.245655 | 26.63 | 0.98 |
| Part-To-Part | 0.148183 | 0.889096 | 96.39 | 3.56 |
| Total Variation | 0.153735 | 0.922409 | 100.00 | 3.69 |

Number of Distinct Categories = 5

Probabilities of Misclassification

Joint Probability

|  |  |
| --- | --- |
| Description | Probability |
| A randomly selected part is bad but accepted | 0.000 |
| A randomly selected part is good but rejected | 0.000 |

Conditional Probability

|  |  |
| --- | --- |
| Description | Probability |
| A part from a group of bad products is accepted | 0.000 |
| A part from a group of good products is rejected | \* |

*Probability of part within spec limits = 0.*



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One-Way ANOVA Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | SS | MS | F | P |
| Part | 9 | 1406269688 | 156252188 | 335281 | 0.000 |
| Repeatability | 20 | 9321 | 466 |  |  |
| Total | 29 | 1406279009 |  |  |  |

*α to remove interaction term = 0.05*

Gage R&R

Variance Components

|  |  |  |
| --- | --- | --- |
| Source | VarComp | %Contribution (of VarComp) |
| Total Gage R&R | 466 | 0.00 |
| Repeatability | 466 | 0.00 |
| Part-To-Part | 52083907 | 100.00 |
| Total Variation | 52084373 | 100.00 |

Process tolerance = 30000

Gage Evaluation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source | StdDev (SD) | Study Var (6 × SD) | %Study Var (%SV) | %Tolerance (SV/Toler) |
| Total Gage R&R | 21.59 | 129.5 | 0.30 | 0.43 |
| Repeatability | 21.59 | 129.5 | 0.30 | 0.43 |
| Part-To-Part | 7216.92 | 43301.5 | 100.00 | 144.34 |
| Total Variation | 7216.95 | 43301.7 | 100.00 | 144.34 |

Number of Distinct Categories = 471

Probabilities of Misclassification

Joint Probability

|  |  |
| --- | --- |
| Description | Probability |
| A randomly selected part is bad but accepted | 0.000 |
| A randomly selected part is good but rejected | 0.000 |

Conditional Probability

|  |  |
| --- | --- |
| Description | Probability |
| A part from a group of bad products is accepted | 0.003 |
| A part from a group of good products is rejected | 0.000 |