

Measurement System Analysis (MSA)

Gage R and R (GR&R)

Purpose: A Gage R&R is used to ensure the proper equipment, people, and procedures are in place to accurately measure a given part. To this end, a GR&R is executed to evaluate the amount of variability in a measurement system.

Procedure: Apple Rubber's standard gage R&R is a long form crossed gage R&R study. Three appraisers each measure ten parts three times (3 appraisers, 10 parts, 3 trials).

- Critical to Quality (CTQ) parameters are chosen for evaluation.
- The appraisers performing the measurements are lab technicians whose normal duties include operating the given piece of measuring equipment to measure parts of this configuration.
- The ten sample parts are selected at random.
- Sample parts are labeled and then measurements are made in a random order.

Data Analysis: Two methods are available for determining the repeatability and reproducibility:

1. Option 1: Average and Range Method
2. Option 2: ANOVA Method

Data Evaluation: The person conducting the gage R&R study shall review the output from the data analysis to determine if the results are acceptable. Both of the following requirements must be met for the GR&R to be deemed internally acceptable:

- Gage R&R Part / Tolerance (P/T) ratio must be less than or equal to 20%.
- The number of distinct categories (NDC) must be greater than or equal to 5.

Below is a link to a sample GR&R using the Average and Range Method;

[Gage R&R Average and Range](#)

As well as a sample GR&R using the ANOVA method.

[Gage R&R ANOVA](#)