

## 3 $\sigma$ (3 Sigma) Testing

1. Test a sampling of parts. Write down the breaking strength of each.
2. Work out the Mean (average) number (Breaking strength of each divided by number of parts tested)
3. Then for *each* breaking strength number: subtract the Mean and square the result
4. Then work out the average of those squared differences.
5. Take the square root of that average to find standard deviation
6. Multiply the standard deviation by three
7. Subtract this from the average breaking strength (Mean) of all tested parts. Result is the 3 Sigma MBS rating. It is 99.73% probable any additional breaks will be at or above this final value.

### Example 1:

Test Sample 1 breaks at 1000 lbs

Test Sample 2 breaks at 1100 lbs

Test Sample 3 breaks at 1050 lbs

(Item 2 above)

Mean of above (average) = 3150 divided by 3 = 1050 Lbs Mean

(Item 3 above)

1000-1050 squared = 2500

1100-1050 squared = 2500

1050-1050 squared = 0

(Item 4 above)

Mean = 1666.66

(Item 5 above)

Square root of 1666.66 = 40.82 Standard Deviation

(Item 6 above)

40.82 x 3 = 122.46 lbs

(Item 7 above)

1050 - 122.46 = **927.54 lbs MBS 3 Sigma Rating**

### Example 2:

Test Sample 1 breaks at 3000 lbs

Test Sample 2 breaks at 3100 lbs

Test Sample 3 breaks at 3050 lbs

Test Sample 4 breaks at 3200 lbs

Mean of above (average) = 12,350 divided by 3 = 3087.5 Lbs Mean

3000 – 3087.5 squared = 7656.25

3100 – 3087.5 squared = 156.25

3050 – 3087.5 squared = 1406.25

3200 – 3087.5 squared = 12656.25

Mean = 5468.75

Square root of 5468.75 = 73.95 Standard Deviation

73.95 x 3 = 221.85 lbs

3087.5 – 221.85 = **2865.65 lbs MBS 3 Sigma Rating**