Lesson 1.3 – Measurement and Statistics

Concepts

1. Measurement systems were developed out of the need for standardization.
2. Engineers apply dimensions to drawings to communicate size information.
3. Manufactured parts are often created in different countries, where dimensional values are often converted from one standard unit to another.
4. The amount of variation that can be measured depends on the precision of the measuring tool.
5. Statistical analysis of measurements can help to verify the quality of a design or process.
6. Engineers use graphics to communicate patterns in recorded data.

Performance Objectives

It is expected that students will:

- Research and design a CD cover or book jacket on the origins of the measurement systems.
- Measure and record linear distances using a scale to a precision of 1/16 inch and 1 mm.
- Measure and record linear distances using a dial caliper to a precision of 0.001 inch.
- Add and subtract U.S. standard and metric linear measurements.
- Convert linear distance measurements from inches to millimeters and vice versa.
- Apply linear dimensions to a multiview drawing.
- Calculate the mean, mode, median, and range of a data set.
- Create a histogram of recorded measurements showing data elements or class intervals, and frequency.

Essential Questions

1. Why did our ancestors create measurement standards?
2. Who is responsible for establishing measurement standards that are used by engineers and manufacturers today?
3. What methods do engineers use to communicate an object's dimensional information?
4. What problems could result from incorrectly converting measurements from one system to another?
5. What factors influence the precision of a measuring tool?
6. What information can a designer use from a statistical analysis of a product?

Key Terms

American National Standards Institute (ANSI)	**Accuracy**	**Caliper**
Class Interval	**Convert**	**Data**
Data Set	**Dimension**	**Dimension Lines**
English System	**Extension Lines**	**Frequency**
Graph	**Histogram**	**International Organization for Standardization (ISO)**
Mean	**Measure**	**Median**
Metric System	**Mode**	**Normal Distribution**
Numeric Constraint	**Precision**	**Scale**

Standard	**Statistics**	**Two-Dimensional**
Unit	**Variation**	

Instructional Resources

PowerPoint® Presentations

- **Scale Reading Basics**
- **Dial Calipers**
- **Dimension Practices**
- **Introduction to Basic Statistics**

Word Documents

- **Project 1.3.1 History of Measurement**
- **Activity 1.3.2 English and Metric Linear Measurements**
- **Activity 1.3.3 fischertechniks® Block Measurement**
- **Activity 1.3.4 Linear Dimensions**
- **Activity 1.3.5 Applied Statistics**
- **Activity 1.3.2a Decimal Conversion Chart**
- **Lesson 1.3 Key Terms and definitions in Excel**
- Project 1.3.1 History of Measurement Rubric

Reference Sources

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