Alphabet of Lines

Chapter 3

Sacramento City College
EDT 300/ ENGR 306
The design industry has agreed on a set of standard lines that are used to represent various objects.

The American Society of Mechanical Engineers (ASME) has developed this standard which is accepted throughout the industry.

Written down in a standards manual.
The Alphabet of Lines reveals Shape, Size, Hidden surfaces, Interior detail, Alternate positions, Etc., and of parts, etc.
The Alphabet of Lines

- The Alphabet of Lines
  - Look different.
  - Some are
    - Thin width
    - Medium width
    - Thick width
  
- The various lines are easily distinguishable.
Alphabet of Lines

- The Alphabet of Lines
  - Object
  - Hidden
  - Center
  - Dimension
  - Extension
  - Phantom
  - Break
  - Datum
  - Construction
Alphabet of Lines

Refer to Handout

The Alphabet of Lines

Available on Blackboard
Line Characteristics

- All lines should be dense black,
  - Regardless of line type
  - Regardless of width.
    - Thin, dense black
    - Medium weight, dense black
    - Thick weight, dense black

- Light pencil lines tend to “burn out” during the reproduction process.
  - Make “fuzzy” lines on blueprint/copy.
**Line Characteristics**

- Lines are *uniform* within the line.
  - Looks the same width all along the length of the line.
    - Thin – thin all along the length
    - Medium – medium all along the length
    - Thick – thick all along the length
Visible Lines
Object/Visible Lines

- Show the object.
- Show the outline of the visible edges or contours of an object that can be seen by an observer.
Object/Visible Lines

- Object/Visible Lines
  - Should stand out sharply when contrasted with other lines on the drawing.

- Object/Visible Lines - Spacing and Size
  - Medium width.
  - Continuous line (no dashes)
  - Dense black.
Visible Lines

- CUTTING-PLANE LINE
- VISIBLE LINE
- CENTER LINE (PATH OF MOTION)
- LEADER
- CHAIN LINE
Hidden Lines
Hidden Lines

- Show
  - Edges
  - Surfaces
  - Corners

of an object that are concealed from the view of the observer.
Hidden Lines

- **Spacing and Size**
  - Thin lines.
  - Evenly space short dashes
    - Approximately 1/8” long,
    - Spaces 1/32” long.
- Dense black.
**Hidden Lines**

- **Hidden Line “Rules”**
  - 1. Start and end with a dash.
  - 2. If a hidden line is a continuation of a visible line then a gap is shown.
  - 3. A gap is also shown when a hidden line crosses but **does not intersect** another line.

- **Hidden lines** should be omitted when they are not needed for clarity.
Hidden Lines

- Dimension Line
- Center Line
- Hidden Line
- Break Line
Center Lines
Center Lines

- Center Lines

  - Show
    - 1. Axes of symmetrical parts
    - 2. Centers of circles and
Center Lines

Center Lines - Spacing and Size.

- Thin lines.
- Alternating long and short dashes.
  - The long dash (3/4” to 1-1/2”)
  - The short dash (1/16” to 1/8”)
- Dense black.
Center Lines

Center Lines “Rules”

1. Center lines intersect at the short dashes.

2. Center lines extend only a short distance past the object.

3. Center lines start and end with a long dash.
Center Lines

- CENTER LINE (PATH OF MOTION)
- LEADER
- CHAIN LINE
- SECTION LINE
- VIEW B-B
Dimension Lines
Extension Lines
Leaders
Dimension Lines, Extension Lines and Leaders

- **Dimension lines**
  - Indicate the **size** and **direction** of dimensions.
  - Are terminated by arrowheads.

- **Dimension Lines - Spacing and Size**
  - Thin lines.
  - Continuous.
  - Dense black.
Dimension Lines, Extension Lines and Leaders

◆ Extension lines
  ◆ Indicate the termination of a dimension.
  ◆ Extend from approximately
    ◆ 1/16 inch from the object to
    ◆ 1/8 inch beyond the last arrowhead.

◆ Extension Lines - Spacing and Size
  ◆ Thin lines.
  ◆ Dense black.
  ◆ Continuous lines.
Dimension Lines, Extension Lines and Leaders

VIEWING-PLANE LINE
EXTENSION LINE

DIMENSION LINE

75

B

B
Leaders

- Are drawn to notes or identification symbols used on the drawing.
- **Start** with 1/8 “shoulder”
- **End** with arrowhead.

Leaders - Spacing and Size

- Thin lines.
- Continuous lines.
- Dense black.
Leader Lines

VIEWING-PLANE LINE
EXTENSION LINE

DIMENSION LINE

75
Cutting Plane Lines
Cutting Plane Lines

- Indicate the **location** of the **edge view** of the **cutting plane**.

**Cutting Plane Lines - Spacing and Size**
- Thick line.
- Dense black.

**Two forms** are approved for general use.
Cutting Plane Lines

First Form
- Alternating long dashes (3/4” to 1 1/2”) and
- pairs of short dashes (1/8” with 1/16” space).

Second Form
- Equal dashes 1/4” in length.

Both forms
- Ends bent at 90° and
- Ends are terminated by arrowheads to indicate the direction of viewing of the section.
- Arrow stems are continuous lines.
Cutting Plane Lines
Section Lines
Section Lines

- Represent surfaces exposed by a cutting plane passing through an object.
- Sometimes called
  - “cross-hatching”.
  - “hatching”
- Drawn at an angle of $45^\circ$ with a sharp 2H pencil.
Section Lines

- Section Lines - Spacing and Size
  - Thin lines
  - Continuous lines.
  - Dense black.

- Space about 1/8” apart.
  - small drawings - 1/32
    - Space lines close together
  - large drawings - 3/16”
    - Space lines further apart.
  - Make line spacing uniform.
Section Lines

PHANTOM LINE

SECTION LINE

SECTION A-A
Break Lines
Break Lines

- **Break lines**
  - Show the limit of a partial view of a **broken section**.
  - For **short breaks**,  
    - a **thick line** is drawn **freehand**.  
    - Usually used for **mechanical work**.

- For **large breaks**  
  - A long, thin line joined by freehand “zig-zags”.  
  - Usually used for **architectural work**.
Break Lines

Break Lines - Spacing and Size

- Thick.
- Dense black.
- Freehand.
- Continuous.

- Thin
- Dense black
- Straight line with freehand “zig”
- Continuous.
Break Lines
Phantom Lines
Phantom Lines

- Phantom lines:
  - Show
    - Alternate positions.
    - Repeated details.
    - Paths of motion.

- Phantom Lines - Spacing and Size
  - Thin lines.
  - Dense black.
  - Long dashes 3/4” to 1-1/2” in length with alternating with pairs of short dashes 1/8” long with 1/16” spacing between the dashes.
Phantom Lines
Datum Lines
Datum Dimensions

- Datum Lines
  - Show
    - Lines
    - Points
    - Surfaces that are assumed to be accurate.
  - Are placed on drawings as datum dimensions since they may be used for exact reference and location purposes.
Datum Dimensions

- Datum Lines - Spacing and Size
  - Thin lines.
  - Dense black.
  - Thin, long dashes - 3/4” to 1-1/2” long
    - alternating with
  - Pairs of short dashes - 1/8” long
    - 1/16” spacing between the dashes.
Construction Lines
Construction Lines

- Construction Lines
  - Used to lay out all work PRIOR to drawing ANY object lines.
  - Drawn very light so they will not reproduce when making a blue print.
    - (They should not be visible when viewing beyond an arm’s length from the drawing.)

- Construction Lines - Spacing and Size
  - Thin lines.
  - Light gray lines.
  - Draw with very hard pencil 2H, 3H, 4H.
Border Lines
**Border Lines**

- **Border lines**
  - Are the “frame” of the drawing.

- **Spacing and Size**
  - Thickest lines.
  - Dense black.
  - Continuous.

- Border lines are the heaviest of all lines.