Information Display Design

DEA3250/6510

Information Displays

- Any display must give the operator information about the functional status of technology and/or processes.
- 3 classes of information:
  - Need to know - warnings, orders etc.
  - Nice to know - advisory, messages etc.
  - Historical - miles traveled, time elapsed etc.

Displays: Functional Requirements

- Speed - how quickly can the information be acquired?
- Accuracy - is information interpretation unambiguous and error-free?
- Sensitivity - can changes in the displayed variable be detected at the relevant magnitude?

Displays: Design criteria

- Detection - can the user detect the displayed information and any changes in this in context (e.g. see a visual display, hear an auditory display)?
- Recognition - can the user extract the relevant information from the display?
- Comprehension - can the user understand the displayed information?

Displays: Basic Types

- Static display - display content remains unchanged with time (label, traffic sign, graph, symbol etc.).
- Dynamic display - display content changes with time (speedometer, fuel gauge, radar, watch etc.).
- Quantitative display - displays the quantity of some variable (time, speed, temperature etc.).

- Qualitative display - displays qualitative information (brake light, battery gauge etc.).

Displays: Types of Information

- Status - system conditions (on/off).
- Warnings - unsafe conditions (brake light).
- Representations - (pictures, maps, graphs).
- Identification - (traffic lanes, color-coded wires).
- Symbolic - (alphanumeric, music, math).
- Time-phased - signal duration/interval (flashers, heart beat monitor, sonar).

Static Displays

- Graphic symbols
- Labels
- Instruction signs
- Industrial and Consumer Safety Signs

Sign Surrounds

- Triangle or diamond (yellow/orange) in black surround - caution
- Circle (white in red surround) – mandatory action
- Circle with line (white in red surround, red line from top left to bottom right) – action prohibited
- Square or rectangle (blue or green) - advisory

Graphic Symbols

- A graphic symbol is an optically perceptible figure produced by means of writing, drawing, printing or other means.
- A good graphic symbol transmits information in an unambiguous manner independently of any language.
- A graphic symbol provides information on conditions, facts or actions.

Graphic Symbols - Functions

- Identity - describe a piece of equipment

- Qualify - describe a variation
- Instruct - describe an operation or use
- Command - indicate what MUST or MUST NOT be done
- Warn - draw attention to danger
- Indicate - give direction to a quantity

Graphic Symbols: Design Guidelines

- Image content - Content must be unambiguous.
- Consistency - Symbol elements must not be similar to elements used in other graphic images where the element has a different meaning.
- Easy to Read - Symbol should be easy to read quickly and accurately and provoke a quick response (especially if it's a warning symbol).
- Reproducibility - Symbol must be easy to reproduce at any size and on any print medium.
- Multiple Symbols - Multiple symbols can be used to augment understanding but no more than three should be used in a display.

Graphic Symbols - Design principles

- Silhouette/solid shape is preferable to outline. High contrast
- Closed, simple, unified symbol is preferable.
- Only relevant details included.
- Left/right symmetrical symbols are preferred.
- Symbols with similar height and width are preferred.
- Symbols for directional information should permit reversal.
- Symbols should be in enclosures (square; diamond; circle; triangle, in order of preference).

Graphic Symbols - Dimensions

- Size of significant details (M) should be at least 1 mm for every meter viewing distance.
- Line width of significant details *should not* be less than 0.5 mm for every meter viewing distance.

- Distance between edge of symbol and inner edge of the enclosure should not exceed 1.5 mm, or 2.5 mm if the edges are parallel (per meter distance).
- General purpose symbols should be within a 15° viewing angle; if critical symbol, reduce to <5°.
- Symbol size, for legibility:
  Conspicuity = .025D + .012 D=distance (meters)

Basic Symbol Design Grid (ISO 3461)

- Basic grid is used to design symbols.

Graphic Symbols

- Geometric form - square, circle, triangle, diamond
- Abstract symbol
- Pictogram

Safety Signs: 6 characteristics

- Sign should be in the immediate vicinity of the hazard
- Sign should contrast with background.
- Sign should identify the nature of the hazard.
- Sign should indicate the hazard consequences.
- Sign should identify the seriousness of the hazard.
- Sign should indicate how to avoid the hazard.

Safety Sign Design

- Symbol - graphic of the potential accident.
- Signal word - appropriate hazard level:
  - DANGER - immediate hazard which will result in severe personal injury or death.
  - WARNING - immediate hazard which could result in severe personal injury or death.
  - CAUTION - immediate hazard which could result in minor personal injury.
  - NOTICE - potential hazard and safety policy.
- Word message - concise hazard avoidance instructions.

Safety Sign Layouts (ANSI Z535.2)

Safety signs - 3 panel design

Warnings

(Adams & Edworthy, Ergonomics, 38 (11), 2221-2237, 1995).

- Text size and border width are important.
- Background color important (signal word has to be 2x size for black vs. red background).
- White space not important.
- Most effective warning signs not necessarily the most esthetic.

Example: Airplane Safety

- How do you know what you cannot know or see?

Examples: Fire Truck Color

- For optimal visibility day or night a lime-yellow color most closely matches the spectral sensitivity of the day/night retina, making fire trucks easier to see.

Example: Fire Truck Color (Solomon & King, Ergonomics in Design, 5 (2), 4-10, 1997)

Example: Fire exit signs

- Minimalist approach?

Example: Fire exit signs

- Who will instruct me?
- Where are the stairs?
- What if I don't read English?

Example: Fire exit signs

- Turn left or right?

Example: Fire exit signs

- Which way to go?

Example: Fire exit signs

- Marriott Hotel's use a corporate color scheme - is it a good idea?

Example: Fire exit signs

- Unambiguous signs in Human Ecology?

Example: Fire exit signs

- Sign location is important.

Example: Fire exit signs

- Good readers only apply here!

Example: Emergency signs

- So many options?

Example: Fire alarm signs

- It's obvious isn't it?

Example: Fire alarm signs

- Pushmepullme Doctor Doolittle!

Example: Road Sign Visibility

- For road signs, which works best - text or icons?
- Is there a difference between day and dusk?

- Is there an age difference?

Example: NY Subway

- Subway safety sign.

Example: NY Subway

- Subway safety instructions.

Example: NY Subway

- Subway safety sign - creative redesign.

Example: NY Subway

- Subway safety instructions - creative redesign.

Icon Design:

Graphical User Interface (GUI)

Borders and Backgrounds

- Borders and backgrounds can improve layout legibility.

Diagrams

- Static representational displays (diagrams) are often used on industrial equipment, and in buildings for wayfinding.