Alphabet of lines

Science, Mathematics

Alphabet of Lines The " Alphabet of Lines" refers to the different styles of lines used in drafting to show different features about an object that is drawn. There are eleven main line types - visible, hidden, center, dimension, extension, leader, section, cutting-plane, phantom, viewing plane and break. Each line has a definite form and line weight. The standard thick line weight varies from . 030 to . 038 of an inch whereas the standard thin line weight varies from . 015 to . 022 of an inch. Visible lines are dark and heavy lines. They show the outline and shape of an object.

They define features that can be seen in a particular view. Hidden lines are light, narrow, short, dashed lines. They show the outline of a feature that cannot be seen in a particular view. They are used to help clarify a feature but can be omitted if they clutter a drawing. Section lines are thin lines usually drawn at a 45 degree angle. They indicate the material that has been cut through in a sectional view. Center lines are thin lines consisting of long and short dashes. They show the center of holes, slots, paths of rotation and symmetrical objects. Dimension lines are dark, heavy lines.

They show the length, width, and height of the features of an object. They are terminated with arrowheads at the end. Extension lines are used to show the starting and stopping points of a dimension. There should be at least a 1/16 space between the object and the extension line. Leader lines are thin lines used to show the dimension of a feature or a note that is too large to be placed beside the feature itself. Cutting plane lines are thick broken lines that terminate with short 90 degree arrowheads. They show where a part is mentally cut in half to better see the interior detail.

Break lines are used to break out sections for clarity or for shortening a part. There are three types of break lines with different line weights. These are short breaks, long breaks and cylindrical breaks. Short break lines are thick wavy lines used to break the edge or surface of a part for clarity of a hidden surface. Long break lines are long, thin lines used to show that the middle section of an object has been removed so it can be drawn on a smaller piece of paper. Cylindrical break lines are thin lines used to show round parts that are broken in half to better clarify the print or to reduce the length of the object.

Phantom lines are thin lines made up of long dashes alternating with pairs of short dashes. Their purpose is to show the alternate position of moving parts, relationship of parts that fit together and repeated detail. They can show where a part is moving to and from. They eliminate the confusion of thinking there may be two parts instead of just one. They also show how two or more parts go together without having to draw and dimension all. They show repeated details of an object and hence, provide efficiency and less chance of drafter error.

Reference: An Alphabet of Lines. (2003). Retrieved July 21, 2011, from http://www. wisc-online. com/objects/ ViewObject. aspx? ID= mtl17903 Line Weights Line weights, or the varying line thicknesses used in engineering drawing, are essential in creating a drawing that communicates effectively. Line weights are a vital part of conventional technical graphics language. They are embodied to the extent of being defined in national and

international standards. Line types and line weights allow drawings to communicate information that would otherwise be very difficult to convey.

For example: hidden outlines, paths of motion, planes of symmetry, fictitious outlines such as major and minor diameters of screw threads, dimensions and projections, materials (hatching), and centers and imaginary intersections. Conventional practice is that only two different line weights be used on any one drawing. This is subject to discretion and some disciplines regularly use three, and occasionally four, different line weights. Consistency and clarity ofcommunicationare the deciding factors. Continuous thick lines range from 0. 35-0. 50 mm and are used for visible outlines, existing features, cut edges and general line work.

Continuous medium lines are 0. 25-0. 35 mm and used when another level of line weight would assist the delineation e. g. internal line work, notes. Continuous thin lines vary from 0. 18 to 0. 25 mm. They are applied in fictitious outlines, imaginary intersections and projections, hatching, dimensions and break lines. Dashed thick lines are 0. 35-0. 50 mm while dashed thin lines are 0. 18-0. 25 mm. They are used in hidden outlines and edges. Chain thick lines are0. 35-0. 50 mm and they indicate special surface requirements or sometimes with a text component to indicate pipelines and services.

Chain thin lines, 0. 18-0. 25 mm, are for center lines, motion paths and indication of repeated detail. Engineering drawings made on A4, A3 and A2-sized pages are at the smallest end of the range of document sizes that would reasonably be used. The appropriate pen group is from the fine end of

the scale - 0. 18, 0. 25 and 0. 35mm pen widths. Reference: Line Weight. (n. d). Retrieved July 21, 2011, from http://www. cadinfo. net/intellicad/ line-weight Orthographic Drawing Orthographic projection (or orthogonal projection) is a means of representing a three-dimensional object in two dimensions.

It is a form of parallel projection, where all the projection lines are orthogonal to the projection plane. It is further divided into multiview orthographic projections and axonometric projections. A lens providing an orthographic projection is known as an (object-space) telecentric lens. The term orthographic is also sometimes reserved specifically for depictions of objects where the axis or plane of the object is also parallel with the projection plane, as in multiview orthographic projections. With multiview orthographic projections, up to six pictures of an object are produced, with each projection plane parallel to one of the coordinate xes of the object. The views are positioned relative to each other according to either of two schemes: first-angle or third-angle projection. In each, the appearances of views may be thought of as being projected onto planes that form a 6-sided box around the object. Both first-angle and third-angle projections result in the same 6 views; the difference between them is the arrangement of these views around the box. First-angle projection is as if the object were sitting on the paper and, from the " face" (front) view, it is rolled to the right to show the left side or rolled up to show its bottom.

It is standard throughout Europe (excluding the UK) and Asia. First-angle projection used to be common in the UK, and may still be seen on historical

design drawings, but has now fallen into disuse in favor of third-angle projection. Third-angle is as if the object were a box to be unfolded. If we unfold the box so that the front view is in the center of the two arms, then the top view is above it, the bottom view is below it, the left view is to the left, and the right view is to the right. It is standard in the United Kingdom, USA, Canada, and Australia.

A great deal of confusion has ensued in drafting rooms and engineering departments when drawings are transferred from one convention to another. On engineering drawings, the projection angle is denoted by an international symbol consisting of a truncated cone labeled FR for first-angle and US for third-angle. Axonometric projection is a type of parallel projection, more specifically a type of orthographic projection, used to create a pictorial drawing of an object, where the object is rotated along one or more of its axes relative to the plane of projection.

There are three main types of axonometric projection: isometric, dimetric, and trimetric projection. " Axonometric" means to measure along axes. Axonometric projection shows an image of an object as viewed from a skew direction in order to reveal more than one side in the same picture. Whereas the term orthographic is sometimes reserved specifically for depictions of objects where the axis or plane of the object is parallel with the projection plane, in axonometric projection the plane or axis of the object is always drawn not parallel to the projection plane.

With axonometric projections the scale of distant features is the same as for near features, such pictures will look distorted, as it is not how our eyes or

photography work. This distortion is especially evident if the object to view is mostly composed of rectangular features. Despite this limitation, axonometric projection can be useful for purposes of illustration. Reference: Orthographic projection (n. d.). In Wikipedia. Retrieved July 21, 2011, from http://en. wikipedia. org/ wiki/Orthographic_projection