Design Engineering with Standard Continuous Hinges

A Reference Guide
Dear Design Engineer or Purchasing Agent,

We frequently see blueprints for unnecessarily complex fabricated hinges. Such customized hinges will, inevitably, be more expensive and have longer lead times. Since we know that pre-design evaluation of hinge options can save our customers and potential customers time and money, we developed this Design Engineering Reference Guide. Please take a moment to review it before designing a product that will use continuous hinges.

We manufacture our hinges on fully-automated, high-speed production lines. For the most economical choice with the quickest delivery, select one of our 200 standard hinges from the chart inside. If you require variations or more fabrication, keep in mind that the more we can do within our automated processes or "on line," the quicker our turnaround and the lower your costs. We can cut our hinges to the lengths you specify, punch holes and stake pins within our fully-automated work centers when you order in large quantities. All bending operations, including swaging and offsetting, are completed in our secondary department.

To design products using time- and cost-saving standard continuous hinges, follow these steps:

A. Before designing, take a moment to consider the requirements of your hinge:
   - What type of metal and finish should it have?
   - How and where will the hinge be attached to the assembly?
   - How long and wide does the hinge need to be? How strong?

B. Review the four design parameters in this reference guide:
   - Gauge, Metal, Width, and Length.

C. Then, develop blueprints and specifications for your product assembly and hinge.

We are here to help every step of the way.

Chris Stevenson

President and Chief Executive Officer
Continuous hinges, commonly known as "piano hinges," are hinges that are at least five inches long. Continuous hinges are:

- strong throughout their entire lengths because each knuckle is a load bearing point
- strengthening, increasing product rigidity by supporting full length of applications
- easier and more precise to align than two or more butt hinges
- attractive and uniform in appearance
- smooth in pivotal action, providing optimal axial rotation
- low-cost and economical, lasting through many swing cycles

**What is a continuous hinge?**

**Continuous hinge parts**

- **Pin** the rod, running the length of the hinge, that holds the leaves together.
- **Knuckle** the hollow circular part of a hinge that the pin goes through.
- **Leaf** the part of a hinge that extends from the knuckle and revolves around the pin.
- **Leaf Width** the dimension from the center of the pin to the outer edge of the leaf. On hinges with equal leaves, leaf width is half of the hinge width.
- **End Play** the amount of up and down movement between the leaves as determined by the dimension (of space) between the knuckles.
- **Paint Clearance** the dimension (of space) between the edge of a knuckle and the edge of the adjacent leaf.

**"Standard" continuous hinges**

Our standard continuous hinges are assembled with pins and leaves of the same metal, leaves of equal widths laying flat in the same plane in an open position and having 275° degrees of travel. Our steel, stainless, and aluminum hinges are standard without holes. Attach them to your applications with spot welding, tack welding or drilling holes at assembly. Our brite-annealed, brass pre-plate and nickel pre-plate hinges are standard with holes punched and countersunk on two inch centers.

**Tolerances**

S&S manufactures hinges under the standard tolerances shown here.
Gauge is the thickness of the metal used to make the hinge leaves. The gauge of a hinge is generally the same gauge as the door or component part to which the hinge is attached. When the width of the door is more than twice its height or if the door carries added loads, you may want to specify a heavier hinge. The metal gauge dictates our knuckle length—the dimension of a knuckle measured parallel to the pin—as well as our pin diameter.

The open width (or hinge width) is the overall dimension of the leaves measured perpendicular to or across the pin. Consider the mounting surface, the available mounting space, and the hinge strength required when determining the open width. The numbers in the chart refer to the S&S Standard Series numbers. (We can also manufacture hinges with leaves of two different widths. Unequal leaves should have a total open width equal to a standard width below.)

Hinge metal and finish are generally the same as the parts to which the hinge is attached. To resist corrosion, choose stainless steel or aluminum. We manufacture pre-plated brass and nickel for the furniture industry and brite-annealed stainless for marine applications. (We can also make hinges with special finishes and with pins and leaves of different metals. A plated hinge with a stainless pin may help prevent rust. A stainless pin in a steel or aluminum hinge provides additional strength.)

The length of the hinge is measured parallel to the pin. We highly recommend designing your product to use a hinge that is an even multiple of knuckle length. Partial end knuckles are less attractive, can bind, and may not move as freely. We stock our standard hinges in 6' and 8' lengths. You can use a saw or punch press to cut down hinges to their needed length. (We also manufacture hinges cut to lengths that you specify.)
Fabrication options

1. **Hole Punching** — Attaching a hinge to an assembly with screws, nails or pop rivets requires that holes be pre-punched in the hinge leaves. We are tooled to punch many different hole patterns within our automated work centers and in our secondary department.

2. **Bending** — Fitting a hinge into the space allotted for it may require various types of bending. We do all bending in our secondary department. Variations include:
   - **Forming**
     - all bending of the leaves other than swaging or offsetting.
   - **Swaging**
     - pushing one or both leaves toward or beyond the center of the pin.
   - **Full swaging**
     - one leaf swaged the full diameter of pin. Leaves are parallel in the closed position.
   - **Half swaging**
     - one leaf swaged one half of pin diameter.
   - **Reverse swaging**
     - one leaf swaged to simulate reverse assembly. Leaves will not close to a parallel position.
   - **Offsetting**
     - pushing one or both leaves away from the center of the pin.

3. **Staked pin** — a pin staked into position by small dents made in a consistent pattern on the bottoms of the knuckles. Recommended for high security applications in which customers want to avoid easy removal of pins. We fabricate on line for no additional charge. Standard on S&S 400 series.