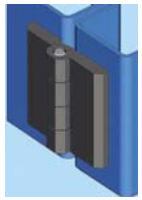
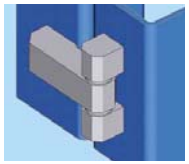
HINGES

FUNCTIONS – What a Hinge does





Primary Function:

To hold one edge of the door in place as the opposite edge swings open.

Secondary Functions:

To allow the door to open enough for easy access and so that an aisle is not blocked.

To keep the hinge side of a door from bending away from a gasket or failing due to an explosion.

To allow or prevent easy removal of the door.

To develop the look of the enclosure.

To hold a door or cover open (friction type)

HINGES

HINGE SELECTION

EMKA manufacturers over 130 different hinges all designed for metal enclosures.

Thus a design engineer has many options from which to select a hinge that gives all the **functionality** that his customers want with the **installation** method that is easy for production at a reasonable **cost.**

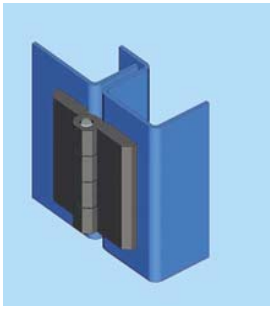
The problem is:

HOW DO WE SELECT THE OPTIMUM HINGE

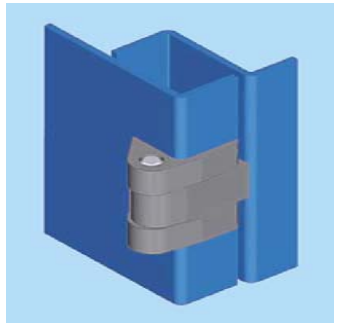
HINGES

DOOR AND HINGE TYPES

Why are there Different Door Types?



Design engineers often chose surface mounted doors (shown on the right) because, typically, they are easier to seal against water ingress and the cabinet front has a “clean” look.



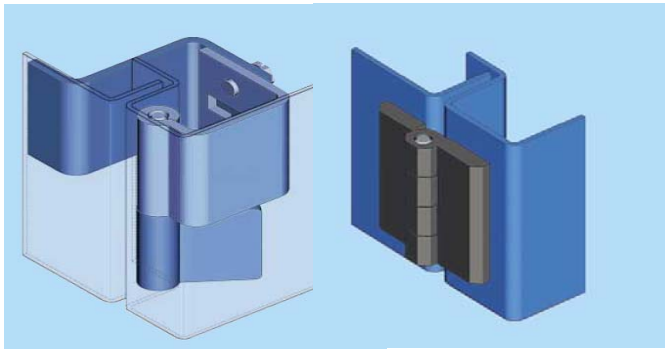
Surface mounted doors are sometimes described as “projected” or “prominent”

HINGES

DOOR AND HINGE TYPES

Different Door Types NEED Different Hinges

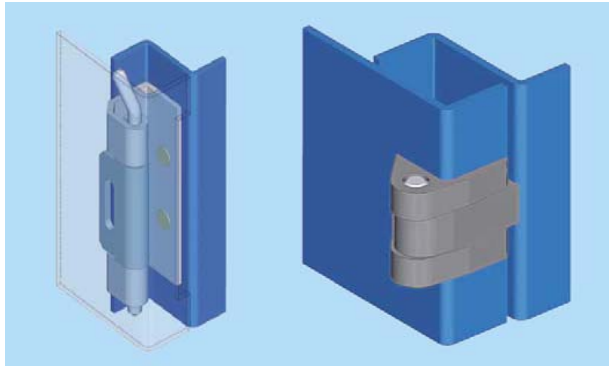
Flush Door



Concealed hinge
180º opening

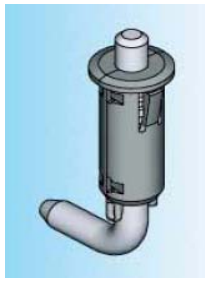
Exposed hinge
180º opening

Surface Mounted Door



Concealed hinge
120º opening

Exposed 180º opening

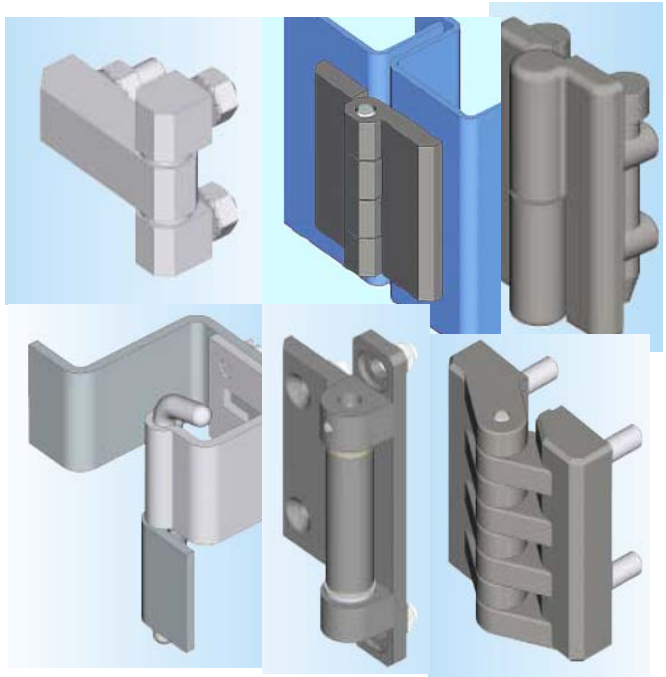


Flush door,
spring hinge

Some hinges can be used on both types of door e.g. 1056-U33

HINGES

FLUSH DOOR HINGES – OVERVIEW



These hinges can be divided into two types: Lift-off and captive.

Hinges with studs give more security than those with exposed screws, also they are easier to install.

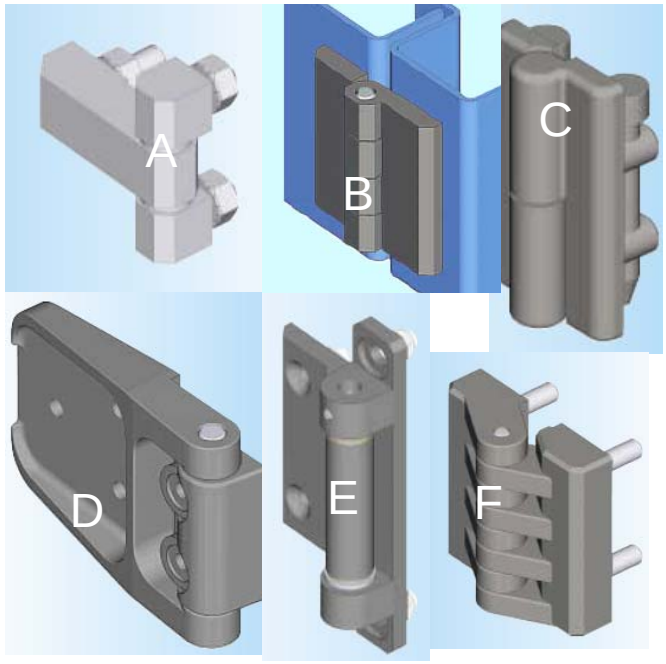
Appearance and method of installation are significant factors in selection.

Some available with symmetric or asymmetric friction

<u>Attachment methods significantly influence total installed cost</u>

HINGES

FLUSH DOOR HINGES – EXPOSED
SOME SPECIFICS



A. High Strength, “Explosion resistant”

B. With studs or countersunk holes; nylon, zinc alloy or 316 stainless, several sizes.

C. Low cost assembly; lift-off or captive.

D. Rivet-on from front for insulated doors.

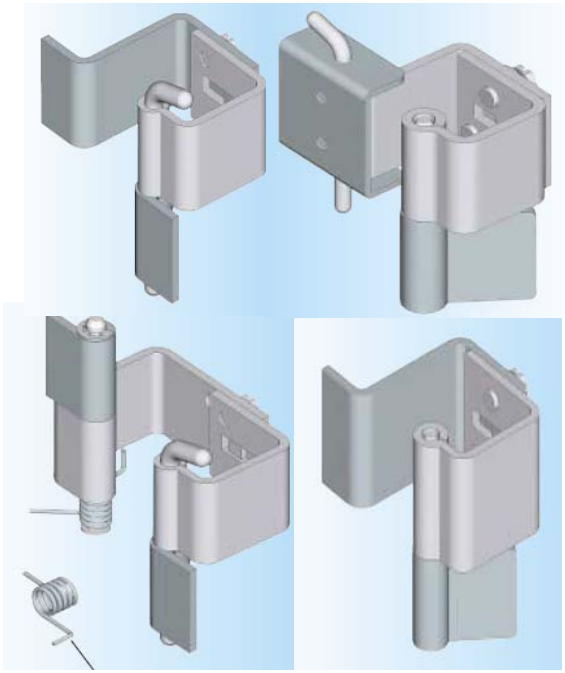
E. Some have adjustability to align doors.

F. Rugged looking for outside applications – excellent value

C – Lift-off in normal configuration, but if two hinges are installed “back to back” the door is captive

HINGES

FLUSH DOOR HINGES - CONCEALED



All EMKA concealed flush hinges are weld-on and relatively heavy duty.

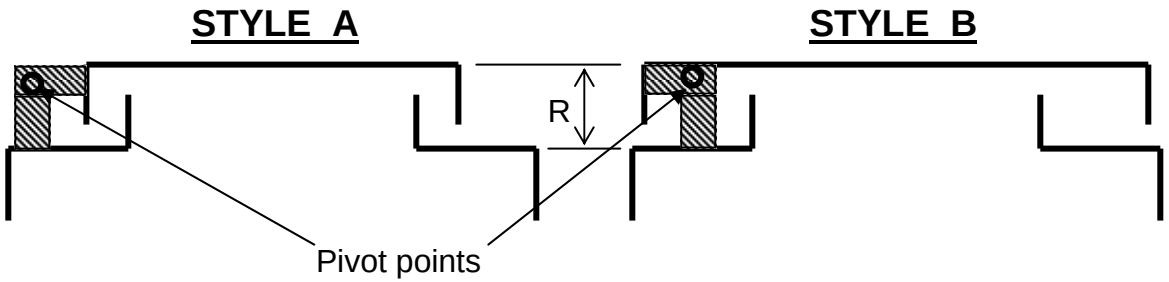
The hinge shown bottom left has two pivot points and so can open 180º.

All these are lift-off type.

Stainless or mild steel available

HINGES

SURFACE MOUNTED DOOR HINGES - OVERVIEW

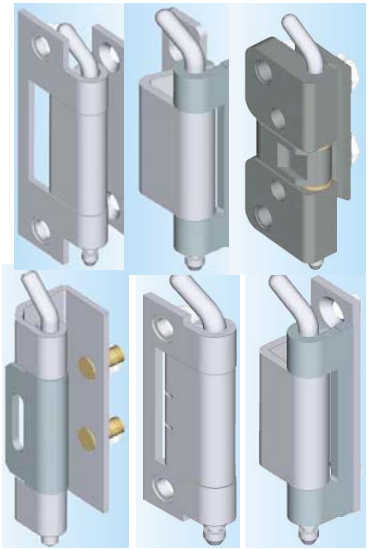


Most EMKA hinges have versions for both standard door returns (“R” in the sketch above) 20 mm (3/4”) and 25 mm (1”). The hinge selected must match the door design.

When the pivot point is inside the plane of the door true 180º opening is not normally possible. We define “true 180º” as the ability to open 180º when adjacent to an identical cabinet.

HINGES

SURFACE MOUNTED DOOR HINGES - CONCEALED



These are not lift-off, but the door can easily be taken off by removing the pin

Stainless or mild steel and zinc alloy hinges available.

Attachment Methods - installing a hinge is usually the major component of “TOTAL INSTALLED COST.”

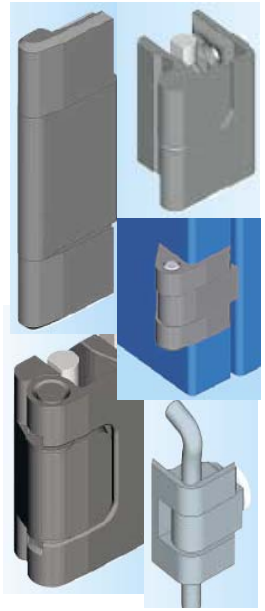
The best attachment method may depend on other manufacturing processes, e.g. inserting a PEM stud is very low cost if other studs are needed in a panel, but relatively expensive if not.

Check return dimension is available

HINGES

SURFACE MOUNTED EXPOSED HINGES FOR STYLE B DOORS – WHY?

Concealed hinges give a cleaner look and can be less expensive than exposed hinges, so why use exposed hinges?



Only when the pivot point is outside the enclosure is true 180º opening normally possible.

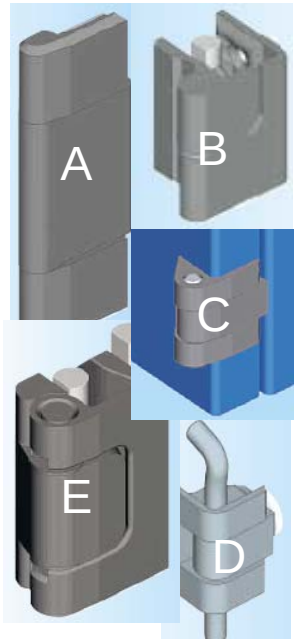
Lower installed cost

Very easy door removal is possible.

It is easy to manufacture and paint the door and frame separately.

HINGES

SURFACE MOUNTED DOOR STYLE B
EXPOSED HINGES, SOME SPECIFICS



A – Inconspicuous; true 180º opening; captive door.

B – Lift-off, but secure; low cost installation; true 180º opening; LH & RH versions needed.

C - Only 2 screws needed to install; true 180º opening; captive door.

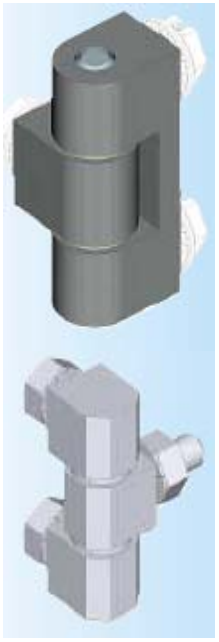
D – One screw plus pin for assembly; not “true 180º” opening; captive.

E – Lowest cost assembly; very easy door removal; one version for both sides of the door.

Check that the hinge you select is available with the correct return dimension for your door

HINGES

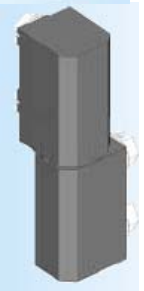
SURFACE MOUNTED EXPOSED HINGES FOR STYLE A DOORS



These hinges are suitable for enclosures where the door just covers the opening, Not true 180º opening.

The weld-on hinges, top right, are either mild or stainless steel. They have a tear drop shape to make welding easier.

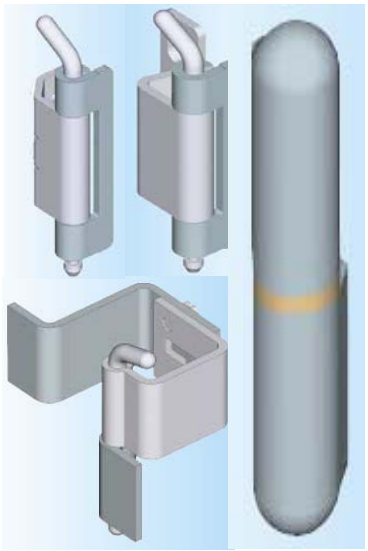
The others are attached by screws or nuts. One (lower right) is Interchangeable with Southco P/N 96-50-510-50



HINGES

ATTACHMENT METHODS

Welding – this requires several costly steps



- Setting up fixtures, one for the door and one for the enclosure
- Moving door and frame to welding area
- Clamping door part to door and frame part to frame
- Welding operation
- Clean up welded areas, this may include grinding
- Check for distortion
- Check for correct positioning

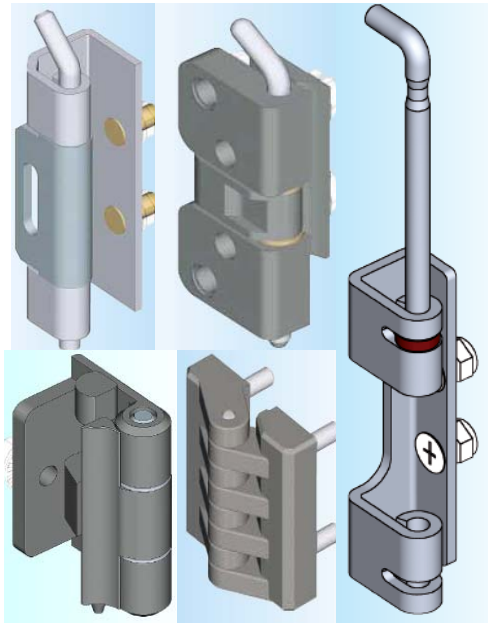
Heavier gauge doors may be needed to minimize distortion

Also the enclosure must be painted after hinge attachment. However good the fixturing is accuracy of positioning will be poor, this affects hinge load capability.

HINGES

ATTACHMENT METHODS

Screw-on, Several variations on this theme



- A screw in a countersunk hole and a nut is simple
- A hinge with holes for PEM- or Weld-studs is easier to assemble, but needs some panel preparation.
- A hinge with a threaded hole just needs a screw (EMKA hinges of this type have locating bosses to improve positioning accuracy.
- A hinge with studs only requires a hole in the panel and a nut, there is no screw to access from outside the enclosure. This is often the best all round choice.

HINGES

ATTACHMENT METHODS

Non-conventional

Pin Clamp

This is an extremely fast, accurate, and secure installation method. It does require a metal thickness, including paint, of 2 mm +/- .2 mm (.079” +/- .008”) typically.

Panel cut-out

Several hinges use a panel cut out to locate the door part of the hinge in the door and a variety of mechanical attachment methods for the frame part of the hinge. This is an extra operation on the laser or punch, but allows the hinge to be positioned accurately and secured very quickly,

HINGES

SURFACE MOUNTED DOOR QUESTIONS

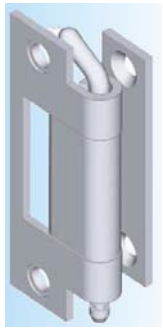
Do you need true 180º opening?

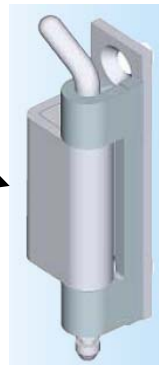
Do you want easy door removal?

Do you want low cost assembly?

Do you want to avoid welding?

Do you want simple, clean look?





Check that the hinge you select is available with the correct return dimension for your door

HINGES

OTHER FACTORS - STRENGTH

All EMKA's hinges have been lab. tested and analyzed for strength by FEA (Finite Element Analysis).

The differences between these academic evaluations and real life can be very significant. Not only door dimensions, orientation and position of the center of gravity, but also the position of the hinges and the tolerances of installing them can have a profound effect on a hinge's load carrying capability.

EMKA will happily look at the design parameters and suggest, and supply hinges for real life testing.

99% of the time if the number and size of hinges proposed looks adequate the design will be very safe.

HINGES

OTHER FACTORS - CORROSION

For NEMA 4X enclosures powder coated or chrome plated zinc alloy and stainless hinges can be considered. These must have corrosion resistance equivalent to 304 stainless.

To meet the more rigorous GR 487 (telecomm) standard 316 stainless or a special powder coating over zinc alloy may be required.

Glass reinforced nylon does not corrode, it is entirely suitable for outdoor use.

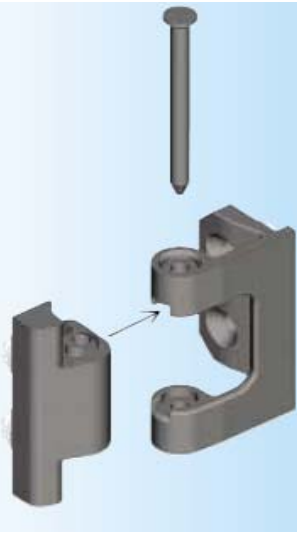
HINGES

OTHER FACTORS - REVERSABILITY

Most enclosure manufacturers offer products with right and left hinged doors (looking from the outside)

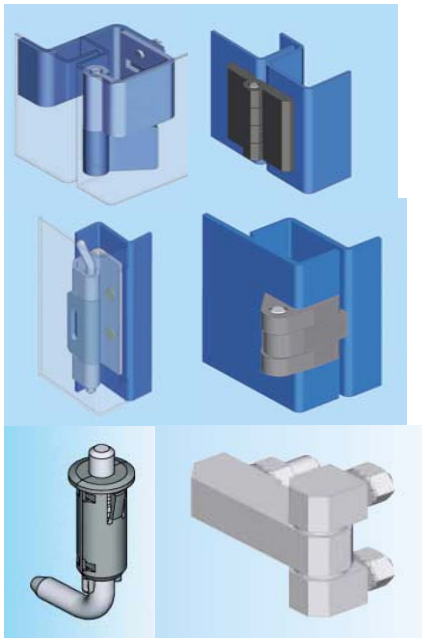
For lift-off, 180º hinges left and right versions are needed. Two parts must therefore be kept in inventory.

A better solution is to use the hinge on the right, this provides even easier door removal and replacement than a lift-off, low cost installation, attractive looks and reversibility. (1110-U122/U126)



HINGES

HINGE MATERIALS



MATERIAL OPTIONS

Glass reinforced PA (nylon) – low cost, no corrosion relatively weak, UV stabilized.

Zinc Alloy – medium cost, good stiffness, low corrosion when plated or coated.

Mild Steel – medium cost, very good impact strength easy to weld to steel enclosures

Stainless – high cost, 304 or 316 grades, high strength, low corrosion, weldable to stainless

HINGES

APPLICATIONS

DATA CENTER

- True 180º, easy door removal

OUTDOOR TELECOM

- Corrosion resistance, 1/8” thick aluminum, surface mounted doors.

SWITCHGEAR

- Block hinges have the strength to withstand short circuits, if this is not needed any “surface mounted door” hinge is suitable.

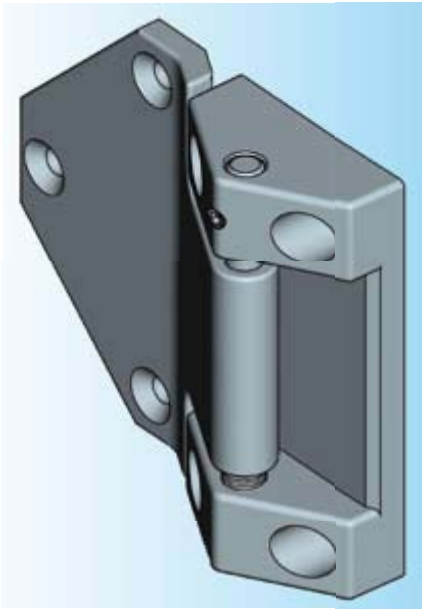
SMALL PANELS

- Spring hinges or all nylon hinges most suitable

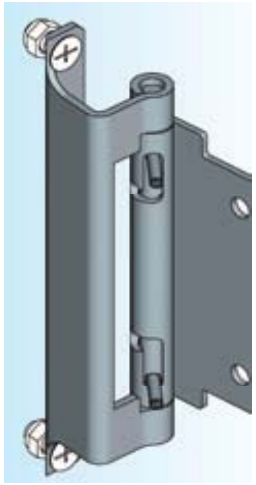
NEW HINGES

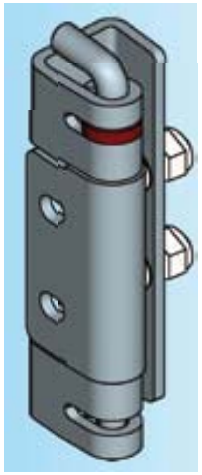
FEATURES

ADJUSTABILITY
Height +/- 4mm



CAPTIVE PIN
1031-U12, 13, 14





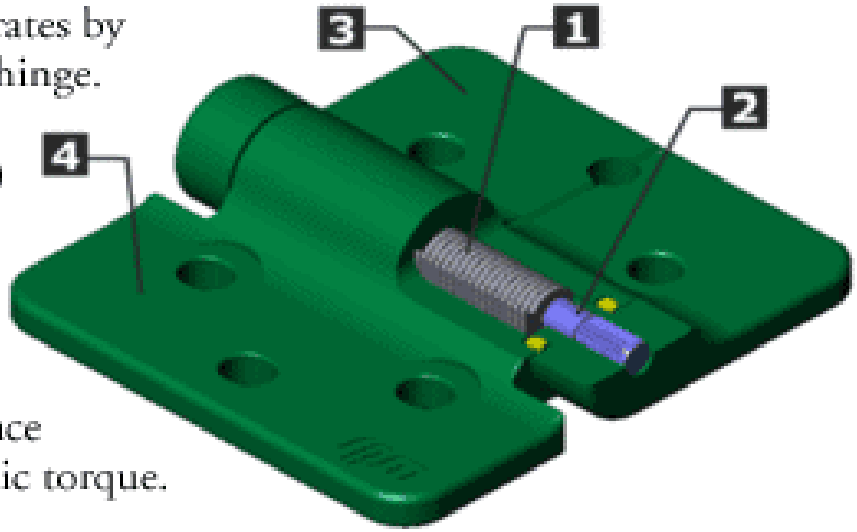
FRICTION HINGES

Friction hinges are typically used to hold something – like a monitor in position or to hold open a cover to allow easy access.

Often they are used as a lower cost, easy to install, alternative to gas springs.

FRICTION HINGES

The patented Reell friction hinge operates by providing torque along the axis of the hinge. In the hinge pictured at right, this is achieved by using a series of "clips" (1) that are pressed on to a shaft (2). The end of the shaft is attached to one side of the hinge (3), while the other side (4) is attached to the foot of the clips. When rotated, the clip/shaft interference provides a consistent static and dynamic torque.



FRICTION HINGES

Torque ranges (per hinge) for various types