**Information on flange face surface damage:**

Flange damage during fabrication or at site during construction has been a concern and what is currently out there for protection products hasn't done the job well enough to save clients lost time and money due to rework for damaged flange raised faces. Our Flange Armour protection system products now give clients the confidence in protection they need.

The purpose of surface finish is to allow a gasket to conform to and seal the flange face. "Sealing Sense" in the April 2008 *Pumps & Systems* discussed the importance of ensuring that the choice of gasket and surface finish work together to maintain the appropriate level of sealing stress on the gasket. This update identifies some of the typical damage that occurs to a flange face, what the effect is and discusses a way to identify the practical limits for them.

**Gasket Sealing**

A gasket's role is to seal the space between the mating surfaces of a flange connection. This is accomplished when the bolt load compresses the gasket to a level of tightness that allows it to fill the gap between the mating faces and fill the small imperfections in the sealing surfaces.

With proper flange design and gasket installation, the stress on the gasket will be sufficient to create a barrier between the pressurized side of the gasket and hold it securely in place. All the paths of leakage are effectively blocked between the gasket and flange. However, what if portions of the flange face are damaged? Will the flange leak if used or should the end user replace it? Let's look at flange face damage and its potential effect on gasket sealing.

**Types of Damage**

Over time and for any number of reasons, damage can occur to flange faces. Each damaged area will tend to create a potential leak path that the gasket must try to seal.

Some common types of flange surface damage, their characteristics and possible causes are listed below:

- **Scratches**—This type damage is narrow and elongated with sharp, shallow bottoms. However, depending on the force that created them, they can be deep. Frequently, this type damage is created by a sharp object dragging across the flange face. These objects may include the bristles of a wire brush or a tool, such as a chisel.
- **Gouges**—These are wide and elongated with blunt, rounded bottoms and are created by a dull object dragging across the flange face. Gouges can be caused by objects—such as a screwdriver, flange jack or chisel.
- **Pits**—This damage is usually small, somewhat rounded areas of concentrated material loss created by corrosion. Often, pits occur in clusters or groups.
- **Dents**—This type damage can be sharp or blunt non-elongated areas caused by some form of impact. Dents sometimes result from equipment collisions caused by positioning the mating flanges using cables and rigging.

The most common events that create surface finish damage are indentations that occur from removing previously used gasket material from the sealing surface. Tools, such as chisels or screw drivers, should be avoided. A brass wire brush is preferred.

**Damage Impact**

What the damage types have in common is that they reduce the sealing tightness of the gasket against that particular (damaged) area of the flange face. If these defects are small and few, the leak tightness of the bolted connection will not be significantly impacted. If a defect is large (especially across the radial direction of the flange face) or several defects are grouped in a small area, the leakage path can exceed the ability of the gasket to block it, and leakage can occur.

Whether the gasket can successfully seal these damaged areas depends on their size, depth, orientation and number. The question then becomes, how large is too large, or what is the limit on the number of small defects in a single area? Is the flange “fit” to be returned to service?