

**Fretting** refers to wear and sometimes corrosion damage at the asperities of contact surfaces. This damage is induced under load and in the presence of repeated relative surface motion, as induced for example by vibration. The ASM Handbook on Fatigue and Fracture defines fretting as: "A special wear process that occurs at the contact area between two materials under load and subject to minute relative motion by vibration or some other force. The amplitude of the relative sliding motion is often in the order from micrometers to millimeters, but can be as low as 3 to 4 nanometers.

**Galling** is a form of wear caused by adhesion between sliding surfaces. When a material galls, some of it is pulled with the contacting surface, especially if there is a large amount of force compressing the surfaces together. Galling is caused by a combination of friction and adhesion between the surfaces, followed by slipping and tearing of crystal structure beneath the surface. This will generally leave some material stuck or even friction welded to the adjacent surface, while the galled material may appear gouged with balled-up or torn lumps of material stuck to its surface.

**Cold welding** is a bonding process during which two solids are forced to form a single piece by applying adequate pressure. This disrupts the barriers of the oxide layers on the interface, and brings about an enduring adhesion between the two surfaces.

Unlike the conventional welding process, there is no application of severe heat or melting of the material at the interface. Both the surfaces continue to remain in solid phase throughout this forced adhesion process.

Surfaces that are exposed to atmospheric conditions are generally covered by physically or chemically absorbed layers. Even in the absence of absorbed water, grease or other macroscopic contaminants, there remain surface layers, such as oxide and nitride layers, which are formed under terrestrial conditions on pure metal surfaces, and can be regarded as natural protection layers against cold welding.

Under vacuum or in a space environment, once these layers are removed by wear, they are not rebuilt and the exposed clean metal surfaces show a higher propensity to cold welding. So, their adhesive and tribological behaviours under vacuum or in a space environment differs significantly from those under terrestrial conditions

**Abrasive wear** occurs when either a rough, hard surface or a soft surface with hard particles embedded in its surface slides over a softer material. A plowing action takes place. When abrasive wear is the result of loose wear particles and contaminants, it is called three-body abrasive wear.