

Abstract

Galling characteristics of corrosion-resistant metals

By

Kenneth G. Budinski,

Bud Labs

3177 Latta Road #146

Rochester, New York 14612-3092 USA

Presented at the 23rd IRG OECD Conference in Coimbra Portugal, May 6 2002

Silicon nickel, a cast nickel alloy containing about 4 percent silicon, had been used for threaded couplings in chemical delivery systems for over 40 years, because it had necessary corrosion resistance and did not gall when mated with 316 and other stainless steels. In 2001, it was learned that this material was no longer available from long-time sources, and a laboratory study was undertaken to find a substitute alloy.

Laboratory tests evaluated the threshold galling stress (using ASTM G 98) of six stainless steels against two titanium alloys and two proprietary alloys that allegedly have good galling resistance. Silicon nickel was also tested as the material to "beat" in galling tests.

The silicon nickel exhibited poor galling characteristics against all test counterfaces. Titanium with 6% Al and 4% V showed good galling resistance against all counterfaces but produced significant transfer to some counterfaces. One of the galling-resistant alloys exhibited good galling characteristics but transferred less.

The galling-resistant alloy, which was essentially an austenitic stainless steel with increased nitrogen and manganese, was recommended as the substitute for the silicon nickel. It is thought that the silicon nickel worked in service because its porosity and silicide inclusions produced very high surface roughness in machining, and it was the porous, rough surface that provided its apparent galling resistance.