NASA TECH BRIEF

Coating Permits Use of Strain Gage in Water and Liquid Hydrogen

The problem:

To provide a protective coating that will permit a strain gage to be used for making measurements in water and subsequently in liquid hydrogen. Previously, no single strain gage installation could be satisfactorily used in both environments.

The solution:

A strain gage installation consisting of a selected foil strain gage bonded with a modified commercial heat-curing epoxy cement and covered with a three-layer coating of commercially available protective materials.

How it's done:

The surface on which the gage is to be mounted is first subjected to a thorough cleaning and abrading treatment. A drop of distilled water will flow freely on a properly prepared surface.

A 1-mil precoat of a modified heat-curing epoxy resin is applied to the prepared surface and allowed to dry for 4 hours. A 1-mil coat of this resin is applied over the precoat, and the gage and tabs are positioned on the coated surface. The installation is then cured for 4 hours at 225° F under 5 psi clamping pressure. Leads from Teflon-insulated wires are soldered to the tabs. A small dab of the epoxy resin is used to bond the lead wires to the test specimen.

A 1-mil coat of a flexible nitrile rubber is brushed over the entire gage and tab area and over the lead wires. This coat is allowed to dry for 15 minutes. A 1-mil coat of a quick-drying resin is applied over the same area and allowed to air-dry for 15 minutes. The last step in the installation procedure is to apply a thin coat of a silicone waterproofing lacquer over the air-dried resin.

Notes:

1. When the gage installation is immersed in liquid hydrogen, the outer silicone lacquer protective layer may develop cracks, which will destroy its waterproofing characteristics. Therefore, when the gage is to be used for strain measurements in water and in liquid hydrogen, the measurements in water must take precedence.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama, 35812
   Reference: B66-10192

Patent status:

No patent action is contemplated by NASA.

Source: B. B. Berven
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