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Goddard Space Flight Center



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Plating by Glass-Bead Peening

A glass-bead peening technique permits substrates (primarily metallic) to be plated with various metals (or other materials) at normal temperature and without vacuum, electricity, liquids, or baths of any kind. The peening is accomplished by using compressed air to apply concurrent streams of small glass beads and powdered plating material to the substrate.

The process requires a compressed air source, a work chamber, supplies of glass beads and plating powder, a nozzle to direct the stream, and Almen strips for gaging the peening effect. The sizes of the beads and of the nozzle, the nozzle's distance from the substrate, the duration of the stream application, the nature and size of the plating material, the method for introducing the material into the airstream, and the force of the airstream can be varied. Areas that are not to be plated can be masked with any one of several pressure-sensitive tapes or films that can be easily removed.

Substrates of copper, steel, magnesium, and aluminum alloy have been plated with aluminum or nickel. The plating rate is determined by such conditions as the sizes of the beads and of the plating powder, the air pressure, and the ratio of powder to beads. The coating thickness is determined by the duration of the spray. Various nonmetals, such as polytetrafluoroethylenes and solid lubricants, can also be applied to metals.

One advantage of this method is that, during the plating process, the surface is mechanically worked. This can be employed to produce surface hardening, increased resistance to fatigue by the removal of residual stresses, the elimination of tool marks, or the development of galvanic

potentials for specific applications. In addition, plating is more rapid than other means, a greater variety of metals may be employed, no hazardous chemicals are required, the equipment is simpler to operate and less expensive than electroplating systems, and there is no danger of hydrogen embrittlement. In addition, the stream of glass beads can be used to clean the substrate surface before the metal powder is introduced.

The mechanical working may introduce some distortion in thin-gage metallic substrates. Though generally undesirable, this feature can be used to induce specific curvatures.

Note:

No further documentation is available. Specific questions however, may be directed to:

Technology Utilization Officer
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Patent status:

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