NASA TECH BRIEF

Weldable Aluminum Alloy Has Improved Mechanical Properties

The problem:

To develop a weldable aluminum alloy with mechanical properties superior to those of commercially available weldable aluminum alloys.

The solution:

A series of new alloys based on aluminum alloy 2219-T87, which nominally contains 6.53 percent copper and 0.30 percent manganese. The alloy with the best mechanical properties in this series, designated X2021, was produced by the addition of 0.15 percent cadmium and 0.05 percent tin to the 2219-T87 alloy. The ultimate tensile strength, yield strength, percent elongation, and notch-tensile ratio of the X2021 alloy were found to be from 8 to 14 percent higher than typical values for the basic 2219-T87 alloy. The new alloy has good resistance to stress-corrosion cracking, shows unchanged strength and formability after storage at room temperature, and can be pre-aged, stretched, and aged. The recommended heat treating temperature for this alloy is 990°F (solidus temperature, 1001°F). With respect to weldability, the new alloy appears to be as good as the 2219-T87 alloy. X2021 is well suited for use at cryogenic temperatures; all of its mechanical properties at −423°F are better than at room temperature.

Notes:

1. Several aluminum alloys of the 7000 series, such as 7075 and 7178, have slightly higher ultimate tensile strengths than the new alloy, but are not as weldable.
2. Toxic fumes of cadmium oxide are evolved when the new alloy is welded. Adequate ventilation must therefore be provided to safeguard welding operators from these fumes.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B66-10445

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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