DEVELOPMENT OF HYDROGEN RESISTANT ALLOYS

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The most hostile operating environments in the O_2/H_2 Space Shuttle Main Engine are gaseous hydrogen and hydrogen/water vapor. After years of evaluating commercially available alloys, only a few high strength alloys have been found that perform satisfactorily in these environments.

In a search for hydrogen tolerant alloys, this paper describes the evaluation of various compositions of the Fe-Ni-Co system with elemental additions of Cr, Cb, Ti and Al. After processing, notched tensile specimens were tested in 5000 psi hydrogen at room temperature as the prime screening test. The H_2/air ratio was used as the selection/rejection criteria.