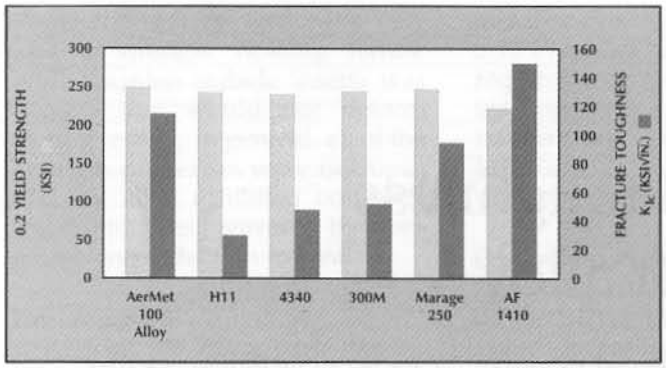

Fig. 1 — Yield strength and fracture toughness (darker bars) of AerMet 100 and other ultrahigh-strength alloys commonly used for aerospace applications such as landing gear.

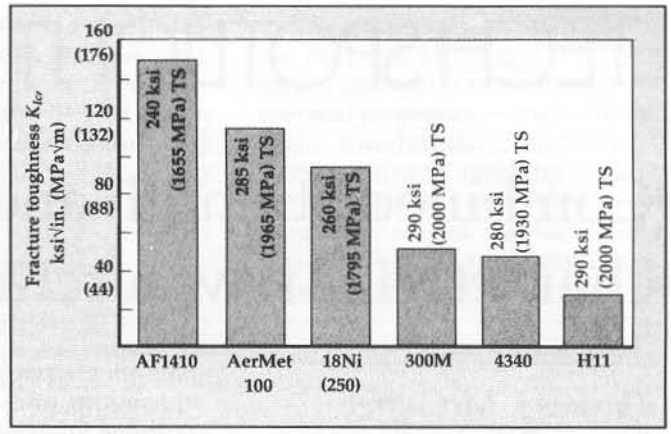

Fig. 2 — Ultrahigh-strength alloys exhibit dramatic differences in fracture toughness. For example, in this comparison, AISI H11 has a slightly higher tensile strength (TS) than AerMet 100, but its fracture toughness is approximately one-fourth that of the CarTech alloy. Longitudinal data.

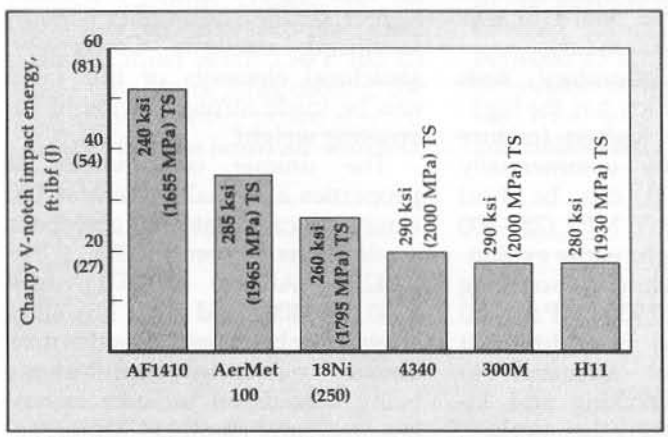

Fig. 3 — Charpy V-notch tests show large differentials in toughness among high-strength alloys. Longitudinal data. Tensile strength (TS) values also are given for each alloy.

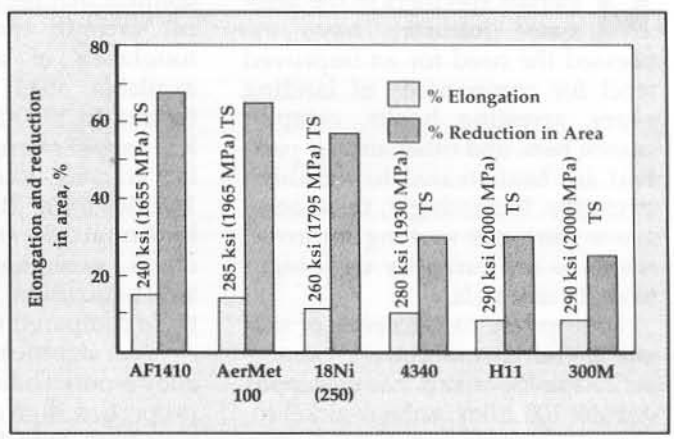

Fig. 4 — Elongation and reduction in area values also vary widely among high-strength steels. Longitudinal data. Tensile strength (TS) values also are given for each alloy.

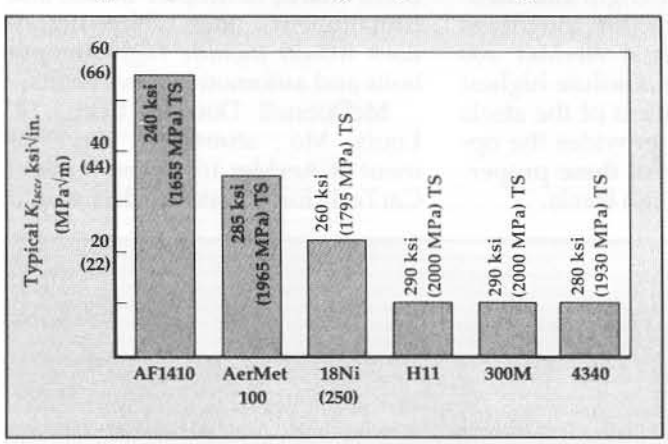

Fig. 5 — K_{Iscc} is the threshold stress intensity for stress-corrosion cracking. High-strength, high-toughness AerMet 100 has superior resistance to SCC. Immersion test in 3.5% NaCl, longitudinal data. Tensile strength (TS) values also are given for each alloy.

reduce the weight of landing-gear components for its A-12 aircraft. It wanted to replace 300M with a modification of AF1410 that would provide strength comparable to that of 300M with increased fracture toughness and the stress-corrosion cracking resistance that the U.S. Navy required.

Although the A-12 program was canceled, the information and data obtained were valuable and led to the use of AerMet 100 in place of 300M in F/A-18 E/F aircraft landing gear. The U.S. Navy requires a tougher, more fatigue-resistant alloy for aircraft that must land on carrier decks. It also insists on superior resistance to stress-corrosion cracking, especially in chloride-containing environments.

The U.S. Army also is using AerMet 100, instead of AISI 4340, in the LHX light helicopter because of its excellent ballistic tolerance and its resistance to stress-corrosion cracking.

Mechanical properties compared

Extensive tests were conducted by Battelle, Columbus, Ohio, and CarTech to obtain comparative mechanical properties for AerMet 100 and five other alloys used for aerospace applications because of their high-strength characteristics.

Strength, toughness: Figure 1 shows how yield strength and fracture toughness are combined in each alloy: All of the alloys with yield strength comparable to that of AerMet 100 exhibit relatively low fracture toughness. Values for fracture toughness range from 125 MPa√m (115 ksi√in.) for AerMet