# NASA TECH BRIEF



## High-Strength Magnetic Materials

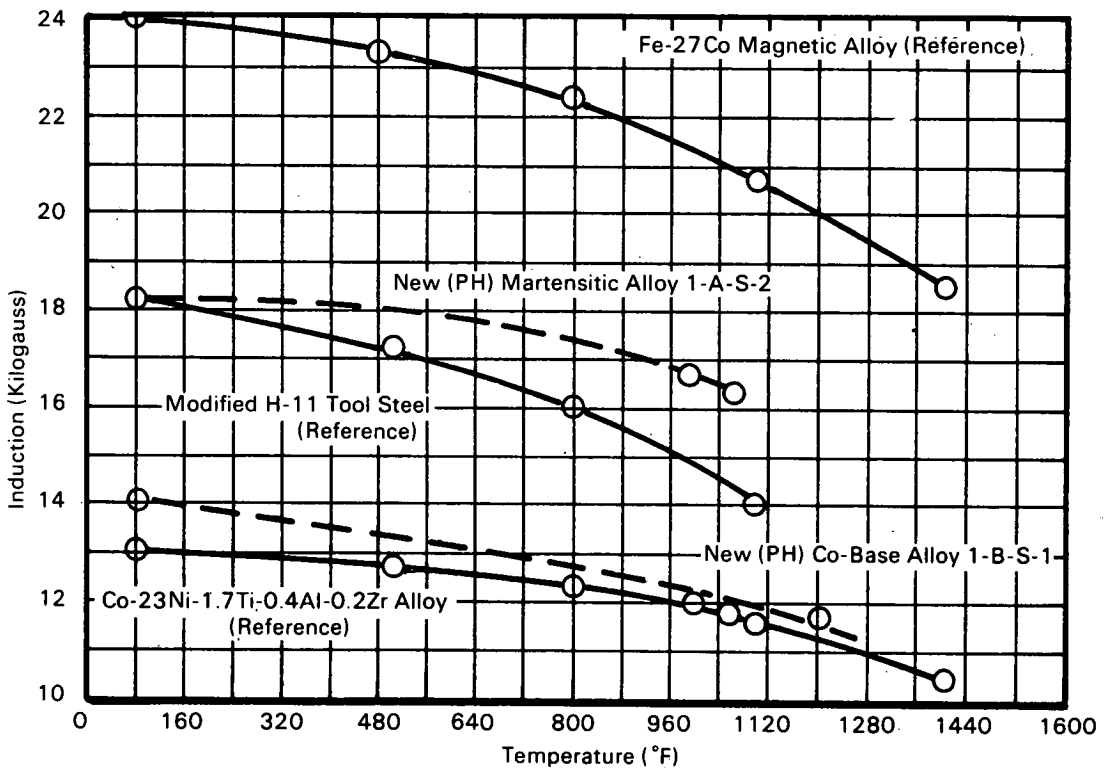


Figure 1. Magnetic Induction Versus Temperature

Two new high-strength magnetic alloys have been developed which are suitable for operation in the 800° to 1600°F range: a new class of precipitation-hardened maraging steels designated martensitic alloy 1-A-S-2, and a precipitation-hardened cobalt base alloy, 1-B-S-1 Typical composition (in weight %) of the new martensitic alloy is (Fe-12Ni-30Co-1W-3Ta-0.04Al-0.4Ti), and of the cobalt-based alloy is (Co-5Fe-15Ni-1.2 Al-5.0Ta-0.2Zr).

The martensitic alloy has higher temperature capabilities than the comparable commercial alloy, modified H-11 tool steel (Fe-5Cr-1Mo-1V) and is considered to be a possible replacement for it. (See Figure 1. Magnetic Induction Versus Temperature—at a magnetization of 250 to 300 oersteds for high-temperature magnetic alloys developed in this program compared to existing alloys.) The precipitation-hardened cobalt-base alloy has greatly improved creep resistance over

(continued overleaf)

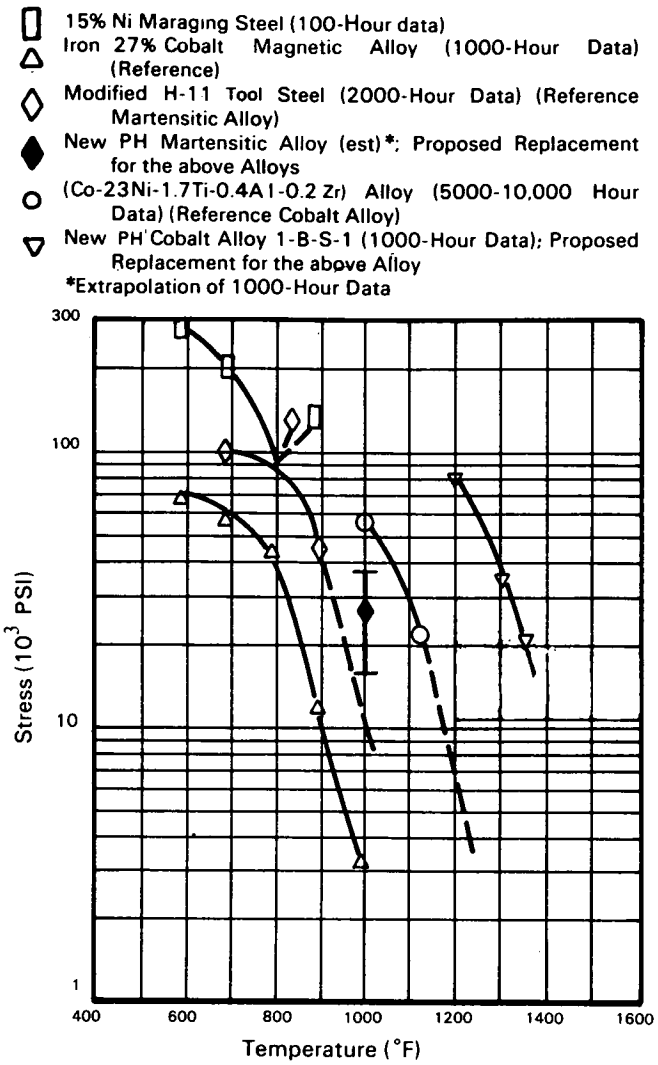


Figure 2. Stress to produce 0.4 percent creep strain in 10,000 hours based upon extrapolations using the Larson-Miller parameter.

that of the best comparable commercial alloy, (Co-23 Ni-1.7Ti-0.4Al-0.2Zr) and is considered to be a possible replacement. (See Figure 2. Comparison is made between alloys developed on this program and commercially available alloys.) These new alloys have application in high-temperature inductors and alternators where creep resistance and magnetic induction govern the weight of a generator.

## Notes:

1. The following documentation may be obtained from:

   Clearinghouse for Federal Scientific and Technical Information
   Springfield, Virginia 22151
   Single document price $3.00
   (or microfiche $0.65)

   Reference:
   NASA CR-1460 High Temperature (800° to 1600°F) Magnetic Materials

2. Technical questions may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B70-10596

## Patent status:

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act [42 U.S.C. 2457(f)], to the Westinghouse Electric Corporation, Wapak Road, Lima, Ohio.

Source: K. Detert of
Westinghouse Electric Corporation
under contract to
Lewis Research Center
(LEW-10697)