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QUARTERLY PROGRESS REPORT NO. 1A

MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

for

Office of Research Grants and Contracts
Code BG
National Aeronautics and Space Administration

July 1962

Metallurgical Research Laboratories
Department of Chemical Engineering and Metallurgy
Syracuse University

MET. E. 873-6111-QP1A

QUARTERLY PROGRESS REPORT NO. 1A
(Period from April 23, 1962 to June 30, 1962)

8131

MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

for

Office of Research Grants and Contracts
Code SG
National Aeronautics and Space Administration

by

R. J. Sell, C. Chave and V. Weiss

Contract No. NASr-43
Account No. 1620.873

This report covers work performed during the period April 23, 1962 through the period June 30, 1962. The period reported was shortened to enable the data herein to be available for the sixth meeting of the Special Committee for Materials Research for Supersonic Transports which meets in Washington, D. C. on July 17 and 18, 1962.

Data obtained during this period for Ti-5Al-2.75Cr-1.25Fe (RS-140) annealed and Ti-4Al-3Mo-1V (RS-115) annealed, is shown in figures 1 through 4. Preliminary data on Armco PH 15-7 Mo heat number 880656, in condition CH-900 is also presented in figures 5 and 6. In addition notch strength ratio versus stress concentration factor for Ti-6Al-4V (RS-120A) in the annealed condition and solution treated and aged condition and Republic PH 15-7 Mo in condition CH-900 and RH-1100 are presented in figures 7 and 8.

Table I shows stress concentration factor (K_t) for the various notch root radii used.

Ti SS
Tensile strength
modulus of elasticity Ti SS
yield strength Ti SS
notch strength Ti SS
end

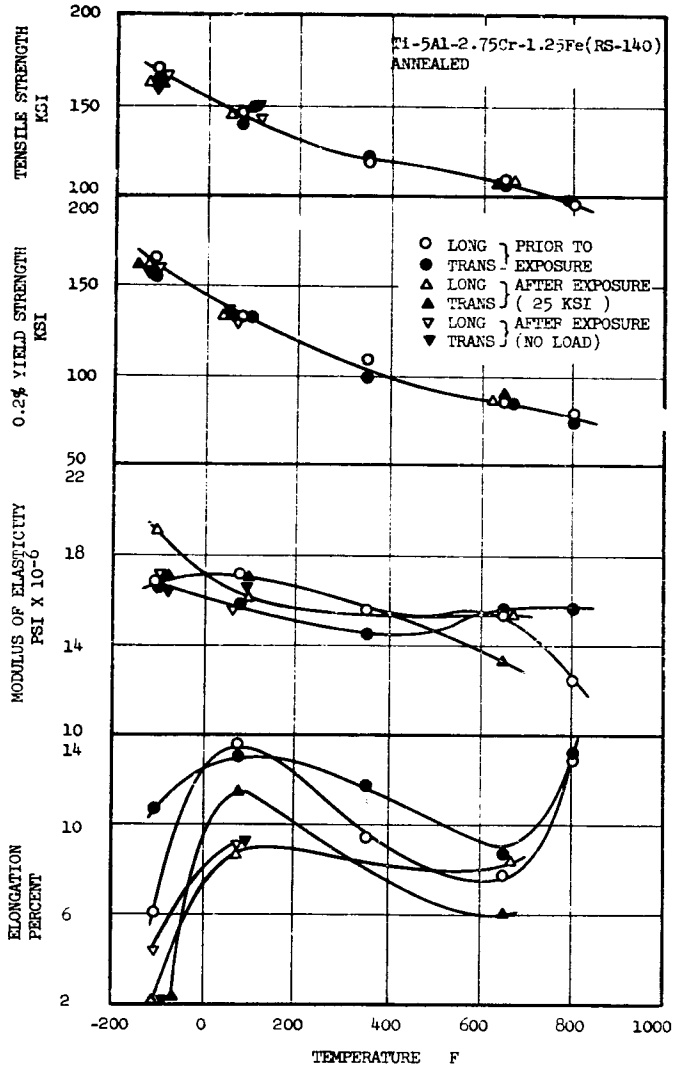

FIG. 1 THE EFFECT OF TESTING TEMPERATURES ON THE TENSILE STRENGTH, THE YIELD STRENGTH, THE MODULUS OF ELASTICITY AND THE ELONGATION IN PERCENT OF Ti-5Al-2.75Cr-1.25Fe (RS-140)

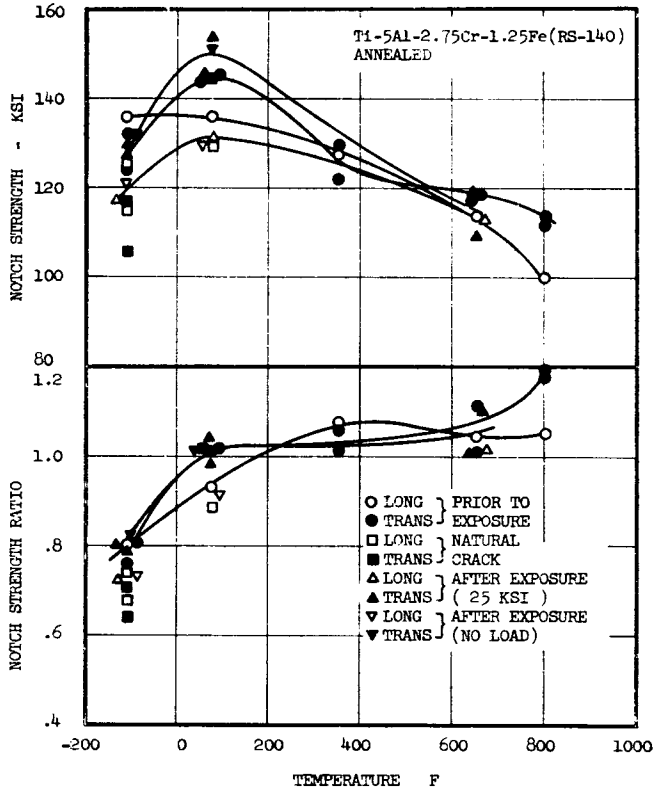

FIG. 2 THE EFFECT OF TESTING TEMPERATURES ON THE NOTCH STRENGTH AND NOTCH STRENGTH RATIO OF Ti-5Al-2.75Cr-1.25Fe (RS-140) ANNEALED. MATERIAL TESTED PRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION.

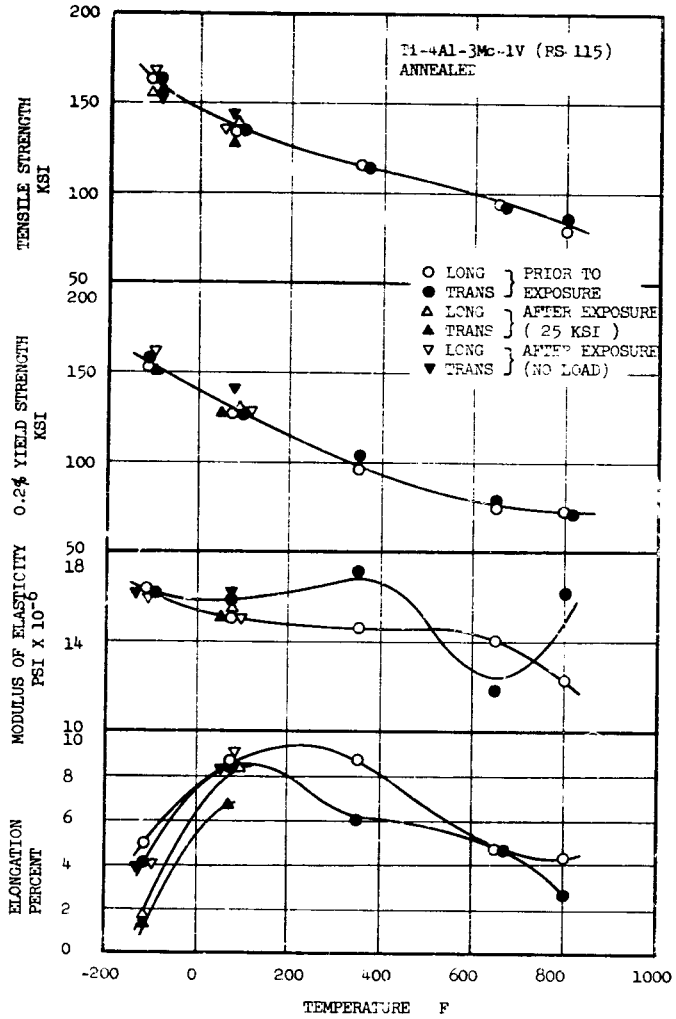

FIG. 3 THE EFFECT OF TESTING TEMPERATURES ON THE TENSILE STRENGTH, THE YIELD STRENGTH, THE MODULUS OF ELASTICITY AND THE ELONGATION IN PERCENT OF Ti-4Al-3Mo-1V (RS-115) ANNEALED. MATERIAL TESTED PRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION.

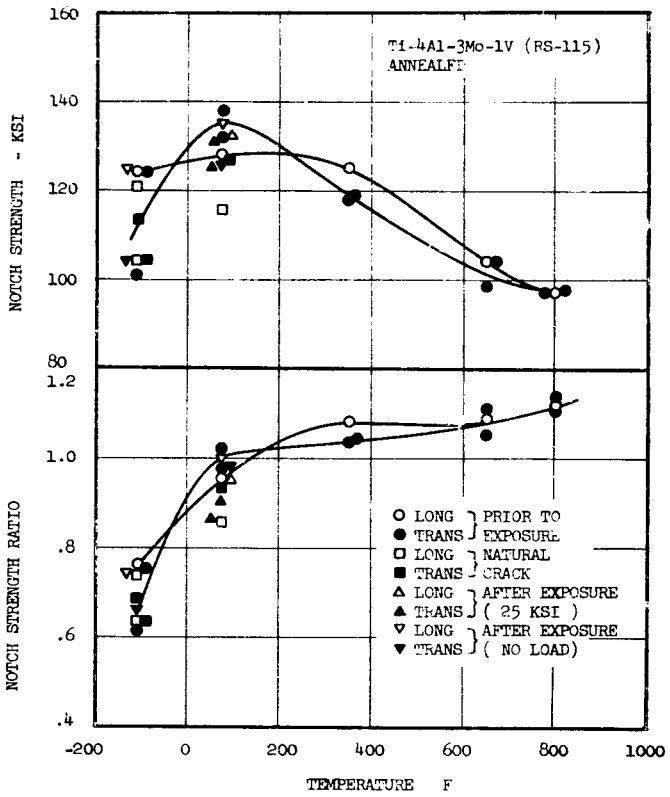

FIG. 4 THE EFFECT OF TESTING TEMPERATURES ON THE NOTCH STRENGTH AND NOTCH STRENGTH RATIO OF Ti-4Al-3Mo-1V (RS-115) ANNEALED. MATERIAL TESTED PRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION.

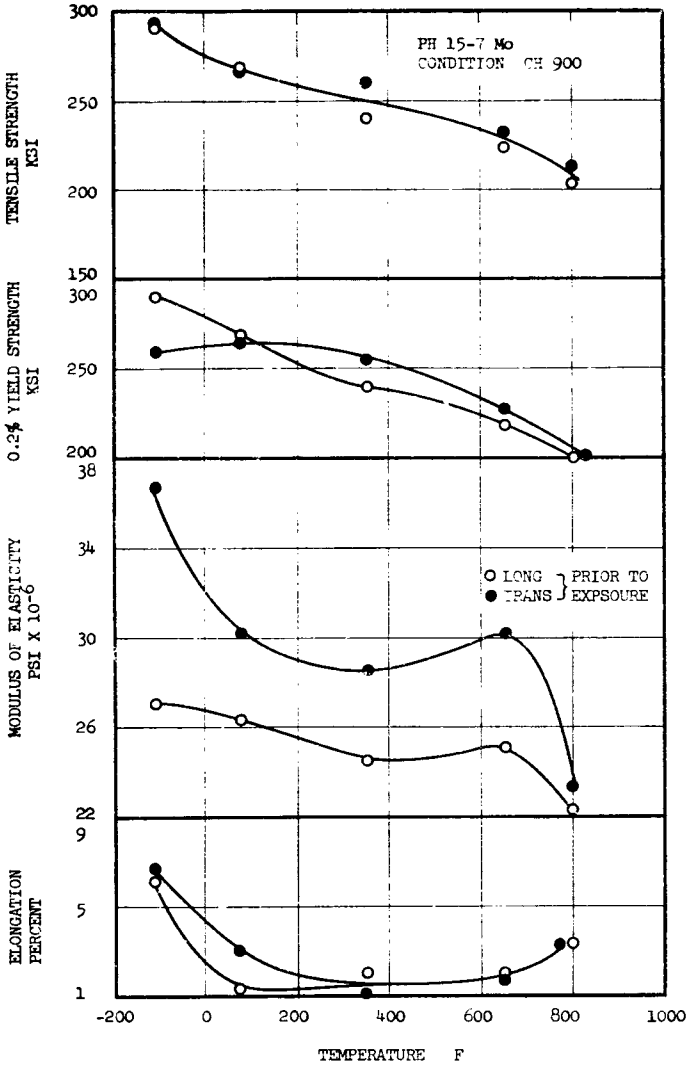

FIG. 5 THE EFFECT OF TESTING TEMPERATURES ON THE TENSILE STRENGTH, THE YIELD STRENGTH, THE MODULUS OF ELASTICITY AND THE ELONGATION IN PERCENT OF PH 15-7 Mo CONDITION CH 900. MATERIAL TESTED PRIOR TO EXPOSURE

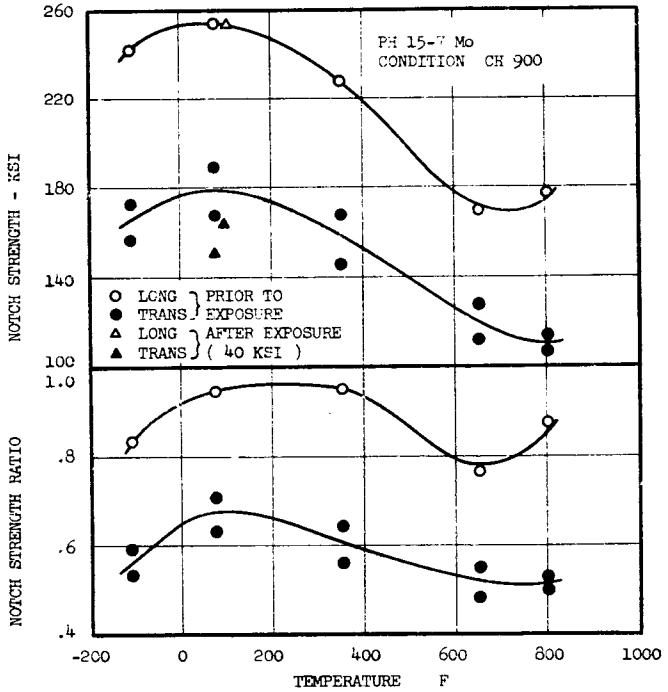

FIG. 6 THE EFFECT OF TESTING TEMPERATURES ON THE NOTCH STRENGTH AND NOTCH STRENGTH RATIO OF PH 15-7 Mo CONDITION CH 900. MATERIAL TESTED PRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION.

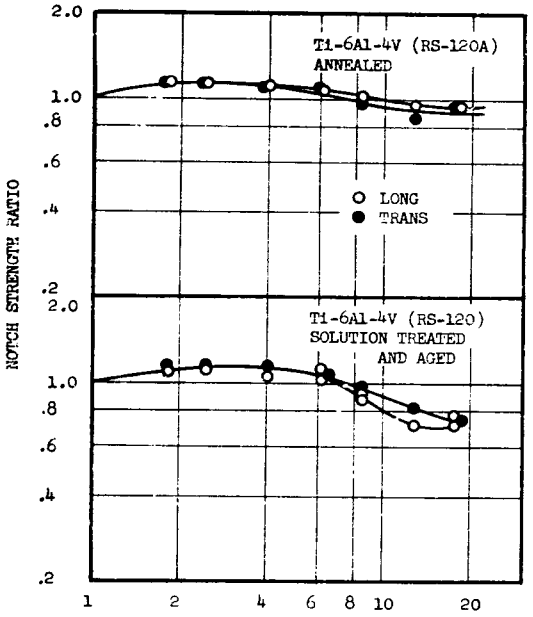

FIG. 7 NOTCH STRENGTH RATIO VERSUS STRESS CONCENTRATION FACTOR (K_t) FOR Ti-6Al-4V (RS-120A) IN THE ANNEALED CONDITION AND IN THE SOLUTION TREATED AND AGED CONDITION. TESTED AT 75F. SINGLE POINT DESIGNATES AVERAGE OF TWO TESTS HAVING CLOSE NSR VALUES.

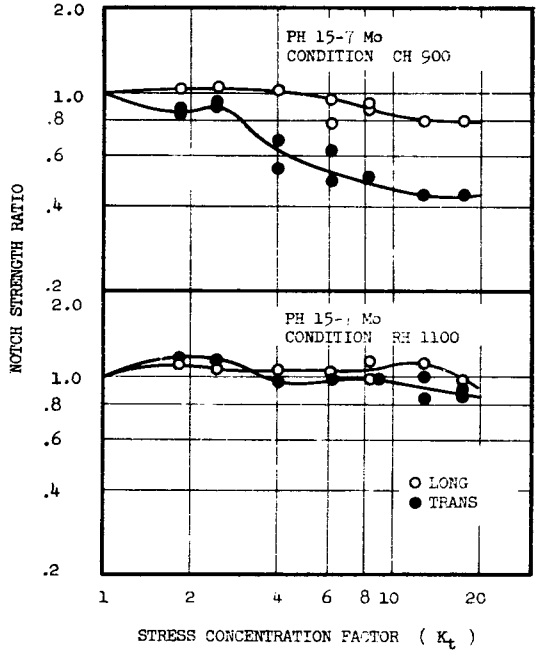

FIG. 8 NOTCH STRENGTH RATIO VERSUS STRESS CONCENTRATION FACTOR (K_t) FOR PH 15-7 Mo IN CONDITION CH-900 AND IN CONDITION RH-1100. TESTED AT 75F. SINGLE POINT DESIGNATES AVERAGE OF TWO TESTS HAVING CLOSE NSR VALUES.

TABLE I

NOTCH ROOT RADII	STRESS CONCENTRATION FACTOR (K_t)
<.001	>17.31
.002	12.75
.005	8.30
.010	6.07
.025	4.00
.080	2.48
.187	1.83

END