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O T T A W A

May 21st, 1943.

## R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1410.

Endurance Tests on 1/8-inch, 7x19 Galvanized  
Preformed "Trulay" Aircraft Control Cable.

Bureau of Mines  
Division of Metallic  
Minerals  
Ore Dressing  
and Metallurgical  
Laboratories

CANADA  
DEPARTMENT  
OF  
MINES AND RESOURCES  
Mines and Geology Branch

Addressed to the Director, O T T A W A

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Source of Material and Object of Investigation:

On April 28th, 1943, Mr. J. Bolingbroke, of the Canada Wire and Cable Company Limited's research and test laboratories, Toronto, Ontario, submitted seventeen 15-foot lengths of 1/8", 7x19 galvanized preformed "Trulay" aircraft control cable for endurance testing to Specification AN-RR-C43.

In addition, on May 6th, a 100-foot sample of 1/8", 7x19 cable was submitted for experimental testing in order to check and compare results of endurance tests made with the Bureau of Mines and Krouse fatigue testing machines, now in use at these Laboratories.

Test Work:

The following table gives the results obtained on the samples submitted on April 28th, 1943:

Table I.

Endurance Test and Residual Strength Results.

Test No.	Sample No. <sup>a</sup>	No. of reversals	Breaking load, in pounds	Tester used	Pulleys used
			Top pulley	Bottom pulley	
1	1	70,000	414	1,282	B.of M. B.of M.
2	1	"	Broke	828	" "
3	2	"	152	1,152	" "
4	2	~70,000	Broke	510	Krouse Krouse
5	6/1	70,000	1,146	1,480	B.of M. B.of M.
6	7/1	"	796	1,180	Krouse Krouse
7	9/1	"	1,250	1,320	" "
8	10/1	"	1,530	1,430	B.of M. "
9	11/1	~70,000	284	Broke	Krouse "
10	12/1	39,086	Broke	Frayed badly	B.of M. B.of M.
11	13/1	36,000	Frayed badly	Broke	Krouse Krouse
12	14/1	70,000	1,290	1,020	B.of M. B.of M.
13	15/1	70,000	784	1,210	B.of M. Krouse
14	16/1	36,954	Broke	Frayed badly	B.of M. Krouse
15	17/1	40,000	586	Broke	Krouse Krouse
16	18/1	70,000	1,290	1,180	B.of M. B.of M.
17	19/1	61,914	Broke	620	B.of M. B.of M.,

<sup>a</sup> All sample numbers listed preceded by F 130-218.

In addition to the above, the following results were obtained on samples taken from the 100-foot length of 1/8", 7x19 cable sent in on May 6th, 1943:

(Continued on next page)

(Test Work, cont'd) -

Table II.

Endurance Test and Residual Strength Results.

Test No.	Sample No. <sup>a</sup>	No. of reversals	Breaking load, in pounds		Tester used	Pulleys used
			Top pulley	Bottom pulley		
18	2/1	70,000	840	1,610	B.of M.	Krouse
19	2/1	70,000	1,440	1,270	"	"
20	2/1	"	780	1,306	"	"
21	2/1	"	1,306	1,076	"	"
22	2/1	"	790	1,208	Krouse	"
23	2/1	"	752	626 <sup>ee</sup>	B.of M.	B.of M.

<sup>a</sup> All sample numbers listed preceded by F 130-218.

<sup>ee</sup> Top pulley reversed from position used in Test No. 3.

In view of the wide difference between the above results and those obtained in Tests Nos. 2 and 3 (Table I), the possibility that these two cable samples were obtained from a different reel should not be overlooked.

Tensile Tests on "As Received" Samples -

The tensile strength of each sample was determined in the "as received" condition and the following are the results obtained:

Sample No.	Breaking load, in pounds
1	2,210
2/1 (Apr. 28/43)	2,260, 2,400
2/1 (May 6/43)	2,140
6/1	2,200
7/1	2,120
9/1	2,020
10/1	2,040
11/1	2,200
12/1	2,220
13/1	2,000
14/1	2,200
15/1	2,100
16/1	2,000
17/1	1,800 <sup>b</sup>
18/1	1,940
19/1	2,400

<sup>b</sup> Not enough sample to recheck this low result.

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Discussion of Results:

An analysis of the results obtained in these tests indicates that the Bureau of Mines and the Krouse fatigue testing machines give comparable results.

Summarizing, we find that out of 23 tests nine samples failed the endurance test for both pulleys (of these, seven broke in the endurance test) and seven failed for one pulley. Of the latter, five samples had breaking loads close to 80 per cent of the specified 1,000 pounds.

Conclusions:

These tests definitely indicate that the cables submitted are not consistently satisfactory. It is felt that cable improvement is a lubrication problem.

- Selective lubrication must be used. Lubricants  
for made-up cables must be selected carefully  
and the number of lubricant points must be limited.

NBB:PES.