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CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

OTTAWA

IR 59-87

MINES BRANCH INVESTIGATION REPORT IR 59-87

IDENTIFICATION OF BLOWER BLADE ALLOY

by

A. COUTURE

PHYSICAL METALLURGY DIVISION

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01-79892/8

COPY NO. 10

OCTOBER 1, 1959

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Mines Branch Investigation IR 59-87

IDENTIFICATION OF BLOWER BLADE ALLOY

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A. Couture*

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SUMMARY OF RESULTS

Qualitative spectrographic analysis and metallographic examination suggest that the blade material probably corresponds to an alloy of the type SC64 or SC53 (Alcan 117).

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INTRODUCTION

On September 17, 1959, the Non-Ferrous Metals Section of this Division received a blower blade from the Twinn Pest Control Company Limited, Ottawa. The following information was requested:

- a) Chemical composition of the blade.
- b) Canadian and U.S.A. equivalents of the alloy used.
- c) Physical properties of the alloy.

It was also requested to save the blade and return it to the company for future use in the blower.

SPECTROGRAPHIC ANALYSIS

A small sample was ground off the free end of the blade and sent for spectrographic analysis. Unfortunately the Mines Branch Spectrographic Laboratory could supply only a qualitative analysis. Consequently it is not possible to identify the alloy positively without a chemical analysis, but this would necessitate the destruction of the blade. The Spectrographic Laboratory report shows that aluminium is the major constituent, while silicon, iron, copper and nickel are minor constituents. A spot test did not give any information, probably due to the interference of the several addition elements with one another.

MICROSCOPIC EXAMINATION

Metallographic examination of the hub revealed the presence of coring, CuAl_2 and a large number of silicon needles. Coring would indicate that the blade was not solution treated. The amount of CuAl_2 and silicon needles suggests that the alloy may contain from 2 to 4% copper and 5 to 8% silicon. The microstructure also shows crystals of Al-Fe-Si.

DENSITY AND HARDNESS

The density of the whole blade is 2.78 g/cc and its hardness 80-85 Rockwell E (approx. 75-80 BHN).

EQUIVALENT SPECIFICATIONS

The original blade was made in the U.K. and, from visual examination, appears to be a permanent mould casting. The tests carried out suggest that the closest Canadian specification to the original material is CSA Spec. HA3-1958 Alloy SC53 (Alcan 117). Alternatively ASTM Specification B179-58 Alloy SC64B may be considered equivalent. The specified composition ranges are given below:

	<u>SC64B</u>	<u>SC53(Alcan 117)</u>
Copper, %	3.3 - 4.3	2.0 - 4.0
Iron, %	0.8*	0.7*
Magnesium, %	0.1	0.15
Manganese, %	0.5	0.3 - 0.7
Nickel, %	0.35	0.3
Silicon, %	5.5 - 7.0	4.0 - 6.0
Titanium, %	0.25	0.2
Zinc, %	1.0	0.2

* Unless a range is shown, single values are the maximum amounts permitted.

MECHANICAL PROPERTIES

The specified mechanical properties of these alloys in the as-cast condition are as follows:

	<u>SC64B</u>		<u>SC53(Alcan 117)</u>	
	<u>Sand Cast</u>	<u>Permanent Mould</u>	<u>Sand Cast</u>	<u>Permanent Mould</u>
Ultimate Strength, 1000 psi	23	27	20	24
Yield Strength, 1000 psi	13	14	-	-
Elongation, % in 2"	1.5	2.5	1	4

CONCLUSIONS

It will be appreciated that, in the absence of chemical analysis, it is not possible to draw definite conclusions as to the specifications which cover the alloy used to make this blade. However, it seems that the blade is made of an alloy of the type SC64 or SC53 (Alcan 117).

The blade appears to have been cast in a permanent mould, rather than sand cast.

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