ACTION COPY (SENT)
TO ENGINE SUPT

Reference CB/WJM/SG P 219

21st, November 1961

Mngr.	✓	Eng. Supt.	✓
Sec.		A/F. Mngr.	
Asst. Sec.		Ca. Eng. A/D.	
Ch. Acct.	27 NOV 1961	Pers. Supt.	
		Supply Sales	
		Stores	
Ansd		Init.	

MISSION AUSTRALIENNE
S.N.E.C.M.A.
70, bld Kellermann

PARIS I3e
France

COMMONWEALTH AIRCRAFT CORPORATION PTY. LTD.
BOX 779 H P.O.
Elizabeth Street

MELBOURNE
Australia

CIRCULATION / COPIES 27/11/61	
E.F. MNGR ✓	FCT. ADM. SUPT.
DSGN. ENGR	MC. SHOP. SUPT.
DEV. ENGR ✓	PRODUCN. SUPT.
SERV. ENGR	ASSMLY. SUPT.
QUAL. ENGR	FOUNDRY. SUPT.
PROD. ENGR	METLGAL. SUPT.
MATL. ENGR	PROCESS SUPT.
CH. TL. DSGR	TOOL. PROD. SUPT.
CH. INSP. E. F.	TOOL. ROOM. SUPT.
A/F MANAGER	SUPT. INSPECTION

Attention, : the MANAGER

Subject : Projectors

Dear Sir,

The requirements of projectors for enrobing and blade inspection have been examined, as follows :

I) GENERAL.

a) Enrobing : S.N.E.C.M.A. use J & L projectors for this purpose, fitted by SNECMA, with the calipering attachment and matrix block supports. However, SNECMA have recently requested proposals from both J & L & Microtechnica for enrobing projectors, supplied fitted with the calipering equipment and supports for the matrix blocks. It is understood that the Microtechnica quote is some £ : 5000 cheaper than the J & L.

b) Inspection : S.N.E.C.M.A. use a number of Microtechnica projectors for this purpose. Officially, they are used to inspect the "first off" each batch of compressor blades, for inspection of blades during or after completion of a batch, where doubt exists as to size, shape or set up - i.e. for trouble shooting.
Production inspection, officially, is carried out 100% on the Solex Air gauging equipment. However, in practice, the projector is the instrument used in any cases of doubt and also, is frequently used as a 100% inspection method, in place of the Solex.
For turbine blades, they use the Microtechnica for 1st off inspection, for 10% during the batch and carry out 100% check of the aerofoil sections on either the Microtechnica or Sheffield Air Gauging Equipment. The use of the Solex or Sheffield equipment will be dealt with in another letter, and it will be

...

assumed that, initially at least, we will need to carry out all aerofoil inspection of both compressor and turbine blades by projector.
S.N.E.C.M.A. do not carry out a projector check on compressor blades which have been reworked at overhaul. They state that, in removing nicks there are clearly laid down limits for removal of metal and in general polishing, to remove corrossion, so little is removed, that it is unnecessary to project after rework. This sounds debate able, but the larger size of the ATAR blades may make it acceptable in practice.

2) CAPACITY REQUIRED

a) Enrobing : We shall require to use the Projector for setting up for enrobing the following blades,

Stages	NO
7 Rotor	61
8 "	63
9 "	89
7 Stator	72
8 Stator	78
	363

assuming 1 set per week, and taking 10 mns. which SNECMA officially allow for the enrobing operation.

$$\text{Hrs/Wk} = \frac{363 \times 10}{60} = 60\ \tfrac{1}{2}\ \text{Hrs/Wk.}$$

However, by actual check in the shop, Mr. BROWN has found that 5mns should suffice to enrobe the average blade, some being done in as little as 4mns.
On this basis Hrs/Wk : $\frac{363 \times 5}{60} = 30\ 1/4.$
With say 3 set ups/wk of $\frac{1}{2}$ hr. each = $1\frac{1}{2}$ hrs.

$$\text{Total} = 30\ 1/4 + 1\ \tfrac{1}{2} = 31\ 3/4.$$

i.e. one projector for enrobing should be sufficient.

b) Inspection
It is essential to have a projector for inspection, even if a Solex or Sheffield air gauging set up is used, as the projector is always used for reference and is also used to run over the master blade used to set up the Solex, each time the latter is set up for a new run.
In view of this, it appears reasonable to consider the use of the projector as the sole means of aerofoil inspection, when assessing capacity.

...

Rotor		Stator		Others	
Stages	No.	Stages	No.		
1	29	1	56	Turbine HP	: 73
2	27	2	46	Turbine LP	: 50
3	37	3	40	LP.NGVs	: 54
4	39	4	44		177.
5	53	5	56		
6	53	6	60		
7	61	7	72		
8	63	8	78		
9	89				
	451		452.		

Total : I080.

The SNECMA times by actual observation are about $2\frac{1}{2}$ mins. per blade.

$$\text{Hrs/Wk } \frac{I080 \times 2\frac{1}{2}}{60} = 45 \text{ hrs.}$$

With set ups, to be considered, this will be too much for one projector.
Stages Stator 6,7 and 8 and Rotor 9 totalling 299 blades can be inspected on the Genevoise AP 14 A.
Then for the Microtechnica Hrs/Wk becomes $\frac{(I080 - 299) \times 2\frac{1}{2}}{60} = 32\frac{1}{2}$ hrs.
Allowing 10 set ups/Wk at $\frac{1}{2}$ hr. each : 5 hrs.

Total : 32.5 + 5 = 37.5 hrs/Wk.

one projector would be sufficient.

c) Equipment recommended : In view of the fact that SNECMA have standardised on the Microtechnica for Inspection and are proposing to obtain Microtechnicas' fitted for enrobing, including the Cerrobend Melting tank, it is considered that we should adopt the same course. Further, that the Inspection machine should be of the same type as the enrobing machine, fitted with the same calipering and work holding arrangements, but be supplied without the brackets and slides for the matrix block support fixture, and the Cerrobend tank.
This would give us the maximum of standardisation, and would enable the inspection machine to be converted over to enrobing, with the minimum amount of work, should this ever be necessary.
The OMT machine position has been considered and conversion of our OMT does not appear to be feasible. The latest OMT, similar to ours can be fitted with a calipering attachment for inspecting such items as blade die blocks. However, there are a number of differences in the design of the frame of the machine and it does not appear possible to convert our model.
There are detail differences between the Microtechnica machine designed for enrobing and the standard machine designed purely for inspection. The standard machine, fitted with the calipering attachment and work holder designed and built by SNECMA would be substantially cheaper (about £ 1700) than the enrobing

...

machine supplied less matrix block support equipment and cerrobend tank. However, as the enrobing process by projector is a key operation of the utmost importance which cannot be done by any other means, it is considered that the added cost of having the second machine with enrobing capability (with slight additions) is more than warranted.
Also, there are obvious technical advantages in having the two machines fully fitted and ready for work, except for the addition of transparencies and blade root clamps. The alternative of taking a standard inspection machine and the SNECMA equipment, would involve us in the work of setting up and proving the machine, which will, in fact, reduce the apparent difference in price.
Mr. MELBOURNE has obtained quotations for :

a) the enrobing machine = A£ II,450
F.O.B. Genoa 12 months delivery.

b) The enrobing machine, arranged for inspection only.
F.O.B. Genoa 12 months delivery. = A£ II,000.

It was intended to send the quotations and proposals with this letter, but, on Friday I7th November, a meeting was held here, between Microtechnica, SNECMA, the Swiss representatives and Mr. MELBOURNE. At the meeting, Mr. CHEZ of SNECMA indicated that he preferred the Microtechnica complete units, rather than the Microtechnica basic machine fitted with the SNECMA calipering and work holding fixtures. This, however, was subject to Microtechnica making a number of modifications to their design, such as lighter slides and antifriction rollers in the slides, to facilitate operation of the machine. He also informed the Swiss Mission that he would not approve the machine for Swiss use, unless the mods were incorporated. Microtechnica have therefore asked for one week to study the matter, after which they will submit proposals to both the Swiss and ourselves and also presumably to SNECMA.
These proposals will be forwarded as soon as they have been received and studied. It is not envisaged that the ~~francs~~ Price will be increased greatly - say £ 23000 for the two machines.

Yours Faithfully,

C. Bellward

cb:wjm:sg.

C. BELLWARD.