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7th, December 1961

CB/SG P 263

ACTION COPY SENT
TO ENGINE SUPT.

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

PARIS 13e
France

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

MELBOURNE
Australia

FR 8/11

Mngr.....	Eng. Supt.....
Sec.....	A/E. Mngr.....
Asst. Sec.....	Ch. Eng. A/D.....
Ch. Acct.	Pers. Supt.....
11 DEC 1961	Supply Sales
Stores.....	
Ansd.....	Init.....

Attention : the MANAGER

Subject : ATAR engine project - Progress report.

Dear Sir,

We are enclosing three copies of Progress Report No. 3 reviewing the activities of the Australian Mission at S.N.E.C.M.A. and summarising progress on the project to the end of November 1961.

CIRCULATION / COPIES / 4 / 12 / 61	
E.F. MNGR ✓ DSGN. ENGR DEV. ENGR SERV. ENGR QUAL. ENGR PROD. ENGR MATL. ENGR CH. TL. DSGR CH. INSP. E. F. A/F MANAGER ✓	FCT. ADM. SUPT. MC. SHOP. SUPT. PRODUCN. SUPT. ASS'LY. SUPT. FOUNDRY SUPT. METCAL. SUPT. PROCESS SUPT. TOOL. PROD. SUPT. TOOL. ROOM. SUPT. SUPT. INSPECTION

Yours faithfully,

C. Bellward

C. BELLWARD.

CB/SG

R E P O R T N° 3. Australian Mission at S.N.E.C.M.A.

TEAM.

The 5th party, comprising Messrs. FOSTER, TAGGART, KING and GOODING arrived on October 29th, after a 24 hours delay en route. The Team now comprises :

Messrs. C. BELLWARD	A. JOHNSTON	P. THOMPSON
F. SAYERS	J. MOREY	G. FOSTER
V. MORLEY	A. WOODS	E. TAGGART
J. HOGARTH	D. BOWYER	H. KING
G. BROWN	E. SIMPSON	C. GOODING.
J. MELBOURNE	R. PAGE	

It is proposed that the following members will return to Australia as listed below :

F. SAYERS)) Depart from Paris, Wednesday December 6th, via Rome.
V. MORLEY)	
C. BELLWARD)) " " " , Friday December 8th, via Rome.
G. BROWN)	
J. HOGARTH)	

A request has been granted for an extension of time for Mr. BOWYER and Mr. MOREY. This is due to delays in the receipt of tooling information.

DOCUMENTATION.

Supply of technical data, translated and with conversion of dimensions as required, as prints or reproducibles as specified.

(a) The following documents have been supplied in full in the original French text to the C.A.C. Mission :

- 1 a. Parts list (subject to amendments, to be completed before 12th Dec. and then sealed).
- 1 b. Bill of Material.
- 1 c. Detail, Assembly and Installation Drawings (part).
- 1 d. Standard handbooks and General Standards.
Standard Parts.
- 2 a)
- 2 b)
- 2 c) Material and Process Specifications.
- 2 d)
- 3 Test schedules for castings, forgings and weldments.
- 4 Machining Specifications.

- 6 Storage specifications.
- 9 List of Suppliers of Power Plant Parts.
- 10 a. List of Machines to meet Production Schedule
- 10 e. Standard Tool Drawings. Tooling Standards and Machine capacity Manual.
- 11 b. Machining, Process and Inspection Times.
- 13 a. Lists of benches and Equipment for Partial Assembly Testing.
- 15 a. Drawings for Raw forgings and castings, and Partly Finished Parts.

(b) The following have been supplied in part:

- 1 e. Drawings of engine replacement Parts.
- 5 Test schedules for complete engines. Sub assemblies, and accessories.
- 8 List and copies of Official standards and Specifications.
- 10 b. Tool manufacturing Drawings.
- 10 c. Assembly Tool Drawings.
- 10 d. Handling Tool Drawings.
- 11 a. Operation sheets and Pictures.
- 12 Assembly or Stripping operation sheets.
- 13 b. Drawings of Partial Test Benches for sub assemblies.
- 14 a. General Inspection Instructions.
- 14 b. Drawings of special Inspection Tooling.
- 15 b. Operation sheets for forgings, castings and Partly Finished Parts.
- 16 a. List of Spare Parts.

After these documents have been studied by the Engine Production Team Members, they are being despatched to C.A.C. by either Diplomatic Bag or Air Freight.

(c) Reproducibles.

When reproducibles have been prepared (with English text and dimensions when specified), they are being despatched by S.N.E.C.M.A. without, in general, actual sighting by the C.A.C. office. To date, the following items have been despatched - Items 10 a (part), 10 d, 11 b (part), 13 a, 13 b (Refer above for descriptions).

Considerable assistance has been given by Mr. HOGARTH to S.N.E.C.M.A. in the translation task.

PLANNING and PRODUCTION DATA.

The following tabulation indicates the status of appraisal and despatch of production data for the various engine sections.

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PROGRESS REPORT - PRODUCTION DATA.

Group No	Description	LOP Appraisal		Despatches	
		(1st) IO 22-31	(2nd) IO 32-41	(1st) IO 22-31	(2nd) IO 32-41
I	Compressor Rotor	O.K.	O.K.	O.K.	O.K.
2	Compressor Casing	O.K.	O.K.	O.K.	O.K.
3	Intake Casing	O.K.	O.K.	O.K.	X
4	Starter Fairing	Hardcore			-
5	Reducteur	O.K.	O.K.	X	X
6	Accessory Drive	O.K.	O.K.	O.K.	X
7	Accessory Support Casing	O.K.	O.K.	O.K.	O.K.
8	Central Casing	O.K.	O.K.	O.K.	X
9	Comb. Chamber	O.K.	O.K.	O.K.	X
10	Turbine Support Casing	O.K.	O.K.	X	X
II	2 St. Turbine	O.K.	O.K.	O.K.	O.K.
12	NGV 1st St.	O.K.	O.K.	X	X
13	" 2nd St.	O.K.	O.K.	O.K.	X
14	Miscellaneous Ext. Assy's.	O.K.	O.K.	X	X
15	Ext. Pipe Assy's	O.K.	O.K.		
16	Elect. equipment	S.N.E.C.M.A. supply			
33	Prise de Mouvement	O.K.	O.K.	X	X
	Canal-Jet pipe.	(await Prod. Data).			
		Agreement reached on E/D responsibilities			
				X denotes in progress	

TOOLING.

The following engine parts and their tooling requirements have been investigated :

- Compressor rotor discs.
- Compressor inner spacers.
- Compressor outer spacers.
- Compressor conical spacers.
- Compressor rear hub.
- Compressor 1st, and 3rd. stage rotor blades.
- Compressor discs and blades assemblies, stages 2 to 9.
- Coupling parts.
- H.P. Turbine disc and shaft.
- L.P. Turbine disc.
- Accessory drive group.
- H.P. & L.P. turbine blades.
- Accessory support casing.
- Central casing components except casing assy.
- Miscellaneous, external assemblies.

In addition, tooling for gears and splines has been investigated, and a special study has been made of the metric thread systems.

In connection with the tooling orders being placed on S.N.E.C.M.A. estimating and checking of quotations has been carried out.

Investigations have been necessary to determine what adaptation of C.A.C. machine tools has been required to accommodate special equipment and components.

MACHINED COMPONENTS MANUFACTURE.

Investigations have been made into S.N.E.C.M.A. machine shop production methods on the most important mechanical components of the engine such as turbine wheels and shaft, turbine blades, compressor discs, compressor blades, gears etc.. including operation of new equipment required for Australia. These investigations have also included work necessary to estimate machine tool capacity.

SUMMARY OF TOOLING FOR A/D.

321 parts and assemblies are to be made in the A/D at C.A.C. for the Canal ; planning for numerous parts and assemblies have been studied and tooling quotes requested or planned to be made in Australia.

In addition, other parts and assemblies have been studied but only partially completed since all the information for individual parts is not received at the one time.

Similar work for the Reacteur has now commenced thus enabling equipment requirements and advanced planning to be undertaken.

Approximately 150 parts and assemblies will be required to be made in the A/D at C.A.C. for the Reacteur, but this is only an estimate as complete information has not yet been received.

Percentage of work completed for entire engine = 50.

The extent of the work and the delays in receipt of tooling information has necessitated an extension of time for the officers concerned with tool design and manufacture.

PROGRESS ON REQUESTS FOR QUOTATION.

(a) Tooling : A total of 77 requests for tooling quotations have been prepared and submitted to SNECMA. We have received 31 quotations covering 318 items of tooling and these have been cleared for manufacture by SNECMA, by letter of intent against order M 124.

(b) Equipment : A total of 4 requests for Equipment of SNECMA design manufacture have been submitted. Quotations have been received for 3, two being rejected on the score of cost - viz. BABF Mill and Concentricity tables, the other items are under consideration.

HANDLING TOOLS.

A list of the principal handling tools has been submitted to the Air Attaché Office, for consolidated ordering action by the R.A.A.F., this course being required by them.

MATERIALS AND PARTS PROCUREMENT.

Assessments have been completed of parts, materials and accessories for the engines S/N 7 to 31 as follows :

- 1 - 100% replacement parts for engines 7 - 26
- 2 - parts for assembly of engines 22 - 31.

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- 3 - 100% replacement parts for engines 22 - 31.
- 4 - raw materials, mainly for engines 22 - 31.

Order details have been prepared and issued for use in conjunction with the official orders.

Work is proceeding on the series 32-41 and order lists are now being typed. Work is also proceeding on the list of castings. Engine group 3 (under modification action) is 80% complete.

Some delays in the finalisation of ordering is due to discrepancies between the L.O.P. and B.O.M. mod. standards. The latest B.O.M. was received on Nov. 27th, and the ordering position is affected by further amendments to the L.O.P. which will necessitate some revision to the work already prepared. It is anticipated that this work will be completed before the departure of our production officers.

SHEET METAL OPERATIONAL PLANNING, MANUFACTURE & EQUIPMENT.

Investigations have been made into the following :

- (a) Heat treatment furnace. A vertical furnace has been recommended for heat treatment of engine and jet pipe sections.
- (b) Resistance welding requirements. Recommendation made for procurement of SCLAKY TRI phase P.300 STK spot welder.
- (c) Welding generators.
- (d) Positioner for longitudinal argon arc welding.
- (e) Roll planishing machine.
- (f) PULLMAN nibbling machine.
- (g) GROTNES expanding machine.
- (h) Descaling and cleaning of parts after heat treatment.
- (i) Hot riveting roll forming.

These and other items have been covered in detail reports and letters.

SHEET METAL PROCESSING AND EQUIPMENT.

In addition to the equipment mentioned in the previous paragraph, the following processes and related equipment have been investigated :

- 1- Caustic soda descaling.
- 2- Vibration cleaning.
- 3- Lubricants for sheet metal forming.
- 4- Descaling of heat-resistant steels.
- 5- Metal spraying.
- 6- Chemical deburring.

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TESTING OF ENGINES, ACCESSORIES AND COMPONENTS.

Investigations have been made into the requirements of :

- (a) Rig testing of accessories and engine components,
- (b) Engine testing and related equipment,

as follows :

Rigs.

(1) A survey has been made of the number of sub-assembly rigs and trouble shooting rigs required for the program. This comprises 14 major items, 2 of which have been finalized.

No SNECMA data is available at this stage relative to the Kerosene starter or the Approach fuel control unit.

(2) A study has been made and a proposal has been finalized in conjunction with SNECMA for a dual purpose rig for the testing of both main fuel control unit and the afterburner fuel control unit. Line diagram of the proposed circuits are to hand and further documentation relative to SNECMA standard fuel control unit is awaited.

(3) A proposal has been finalized of the central casing rig.

(4) A proposal has been finalized for testing the front and rear afterburner manifolds with water for directional spray checks.

A recommendation has been made in respect to a suitable drill grinding machine

(5) A proposal has been finalized for the testing of front and rear afterburner manifolds with kerosene.

Test Cell.

(1) Discussions have been held with SNECMA engineers relative to the modification of the C.A.C. test cell. Documentation has been supplied relative to the main SNECMA fixtures which are applicable to the C.A.C. test cell. A study is in program of the instrumentation required but this is not yet complete.

(2) Discussions have been held with SNECMA relative to test cell calibration requirements and recommendations are to be made.

(3) A survey has been made of the various engine instrument connection points & drives which are associated with engine performance measurement and test cell measurement (65 points).

(4) A survey has been made of the general requirements for "deep check" testing which needs additional instrument and equipment.

(5) A preliminary survey has been made of special test bed equipment.

(6) A review has been made of the test cell silencing requirements. Preliminary discussions have been held with a local manufacturer regarding adaptations to our existing detuner.

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Spare accessories.

A survey has been made of the spare accessories required for replacement during engine testing. This list has been forwarded to the RAAF Attaché office.

High frequency generator.

A proposal has been evolved for a high frequency generator which will be suitable for both brazing of compressor stator blades and assembly of compressor discs. The potential supplier has submitted a technical proposal and quotation.

Magnetic inspection of blades.

A local firm is investigating a proposal for a special machine for the magnetic inspection of steel compressor blades. This has involved a considerable amount of development work and a price and specification for the machine has been received.

Projectors.

An investigation has been made relative to a suitable projector for the inspection of compressor blades and a proposal has been submitted by MICROTECNICA, but is still subject to technical acceptance by SNECMA. An additional proposal has been received for a projector with equipment for the engraving of blades.

Static balancing.

The static balancing requirements of the compressor discs and stators have been studied and a recommendation has been made for a suitable machine. Specification and quotation have been forwarded to Australia.

Dynamic balancing.

An investigation has been made into the dynamic balancing requirements for the deaerator. A recommendation, specification and quotation has been forwarded to Australia.

Spark erosion.

A proposal has been made for a spark erosion machine to cut the aerofoil shape in the inner ring of the L.P. nozzle guide vanes. SNECMA have quoted for this job and a recommendation has been made for acceptance.

Accessories.

Visits have been made to AIR EQUIPEMENT and (2) BRONZEAVIA plants to obtain a general idea of fuel control unit testing facilities.

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French Air Ministry.

A visit has been made to the French Air Ministry testing plant at Saclay, to discuss the use of Baldwin load cells and sound proofing equipment.

Turbine blade vibration check.

A check has been made relative to the equipment required for vibration checks on 1st stage turbine blades.

Aerodynamic measuring bridge.

SNECMA use an aerodynamic measuring bridge for the checking of nozzle guide vane areas. An investigation has been made of the equipment required and SNECMA have been asked to provide an alternative proposal.

Ultrasonic cleaning equipment.

This type of equipment is in use in (3) plants and the makers have been invited to submit details of standard equipment suitable for use on accessories.

MANUFACTURE OF CASTINGS.

Investigation into the manufacture of castings, both sand castings and Shaw process castings, has commenced. Manufacturing techniques and equipment requirements are being evaluated.

Similar investigations into precision investment castings are in progress.

ENGINE ASSEMBLY.

The technique of assembly is currently being investigated for the various engine groups, to date, those being covered are :

- 1 - Compressor rotor, with particular attention to induction heating, and balancing.
- 2 - Compressor case and stator assembly with particular attention to induction brazing.
- 3 - Intake casing.
- 4 - Accessory drive support.
- 5 - Accessory box.

OFFICE STAFF PROVIDED BY SNECMA.

The present staff working with the C.A.C. office consists of 4 interpreters and 2 typistes (one part-time).

TRANSPORT.

Three hired Peugeot 403 cars have been made available to the CAC team. These meet current requirements and provide the necessary mobility for visits to various establishments in the course of official duties.

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