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B&F

Reference P 223 CB/WJM/SG

FR 7/28

22nd, November 1961

Mngr. X		Eng. Supt. X	
Sec.		A/S. Mngr.	
Asst. Sec.		Ch. Eng. A/D.	
		Pers. Supt.	
Ch. Acct.	28 NOV 1961	Supply Sales	
Stores			
Ansd		Init.	

c/c Supply Dept

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

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A/F MANAGER (2) ✓	SUPT. INSPECTION

Attention : the MANAGER

Subject : Plant & Equipment

Dear Sir,

Receipt is acknowledged of your M I26. Dealing with the various statements in turn.

Statement (a)
It is confirmed that these items are all required and it is assumed that you have prices for all items, either up-to-date or approximate prices supplied from here, where applicable.

Statement (b)
All these items have been investigated and are required. However, we have not been able to finalize them all, either for technical reasons, or because we are awaiting quotations from the suppliers of the equipment. Most of these items have features, requiring special consideration by the suppliers.
In detail :

(1) Crack Detector for compressor blades, including Demagnetiser.
Quote received Nov. 23rd. includes demagnetiser.
Price F.O.B. French port. Delivery 5 to 6 months. A£ 6500

(2) Comparator for Blade Enrobing
Quote received. Details being finalised. Refer P 219 A£ 11,450.
Price F.O.B. Genoa. Delivery 12 months.

.../...

(3) Spark Erosion Machine LP.N.G.V. support ring.
Quote received from S.N.E.C.M.A. A£ 1450. ex factory, 8 months delivery. As this unit is intended to be fitted to a radial drill, or other suitable machine and is not complete in itself, it is intended to order this item as tooling.- transfer to Statement (e).

(4) Induction heating Unit for Shroud Brazing and Shrink fitting of compressor Rotor.
Technical proposal finalised, quotation forwarded in P220. A£ 6220 —
Price F.O.B. France. Delivery 4½ months.

(5) Welding Generator Sets.
a) For circumferential welding.
This has been technically finalised and the quotation received. Details are being forwarded. A£ I750 —
Price ex factory-uncrated. Delivery 5 months.

b) For longitudinal welding.
Basically as for 5 (a) but to be slightly modified for interconnection with the longitudinal positioner and supplied with it.- Consider under longitudinal positioner.

(6) Circumferential Positioner - complete with Torch.
Details finalised, quote received. Details being forwarded. A£ 2915 —
Price ex. factory-uncrated. Delivery 5 months.

(7) Longitudinal Welding Equipment. Including Generator.
Refer to 5(b). This item is technically finalised and a quotation is awaited from "COMEPRE". EStimated price. *A£ 6000 —

(8) Projector. Compressor and Turbine Blade Inspection.
Quote received. Some details to finalise. Refer P 219.
Quoted price F.O.B. Genoa = £ 11;000. Delivery 12 months.
Due to possible modifications required by SNECMA, allow. A£ 11,500—

(9) Anodic Film Checking Equipment.
Further details awaited from SNECMA. Estimated price. *A£100 —

(10) Spot Welding Equipment
Refer P II0 and P 187. Final decision to be made in Australia
Taking the French price for estimating allow. *A£ 12,200—

(II) Static Balancing Unit
Quote forwarded P 169. A£ 5131 —
Price F.O.B. German port. Delivery 8 months.

.../...

(12) Barreling Equipment

It is not possible to complete a survey of the barreling requirements at ANECMA in time for this review. However, taking their figures of required capacity ie. 2 units for a 2 shift monthly production of 15 engines/month, this would be equivalent to slightly more than one unit (as regards capacity) for our programme. It is therefore considered, that as our present layout is dictated by both capacity and flexibility, we could substitute the large unit referred to in P II9, in place of one of the small DW I8-24-I units. This would result in a requirement of £ 2500 - £ 360=£ 2140. additional to previous submissions. Allow *A£2140

Statement (c)

It is assumed that estimates for funding purposes will be made at C.A.C., as these will be governed by the local design details. However, it is estimated that these items would be of the following order.

1. Heat treatment furnace, Sheet metal parts	A£ 15,000
2. Caustic descaling unit	Refer MI08
3. Pickling equipment.	" "
4. Chemical deburring equipment	A£ 750
5. Vibration cleaning equipment	A£ 500
6. Afterburner manifold Rig-Kerosene.	A£ 750
7. Central Casing checking Rig.	A£ I250

Statement (d)

Some revision to this list is necessary.

(1) Equipment for special wet processes.

This is considered more than adequate from our present knowledge. However, Mr. KING has not yet been able to survey the position and this item should therefore stand. Allow *A£5000

(2) Adaptation of existing Test Rigs .

Original estimate = £ 6000.

The adaptions to our existing rigs, proposed are :

Oil Pump Rig, allow	£ 2500
Fuel Pump Rig, allow	£ 1250
Burner Rig, allow	£ 1000
Starter Rig. allow	£ 2000
	£ 6750

*A£6750

(3) New Test rigs for basic engine)
(4) New Test rigs for Reheat system) Orig. est. = £ 54,000

It is not possible to break down the proposed rigs into the above two distinct groups, because of the general purpose nature of the proposed rigs, which are as follows :

Accessory support and Drive rig.	Allow £ 4000
Fuel control units (main eng. A/B)	" £45000

.../...

Pneumatic Rig (Fuel system)	Allow £ 5000
Kerosene Rig (Fuel system, gen. purp)	Allow £ 5000
Oil rig (" " " ")	" £ 3000
Electrical Rig(" " " ")	" £ 2250
Capsule Rig	Allow £ 1000
	65250.

*£A 65,250.—

(5) Adaptation of Test Bed.
Prelimanary investigations on this subject show that the original estimate of £ 15,000 may be marginal, depending on such items as the Intake flare, slave jet pipe, alterations to fixed fuel reticulation, final nozzles for calibration, and possible alterations to the test House building.
If all are included in this item, it is considered that the figure should be increased to £ 25,000.

*A£ 25,000 —

Letter P 215 refers to Silencing of the Test Cell.
It is believed that the £ 11,000 referred to, will be adequate.

Statement (e) Tooling items-purchase in France.
In the following list, the prices should not be required for equipment funding, but prices have been shown for information.
Curvic coupling masters (the pair) A £ 264 (quote).

Blade profile Milling att.) St. 1. Rotor) Blade profile Grinding att) St. 1. Rotor)	With common base	A£ 2446 (quote)
Blade profile Milling att 3rd St. Rotor	Estd.	A£ 1000
Blade Setting Fixtures (comp. blades)	"	A£ 1040
Blade Setting Fixtures (Turbine blades)	"	A£ 1120
Bench Setting Fixtures (LP.N.G.Vs)	"	A£ 1000
Contour comparison gauging machine - Turbine blades.		A£ 1280
Special drilling machine for afterburner manifold holes.		A£ 270

Statement (f) Tooling items. To be made in Australia.
The following estimates are offered, pending detail design.

Curvic coupling checking Unit	A£ 750
Sulphur filling equipment. Turb. shaft	A£ 1000
Profile Milling att. for leading and trailing edges of compressor blades. (less cams and root clamps)	A£ 400

12 spindle drilling head. Refer C.A.C.

Concentricity tables. Allow 1 a A £ 3000
1 a A £ 2500
1 a A £ 1500.

Afterburner manifold rig (water) A £ 2000

Statement (g)- Estimate at C.A.C.

Statements (h) & (i). Do not call for comment. It is noted that decisions still have to be made on the Vertical Broaching machines.
Further, to the foregoing, the following additional items will be required, as qualified in the remarks.

Statement (j).
Additional items.

(1) Shaw Process.
Based on Mr. KING's preliminary investigation the following items are those required over and above the equipment presently in the Austenal Casting Section. (estimated)

(I) Universal metal band saw.	A £ 750
(II) Mould firing furnace	A £ 2500
(III) Radiac type cut-off machine	A £ 500
(IV) Concrete mixer.	A £ 150
(V) Induction melting furnace 40kg capacity. 4000 periods.	A £ 10,000
(VI) Burn-off hood and fan.	A £ 250
(VII) Gas or oil fired furnace pits for ladle heating.	A £ 300
(VIII) Miscellaneous	A £ 200
(IX) Shot blast machine.	A £ 400
	A£ 15,050.

If the process is to be applied on a minimum pilot basis, then items (I)(III) (IV) (V) and (IX) can be omitted, with the proviso on item (V), that our present 2 cwt 2000 cycle Brown Boveri induction furnace is technically satisfactory which is believed to be the case, but which will require confirmation with Shaw. This would reduce the amount to A £ 3250. Allow. *A£ 5000

It is not possible to cover possible building extensions or rearrangements, until a policy is laid down. ~~Silence~~ SCHEME 434-0-00 in Mr. STONEs' possession could serve as a basis for discussion.

(2) Adaptation of Welding Equipment A/D.
Adaptation of existing D.C. are welders for remote control

at welding torch and adaptation of tube welding rotary positioner. Allow — *A£ 1000

(3) Miscellaneous sheet metal equipment.
Deburring belt grinders,"CHAMPION""Epingles" etc.
Refer Letter P 204. Allow — *A£ 200
Fork lift loader - New A/d Heat Treat Furnace. — £250.
(4) Fork lift truck is required for loading and unloading the above furnace. It is assumed that a hand propelled truck with smooth action hydraulic rise and fall is required.
Allow — *A£ 500

(5) Fluorescent Penetrant inspection of sheet metal components A/D.
Provision of additional facilities due to large size of welded assemblies. Allow — *A£ 200 £500

(6) Provision of circumferential planishing Equipment.
Adaptation of Robinson Rolls (refer to P 192) for circumferential weld planishing. Allow — *A£ 500

(7) Microscope for Weld Examination A/D.
For closer examination of defects, noted in weld test pieces by binocular inspection. SNECMA use a zeiss "WINKEL" microscope, but a similar type of good quality would be satisfactory. Allow — *A£ 400

(8) Tensile testing machine.
The present tensile testing machine in A/D has a capacity of only 5000 lb, which is not adequate. This matter has been discussed previously at C.A.C. It is recommended that a 5 ton machine be provided. Refer to quotes at C.A.C. Allow — Not known.

(9) Electro-dynamic balancing machine.
For balancing deaerators. Refer letter P 170.
Quote has been forwarded.
Price F.O.B. German port. Delivery 5 months. — A£ 1500

(10) Static moment balancing of blades.
Refer to P 169. SNECMA are preparing to modify and test a Schrenck balancing machine for this purpose. We have received a quote from SCHRENCK, via AVERY. of A£ 2254.
F.O.B. German Port. Delivery 6 months. However, SNECMA have not carried out their tests, and it is also believed that the Swiss are evolving an alternative method which may be cheaper. This still has to be investigated.
In view of the delay before finalising. Allow — *A£ 2200

.../...

(II) Turbine Blade vibration equipment.
SNECMA carry out a 100% vibration frequency check on all Stage 1 turbine blades, in 1st flexure and 1st torsion modes. Prices are not yet available for the equipment comprising amplifier, exciter, oscilloscope and frequency meter. Allow *A£ 1000

(12) X-Ray Equipment. Sheet metal components.
All argon ~~are~~ PURE ~~built~~ welds are radiographed 100%. Due to the large diameters and consequent long welds, our present procedure of making radiographs in sections could result in excessive times.
SNECMA use a special "Rod Anode" tube, which gives 360º coverage with a 30º beam angle. exposes the full circumference of a weld in one exposure. Their machine is made by a firm now out of business and they recommend a PHILLIPS 150 KV 15 mA. set, with Rod Anode tube.
They advise that the set costs A£ 4000 (verbal) comprising transformer, tube and controls.
It should be investigated whether our set can be adapted to use this type of tube. The MULLER catalogue lists the tube and shield as - tube, type MOS.151/15 150 KV 15 mA 5mm focal spot.
shield, " MH 151/15.
Assuming adaption.
For tube and shield - Allow £ 1000
For elevating equipment for tube.
possible alterations to X Ray lab. Allow £ 1500
*A£ 2500

(13) Projector for punched holes.
This projector is required for checking size, shape and position of irregular holes punched or cut in sheet metal rings. It comprises a light source, located inside the ring being inspected, a support for the rings, projection lens and screen. The SNECMA unit is elaborate and it is believed a local design of simpler type can be produced. Allow *A£ 500

(14) Power brushing of Gear Teeth.
SNECMA use an Osborne brushing machine for deburring and radiusing gear teeth. A gear approx. 5" dia is finished in about 4 mins, with a semi automatic cycle. The machine is valued at A£ 7500. and could not be justified. Smaller machines are available, or a machine can be developed. In view of the time saving and consistency of finish it is recommended that we make allowance for this item. Allow *A£ 2000

(15) Air gauging equipment. blades/.
SNECMA use Solex air gauging equipment for compressor blades and Sheffield equipment for turbine blades aerofoil sections.

.../...

As advised in P 219, it is considered that projector inspection is sufficient for our programme, but in case it is considered desirable to provide Air gauging equipment, with the time saving this equipment provides, the following figures for compressor blades are offered - these are estimates as there has not been time to obtain definite proposals.

35 ~~5~~ Tube Display Instrument a £ 120 per tube = A £ 4200

Base fixture - to accept the pairs of plunge jet supports for each blade, and fitted with bow, twist and lay adjustments. Allow A £ 1000

£ 5200

The foregoing makes no provision for tooling. Each blade requires a pair of plunge jet supports, covering 4 points on each side of the blade, at each blade section line (3 or 4 sections)per blade. The plunge jets are fixed in the supports and the supports with jets are changed in toto, in the Solex system, using a multipoint bayonet connector for coupling to the Display Instrument.
For 17 pairs of plunge jet support fixtures, Allow.

17 pairs at £ 400 per pair = A £ 6800

17 root holding fixtures a £ 100 each ≑ A £ 1700

Plunge jets - 17 X $3\frac{1}{2}$ X 8 a £ 40 each = A £ 19,040

The foregoing is very approximate and it is considered that the only satisfactory way to deal with this matter, is to seek specific proposals from, say, SOLEX, SHEFFIELD & SIGMA. No allowance is suggested at this stage.

(16) Spring Calibrating Machine.
For springs in control unit systems. Allow *A£ 400

(17) Ball Bearing testing machine - Ander ometer.
This unit gives visual and audible evidence of bearing condition, under running conditions. Allow *£ 750 A.

(18) Electrical Test Bench.
For continuity and functionning of electrical circuits.
Estimated value £ 1000 - but allow as Tooling item.

(19) Concentricity checking Bed.
For compressor rotors.
Quote awaited from SNECMA, for purchase as tooling item.
Estimated value A£ 3000.

(20) Cerrobend Melting Tanks.
For fixture enrobing of turbine and compressor blades.
Allow
2 a £250 *A£ 500.

...

GENERAL

The foregoing prices, either quoted or estimated make no allowance for :

a) shipping and duties in Australia.
b) Surcharge
c) Installation, other than in the case of rigs, where the price can be taken as installed.
d) Rearrangements.

CONTINGENCIES

The items marked with an * are those for which Firm prices are not yet available. They total : A £ 140,090.

It is recommended that a 15% contingency allowance, be made on this sum, i.e. A £ 21,000, for the following reasons :

a) it is difficult, under the circumstances pertaining, to be sure that all aspects are satisfactorily, covered, until full investigation has been completed, by the specialist officers concerned.

b) Production of the 9 C engine, in the true sense, is just commencing, and there could be production changes found necessary.

c) Considerable difficulty is experienced in obtaining, or estimating, prices from French sources particularly where equipment is not standard.

Yours Faithfully.

C Bellward

CB/SG

C. BELLWARD