

PROGRESS REPORT ON RCBC

R W Newport

1. CHAMBER AND VACUUM ENCLOSURE

1.1 Chamber Assembly

The tender documents for the chamber assembly went out on 23 June for reply by 1 August, which was later modified to 15 August. Of the ten firms included only two made offers. We are now negotiating a contract with MORFAX Ltd. who made the lowest price offer and who also offered the shorter delivery time of 12 months, with the intention of reducing the delivery time.

The main forgings for the chamber were delivered on 14 September.

The tender action for forgings for the hydrogen shield and vacuum tank end plates has been extended until 28 September at the request of some potential manufacturers.

1.2 Main Window

This was checked and accepted optically at Schotts in July. After acid etching this is now expected to be delivered shortly to Grubb-Parsons who have given us a revised delivery date of January 1979.

1.3 Window Gasket

After discussion with potential manufacturers detail design changes have been made to take account of constructional problems and to reduce stress levels.

Stainless steel forged rings for the seal supports have been delivered. A manufacturer has been chosen for the spinings and a tender action is being prepared for the machining and assembly.

The indium shaping jig is almost complete and ready for development work.

1.4 Vacuum Tank

The replies to the tender action have been received for the plain cylindrical vacuum tank, prices and delivery are in line with our estimates.

On closer examination of the design with respect to the SNCT codes for pressure vessels the thickness of the central section has had to be raised to 8.5 mm.

We have made contact with people involved in boron fibre development. Their comments were very encouraging and we are now waiting for information on suppliers.

1.5 Beam entry and exit windows for the chamber

A contract has been placed for the manufacture of these components, the delivery time of 6 months is compatible with the manufacture of the chamber assembly.

2. OPTICAL SYSTEM

2.1 Telecentric lenses

The lens design has been re-optimised and grinding and polishing is well advanced all doublet and triplet elements being complete.

The doublets have been coated and two sets mounted. There have been some delays due to glueing problems but these have now been solved, though some elements need reworking.

The triplet elements are now with Balzers for coating.

2.2 Lens Mounting Plate

The individual lens/capstan mounts have been ordered.

The tender action for the lens plate casting has begun.

2.3 Illumination System

Further flash tube life tests have been carried out, this time at 50 joules. After one million cycles there was no detectable loss of light output.

Tests have also been carried out in a field of 1.15 Tesla at various orientations with no detectable affect on the light output.

We now have on order a prototype non-imaging concentrator to be made by tape controlled profile milling. When this is available tests will be made on the uniformity of the system.

2.4 Data Board

Delivery of components for test is expected soon.

Design of the data board control is well advanced.

2.5 Small windows for the hydrogen shield and the vacuum tank

We have received replies to our tender action. Costs are as anticipated, much higher than the original estimates which were for small windows only half of which were of good optical quality. Delivery is satisfactory.

3. CHAMBER TEMPERATURE CONTROL SYSTEM

3.1 Valve Vessel

This has been ordered and delivery is expected in the second half of November.

3.2 Valves

Delivery has been delayed until October due to personnel difficulties at the manufacturers.

3.3 Control System

Delivery of all elements is expected early in November.

4. EXPANSION SYSTEM

4.1 Bellows

A fourth bellows has been made but is resin rich and is not acceptable. This problem has arisen due to deterioration of the surface of the male silicone rubber mould which may have to be replaced. After a special surface treatment of the male mould a fifth bellows has been laid up and is being cured.

4.2 Bellows Tests

The repaired test unit was cycled 781,000 times in the MAQUETTE before a drive shaft failure occurred. Since the bellows appeared to be entirely unaffected further testing will be carried out on a complete prototype piston-bellows assembly including a full diameter drive shaft. This requires modification to the MAQUETTE, so these tests are not expected to start until early next year. The use of a full diameter drive shaft eliminates a resonance which was present in the test piece and removes the welded joint which failed.

After the dynamic tests the bellows were externally pressurised to 11 bars without damage.

4.3 Piston

All components are now ready for assembly of the first prototype to be started.

4.4 Hydraulic System

All shielding tests have been finished.

A number of important components including the alloy block for the main actuator have been ordered.

The hydraulic overstroke dampers have been tested on the MAQUETTE. Some 200 excursions with a stroke of 14 mm were carried out successfully.

5. VACUUM SYSTEMS

Suitable diffusion pumps and valves have been tested to twice the design pressure of the vacuum tank. Subject to the approval of the CERN Safety Section and order for two new pumps with valves will be ordered.

Delivery of all components for the remaining systems is expected by early 1979. We have already taken delivery of a number of small components.

The modification from AC to DC operation of some gauge control boxes has been successfully carried out.

6. MECHANICAL HANDLING

The chamber trolley is almost complete. Static supports for the chamber have been designed and will be out for tender shortly.

7. ACCESSORIES FOR CONTROL AND MONITORING

The DANA multimeter has been incorporated into the data logger by Credshire but delivery has been delayed until the end of September due to faults in the DANA multimeter and by late delivery of the correct linearising modules for the thermocouples.

8. IRON STRUCTURE

Machining is complete and trial assembly is expected to start this week.

Delivery to CERN is expected during October.

9. TRANSPORT TO CERN

Nothing to report.

10. PROGRAMME

The latest programme summary is attached.

10.1 Since the last meeting the main elements of the programme have been revised in order to bring forward the delivery date for the chamber assembly. Unfortunately, due to an even longer delivery period for the chamber than was anticipated at the time of the last meeting the benefits of the revision appeared to have been nullified and the delivery date is now the end of February 1980. However without the changes this date would have been as late as May 1980.

10.2 The major change to the programme is the elimination of the assembly of the vacuum enclosure around the chamber. A trial fit of the vacuum enclosure onto the chamber will be carried out at the works of the chamber manufacturer and then it will be shipped to CERN in the Autumn of 1979 to be installed in the iron structure.

10.3 We have examined in detail the accessories and controls for the chamber and are now confident that these will be delivered to CERN between June 1979 and December 1979.

10.4 There have been a number of delays of typically 3-4 weeks by some manufacturers but these do not appear to affect the programme substantially, eg. Main window, control valves, lens elements.

11. FINANCIAL

The financial statement valid at the end of August 1978 is attached. Points to note are as follows:

- 11.1 Although the sum committed at 31.8.78 was only £387,317, with the chamber assembly and the prices we have received for the small windows we now have accurate knowledge of over £500,000 worth of equipment which is ~65% of the latest estimated cost.
- 11.2 The latest cost estimate does include the cost of the chamber assembly and the small windows. It is still within the original estimate plus the contingency, at ~~12.7%~~ **+12.7%**
- 11.3 The anticipated spend to the end of November 1978 is between £250,000 and £290,000.

20 September 1978

FINANCIAL STATEMENT
 RAPID CYCLING BUBBLE CHAMBER FOR EHS CERN
 PROJECT NOs NA71500 - NA71799 INCLUSIVE
 PROGRESS STATEMENT AS AT 31 AUGUST 1978

| ITEM | INITIAL COST ESTIMATE 15.2.77 | LATEST COST ESTIMATE * 31.8.78 | COMMITTED TO 31.8.78 | FORECAST DELIVERY DATE | TOTAL SPEND IN PRIOR YEARS | ACTUAL SPEND IN CURRENT YEAR TO 31.8.78 | SPEND FORECAST 1978/79- |
|----------------------------|----------------------------------|-----------------------------------|-------------------------|------------------------|----------------------------|---|-------------------------|
| | £ | £ | £ | | £ | £ | £ |
| 1. Chamber & Vac Enclosure | 297,235 | 328,925 | 127,912 | 28.2.80 | 331 | 6,724 | 123,506 |
| 2. Optical System | 86,925 | 86,925 | 15,863 | 30.9.79 | - | 626 | 12,944 |
| 3. Chamber Temp Control | 46,640 | 46,640 | 30,084 | 28.2.80 | - | 1,260 | 1,260 |
| 4. Expansion System | 58,488 | 58,488 | 8,666 | 28.2.80 | - | - | - |
| 5. Vacuum Systems | 36,559 | 51,394 | 48,803 | 30.6.79 | - | 6,130 | 4,000 |
| 6. Acc for Control etc | 17,798 | 17,798 | 5,339 | 30.11.79 | - | - | - |
| 7. Mech Handling Equipt | 29,120 | 29,120 | 15,298 | 28.2.80 | - | - | - |
| 8. Iron Support Structure | 78,000 | 117,956 | 128,307† | 15.10.79 | - | 5,198 | 128,000 |
| 9. Transport to CERN | 18,200 | 18,200 | 7,045 | - | - | - | - |
| 10. Miscellaneous | 1,040 | 1,040 | - | 28.2.80 | - | - | - |
| | 670,000 | 756,496 | 387,317† | - | 331 | 19,938 | 269,710 |

Contract Price £670,000 (+ 15% Contingency = £770,500)
 at 15.2.77 prices.

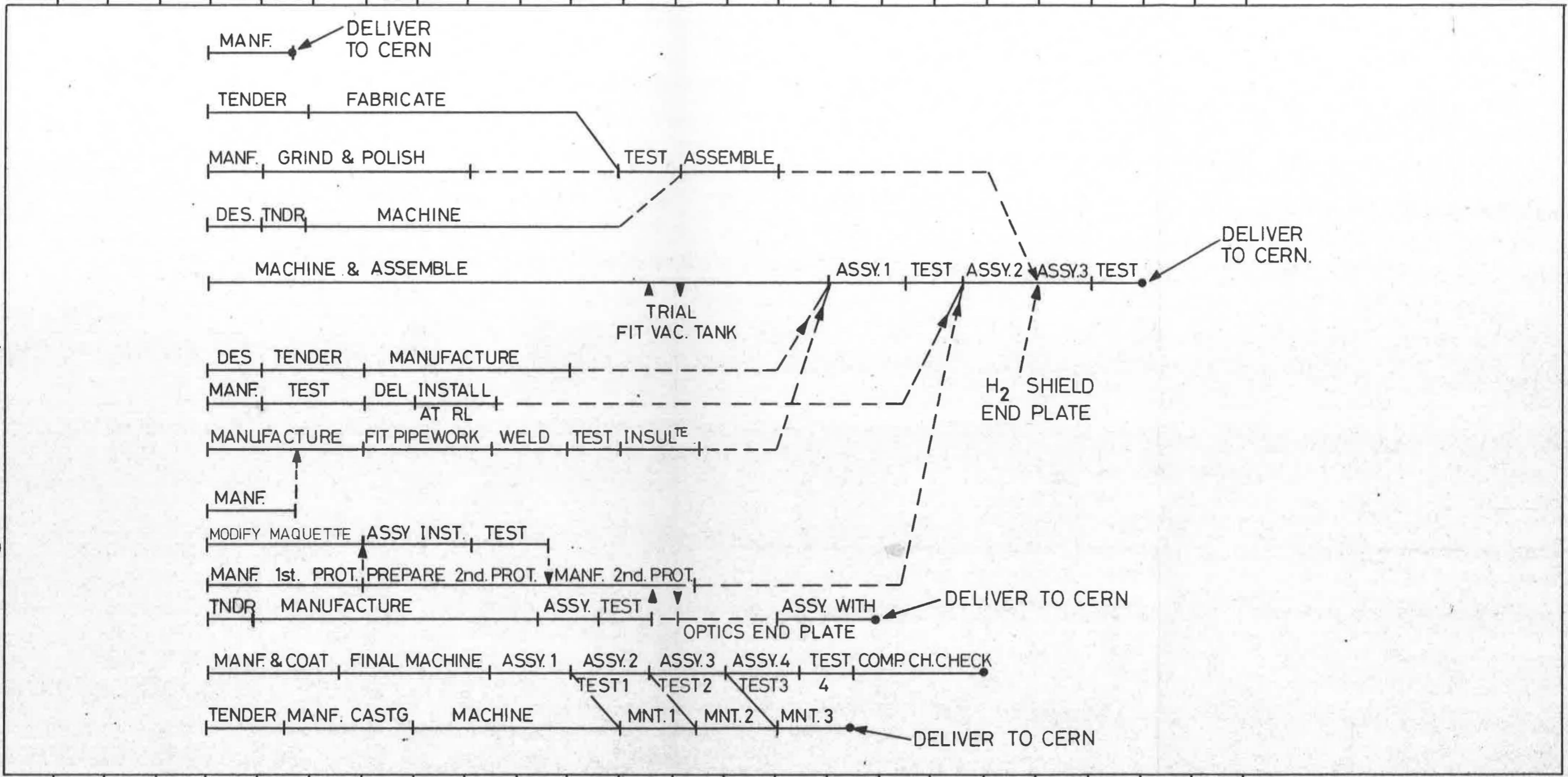
†Includes £9,500 to be provided from another CERN budget.

* at 15.2.77 prices.

All prices exclude VAT.

18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

IRON STRUCTURE
 WINDOW GASKET
 CHAMBER WINDOW
 WINDOW FLANGE
 CHAMBER SYSTEM
 SUPPORT CHAMBER TROLLEY
 VALVE VESSEL
 VALVES
 PISTON & BELLOWS ASSEMBLY P
 VACUUM ENCLOSURE
 LENSES
 LENS PLATE & SUB MOUNTS



RCBC PROGRAMME 31 AUG. 1978