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PSPC/P55

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

GENERAL PURPOSES COMMITTEE

# THE MAIN VACUUM CHAMBER FOR NIMROD

Note by the Chairman of the Project Committee

## 1. INTRODUCTION

1.1 It will be recalled that in July 1958 the Project Committee approved a complete change of approach to the design of the main vacuum chamber. The main feature of the new design is that it comprises two chambers, an outer one of epoxy resin which is supported mechanically by the pole pieces which are located within the outer chamber, and an inner one of light construction not subjected to any appreciable differential pressure.

1.2 The design proceeded at Harwell with assistance from Messrs. Vickers-Armstrong, but in order to develop production techniques in time for manufacture of the component sections, it was necessary to place a contract with a manufacturer who had wide development resources in the special techniques involved.

## 2. DEVELOPMENT CONTRACT

2.1 Following approval by the General Purposes Committee a contract was placed with Messrs. Marston Excelsior, Ltd. for the following work. (Paper N.I. GP.59.1 refers)

(i) Technical study to determine the most suitable constructional techniques.

(ii) Production of models and samples as necessary to establish techniques.

(iii) Development and manufacture of one complete section.

(iv) Submission of drawings and reports on the progress of the various items.

(v) Manufacture of eight complete sections, which is not to commence without prior approval in writing from the Authority.

2.2 The price to be paid for the development work and manufacture of the first complete section will be determined from the materials used, the hours worked and the rates quoted. The development contract has a limit of liability of £100,000.

## 3. ESTIMATED COSTS

3.1 Prior to the placing of the contract an estimate of £325,000 based on preliminary information was made by the Project Group advised by Marston Excelsior.

3.2 The technical study and development work has continued at the manufacturers and it has now become apparent that appreciably more development work and more complicated tooling than was first envisaged is required to produce the sections

3.3 The overall costs have therefore been re-examined and the new estimate is £440,000. The break-down of the original and the new estimate is as follows:-

| | Original £ | Revised £ |
|---|---|---|
| Technical study and development | 30,000 | 55,000 |
| Plant and tools | 60,000 | 150,000 |
| Production of one complete section | 25.000 | 25,000 |
| | 115,000 | 230,000 |
| Production of eight complete sections | 210.000 | 210,000 |
| | £325,000 | £440,000 |

4. DISCUSSION

4.1 It will be seen that the overall increase of £115,000 is due to an increase of £25,000 for technical study and development and an increase of £90,000 for plant and tools.

4.2 The increase of £25,000 for technical study and development is due to under-estimating the amount of work necessary to develop fabricating methods.

4.3 The increase of £90,000 for plant and tools is due to a greater realisation of the tooling necessary to produce the vacuum chamber, the design of which was incomplete when the original estimate was made. A list of the plant and tools is shown in the appendix. A proportion of these tools will be retained by the National Institute at the end of the manufacturing period, and some small sum may be recoverable on the remaining plant.

4.4 It should be noted that the estimated cost of the eight production sections is unchanged. The estimate given, however, is not binding on the contractor, as the price to be paid for these sections will be negotiated when he is in a position to quote.

4.5 The opinion of the Project Group is that this firm are tackling a difficult problem energetically; they are working long hours on research and development to establish the manufacturing processes.

5. RECOMMENDATIONS

It is recommended that:-

5.1 Approval be given to increasing the financial limit of the contract with Marston Excelsior from £100,000 to £230,000.

5.2 Approval be given to increasing the estimate for the Vacuum System by £115,000.

D.W. FRY
Chairman Nimrod Project Committee

A.E.R.E., Harwell.

APPENDIX I.

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NIMROD PROJECT

PLANT AND TOOLS FOR THE MAIN VACUUM CHAMBER

| 1. GENERAL PLANT | £ |
|---|---|
| Checking Plate | 5,300 |
| 5 Ton Crane | 2,600 |
| Extensions to 30 cwt. gantry | 1,500 |
| Transport frame | 400 |
| Lifting frames | 1,500 |
| Truck | 200 |
| Checking and drilling jigs | 2,000 |
| Metrology | 3,000 |
| Fume extraction | 3,000 |
| Portable drill | 350 |
| Sundry small tools | 1,000 |
| Total = | £20,850 |

| 2. SPECIAL PLANT FOR MANUFACTURE OF OUTER COMPONENT | £ |
|---|---|
| A. Side Moulding Plant | |
| Matched Dies, 15 bottom 6 top | 11,500 |
| " " 6 special top and bottom tools | 6,000 |
| Bed Plate Moulding Section | 4,000 |
| " " Light Jig Section | 2,000 |
| Production Press | 1,050 |
| Lifting gantry and rails | 1,000 |
| Heating Elements | 750 |
| Controllers and Contactors | 200 |
| Special grillage for centre section | 500 |
| Erection | 2,000 |
| | 29,000 |
| B. Dorsal Splicing Plant | |
| 25 Bottom Dies | 4,600 |
| 5 Top Dies | 1,000 |
| Supporting framework and clamps | 3,000 |
| Heating Elements | 500 |
| Lifting gantry | 300 |
| Controllers and Contactors | 200 |
| Erection | 1,000 |
| | 10,600 |
| C. Special End Flange Tools | 6,000 |
| D. Pilot Plant | 1,000 |
| Total = | £46,600 |

| 3. SPECIAL PLANT FOR MANUFACTURE OF INNER COMPONENT | £ |
|---|---|
| A. Side Moulding Plant<br>Cost probably similar to Outer Component | 29,000 |
| B. Dorsal Splicing Plant<br>Cost probably similar to Outer Component | 10,600 |
| C. Special End Flange Tools<br>Cost about two-thirds that for Outer Component | 4,000 |
| Total = | £43,600 |

| 4. SPECIAL PLANT FOR MANUFACTURE OF HEADER COMPONENT | £ |
|---|---|
| A. Side Moulding Plant<br>Cost assumed similar to Outer Component | 29,000 |
| B. Dorsal Splicing Plant<br>Cost assumed 50% of Outer Component | 5,300 |
| C. Special End Flange Tools<br>Cost assumed two-thirds that of Outer Component | 4,000 |
| Total = | £38,300 |

| SUMMARY | £ |
|---|---|
| 1. General Plant | 20,850 |
| 2. Special Plant for Outer Component | 46,600 |
| 3. Special Plant for Inner Component | 43,600 |
| 4. Special Plant for Header Component | 38,300 |
| TOTAL = | £149,350 |