SCIENCE - ENGINEERING - TECHNOLOGY — CONSULTING - DESIGN - CONSTRUCTION

H. TRACY HALL, INCORPORATED

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2 March 1974

United Nations Development Program
866 United Nations Plaza
New York, New York 10017
Attn: John B. Cella, Jr.

Reference: IND/72/041

Gentlemen:

The following high pressure/temperature equipment is available for immediate delivery subject to prior sale:

Item 1. One each 200 ton cubic press including all hydraulic and electrical systems, 3 sets of anvils (with 1/2 inch on edge square faces), and 2 sets of binding rings for these anvils, and also including 100 each pyrophyllite sample cubes. The equipment is for use on 220 volt, 3 phase, 60 c/s electric supply.

Price: $68,500.00US, fob Provo, Utah 84601 USA.

Terms: Cash on acceptance of the press at Provo. Prior to acceptance, the press may be operated and inspected by India National Physical Laboratory or other designated personnel for a period of one week in Provo in order for the purchaser to satisfy himself as to the merits of the press and that it is in good working order. No waranty is available after the press leaves Provo.

Variations: 1. For 3 phase, 440 volt, 50 c/s add $600.00 to the above price and add 3 months extra time for delivery.

2. 24 additional anvils $3360.00 fob Provo
3. 24 additional binding rings $10,800.00 fob Provo

Delivery time on items 2 and 3 above is estimated at 8 months.

Note: If the above press now on hand is sold prior to your purchase, it will require an estimated 24 months to build another one and the price will advance to $92,000.00 fob Provo. Also, a $35,000.00 non refundable deposit will be required before construction will commence. The balance of $57,000.00 would then be required on acceptance of the press in Provo at completion.

Item 2. Belt-Type equipment.

I have just consulted with officials of the General Electric Company concerning their patents on the Belt apparatus. They are not willing to grant anyone a licence to manufacture and intend to prosecute unauthorized manufacture. Consequently, we respectfully decline to bid on this type of equipment.

We are not in a position to bid on any other aspects of your project.

Sincerely yours,

H. Tracy Hall

H. Tracy Hall, President

तार :- "नेटफिजिक"
TELEGRAMS : NATPHYLAB.
फोन :- ५७१६१
TELEPHONE : 57161

राष्ट्रीय भौतिक अनुसंधान शाला
NATIONAL PHYSICAL LABORATORY
हिलसाइड रोड, नयी देहली-१२
Hillside Road, NEW DELHI-12

सदर्भ
Ref. No. AM/MW/143/74

दिनांक
Dated February 16, 1974

Dr. B.K. Agarwala
Head, Mechanics Division

Dear Prof. Tracy Hall,

You will kindly recall that during discussions with you at Provo in September, 1972 I had indicated that we wish to purchase a 200-ton cubic press/belt device for laboratory synthesis of diamond, cubic boron nitride and coesite. You had then given me a quotation for the equipment. We have since then been persuing the matter with the United Nations Development Program in New York for funding the project. They have now in principle approved the project and asked us to give them detailed specifications of the equipment, expert services and the training facilities that we need for this project. We have supplied this to them and I am sure they have sent you the tender document for making a suitable quotation. My own impression after talking to you was that you will not find it possible to render either the expert services to make synthetic diamond here or provide training facilities for the scientists from this laboratory. In that case we shall be prepared to accept only equipment from you and make alternative arrangements for obtaining experts and arranging training facilities. I shall be grateful if you could kindly send me a copy of the document that you submit to the UNDP, New York in response to their tender. It will help us if you quote also for the belt type apparatus in addition to the cubic press for which tender documents have been sent. A copy of the tender document is enclosed for ready reference.

$ 40,000 dollars

With kind regards,

Yours sincerely,

Bhagawala

(B.K. Agarwala)

Prof. H. Tracy Hall
Consulting Chemist,
1711 North Lambert Lane,
Provo, Utah

(U.S.A.)

UNITED NATIONS
DEVELOPMENT PROGRAMME

PROGRAMME DES NATIONS UNIES
POUR LE DEVELOPPEMENT

866 UNITED NATIONS PLAZA
NEW YORK, N.Y. 10017

TELEPHONE: 754-1234

CABLE ADDRESS: UNDEVPRO • NEW YORK

REFERENCE: IND/72/041

6 February 1974

Gentlemen,

Establishment of a Pilot and Demonstration Plant
in Hydrostatic Extrusion and Material Synthesis
at the National Physical Laboratory, New Delhi

We are, at the moment, in the process of formulating this project and we are hereby soliciting informal budgetary quotations for the purpose of finalizing the project. The relevant specifications are enclosed herewith. You should note that this project has not yet been approved by the Administrator and that we will have to call international bids once the project is approved.

Your collaboration in this matter would be greatly appreciated and we would like to receive your informal budgetary quotation not later than 4 March 1974 if possible.

Any questions may be referred to Mr. Jean H. Paradis, at the above address (telephone (212) 754-1234 extenstion 4526) cable address UNDEVPRO NEW YORK. Kindly cable acknowledgement of reciept of this letter.

Yours sincerely,

p. John B. Cella, Jr.
Director
Projects Execution Division

H. Tracy Hall
Consulting Chemist
1711 North Lambert Lane
Provo, Utah

Part II

SPECIFICATIONS FOR EQUIPMENT, SERVICES OF EXPERTS, AND TRAINING FACILITIES FOR INDIAN PERSONNEL FOR THE ESTABLISHMENT OF PILOT AND DEMONSTRATION FACILITY IN MATERIAL SYNTHESIS AT THE NATIONAL PHYSICAL LABORATORY, NEW DELHI (INDIA)

1. Project Requirements

The project requirements include

A. Purchase of equipment as listed in Section 2,

B. Foreign expertise to assist Indian personnel as detailed in Section 3,

C. Training of N.P.L. scientists in research and development laboratories abroad as listed in Section 4.

2. Specifications of Equipment

The equipment is intended to be used to

A. Make synthetic diamond, cubic boron nitride, and sintered diamond first on a laboratory scale and then on a batch production scale for consumer trials,

B. Develop composite materials for use in extrusion dies and other high pressure tooling.

The equipment shall consist of

A. 200 ton cubic press including all hydraulic and electrical systems, 3 sets of anvils (with ½ inch on edge square faces), and 3 sets of binding rings for these anvils and also including 100 each pyrophyllite sample cubes for use on 3 phase 440 volts or single phase 220 volts, 50 c/s electric supply,

B. 24 sets of spare anvils,

C. 24 sets of binding rings,

D. 1,000 pyrophyllite sample cubes.

3. Services of Experts

The successful bidder shall arrange to provide experts to assist the Indian personnel in their research and development efforts to fulfill the objectives states in Section 2. The qualifications and duties of the experts are detailed below:

A. 1 expert for 3 months

Qualifications: The expert should have basic qualifications in science or engineering with experience in the synthesis of materials using high-pressure high-temperature techniques.

Duties: The expert will assist the Indian personnel in determining the process parameters for the synthesis of crystalline diamond, sintered diamond and cubic boron nitride. He will also assist in the batch production of these materials for extensive consumer trials.

B. 1 expert for 3 months

Qualifications: The expert should have basic qualifications in science and engineering with experience in the synthesis and testing of composite materials.

Duties: The expert will assist the Indian personnel in determining the process parameters for the synthesis of various types of composite materials and investigating their use in extrusion tooling and other industrial applications.

4. Training Facilities

The successful bidder shall arrange the training for the scientists and engineers of the user organization at its own laboratory or at other research and development laboratories where such facilities exist. The details of training facilities required are given in the following table:

S. No.	Number of Trainees	Total Man-Months	Fields of Training
1.	1	3	Synthesis of crystalline and sintered diamond and cubic boron nitride.
2.	1	3	Synthesis of composite materials.

5. General Conditions

A. The bidder may state whether he is prepared to supply equipment, expect services and training facilities required for the project. If, however, he is prepared to supply only part of the inputs, he may explicitly mention this in the quotations.

B. The bidder shall undertake the erection and commissioning of the equipment and the costs shall be indicated in the quotations for the equipment. The satisfactory performance of the equipment shall be guaranteed for a two-year period from the date of commissioning. In case of unsatisfactory performance, the successful bidder shall carry out the necessary repairs at his own cost.

C. The bidder will indicate whether he is prepared to supply the spare and wear parts on a continuing basis.

D. The bidder may indicate the delivery period for the equipment.

E. The successful bidder will provide a layout sketch of the equipment and the type and size of building that will be necessary to house the unit.

ANNEXURE - I

LIST OF TYPICAL PRODUCTS FOR EXTRUSION

A. Aluminium Alloys

S.No.	Material	Size
	Solid Circular Sections (All 10 metres long)	
1.	Alloy B26S (Cu 4.3% , Si 0.8% , Mn 0.8% , Mg 0.8%)	40 mm diameter
2.	Aluminium Bronze	10 mm diameter
	Solid Rectangular Sections (All 10 metres long)	
1.	Alloy B26S (Cu 4.3% , Si 0.8% , Mn 0.8% , Mg 0.8%)	(i) 40 mm x 20 mm (ii) 50 mm x 20 mm
2.	Alloy A56S (Mg 5.0% , Mn 0.3%)	(i) 0.90 mm x 0.50 mm (ii) 2.70 mm x 0.65 mm (iii) 3.00 mm x 0.50 mm (iv) 3.00 mm x 0.75 mm (v) 3.20 mm x 0.80 mm (vi) 4.20 mm x 1.00 mm
	Circular Tubing (All 6 meters long)	
1.	Alloy 2S (Al 99.0% minimum)	(i) 2.44 mm x 1.42 mm x 0.51 mm (ii) 3.00 mm x 1.60 mm x 0.70 mm (iii) 6.36 mm x 3.92 mm x 1.22 mm (iv) 6.36 mm x 4.76 mm x 0.80 mm (v) 7.94 mm x 5.40 mm x 1.27 mm

S.No.	Material	Size
2.	Alloy 3S (Mn 1.2%)	28.73 mm x 27.31 mm x 0.71 mm
3.	Alloy A56S (Mg 5.0% , Mn 0.3%)	(i) 29 mm x 24 mm x 2.5 mm (ii) 40 mm x 30 mm x 5 mm
4.	Alloy B51S (Si 1.0% , Mg 0.6% , Mn 0.5%)	45 mm x 41 mm x 2 mm

B. Copper and Copper Alloys

S.No.	Material	Size
	Solid Circular Sections (All 10 metres long)	
1.	Copper	(i) 1.35 mm dia (ii) 1.95 mm dia
	Solid Rectangular Sections (All 10 metres long)	
1.	Copper (Cu plus any Ag present minimum 99.9% , Phosphorus min 0.015% max 0.040%)	(i) 2.10 mm x 1.08 mm (ii) 3.05 mm x 1.25 mm (iii) 3.80 mm x 1.00 mm (iv) 6.90 mm x 3.50 mm (v) 7.40 mm x 2.10 mm (vi) 8.60 mm x 2.63 mm (vii) 9.30 mm x 4.70 mm
2.	Silver bearing copper	28 mm x 7 mm

S.No.	Material		Size
	Rectangular Tubing (All 6 metres long)		
1.	Electrolytic copper (ETP Grade)	(i)	7.4 mm x 5 mm x 1.5 mm
		(ii)	60 mm x 18 mm x 6 mm
	Circular Tubing (All 6 metres long)		
1.	Copper (Cu plus any Ag present min 99.9%, Phosphorus min 0.015% max 0.040%)	(i)	0.225 in x 0.125 in x 0.050 in
		(ii)	0.235 in x 0.125 in x 0.055 in
		(iii)	0.245 in x 0.125 in x 0.060 in
		(iv)	0.191 in x 0.031 in x 0.080 in
2.	Copper (Cu plus any Ag present min 99.9%, Phosphorus min 0.015% max 0.040%)	(i)	0.25 in x 0.194 in x 0.028 in
		(ii)	2.25 in x 2.12 in x 0.065 in
3.	70/30 Arsenical Brass (Cu between 70% and 73%, As between 0.02% and 0.06%, Zn the remainder)	(i)	1 in x 0.904 in x 0.048 in
		(ii)	0.75 in x 0.494 in x 0.128 in
		(iii)	1.75 in x 1.622 in x 0.064 in
		(iv)	2.00 in x 1.840 in x 0.080 in
4.	(i) 90/10 Copper - Nickel Alloy (Ni between 10% and 11%, Fe between 1% and 2%, Mn between 0.50% and 1.00%, Cu the remainder)	(i)	16 mm x 14 mm x 1 mm
		(ii)	19 mm x 17.5 mm x 0.75 mm
		(iii)	19 mm x 17 mm x 1 mm
		(iv)	30 mm x 28 mm x 1 mm
	(ii) Admiralty Brass (Cu between 70% and 73%, Sn between 1% and 1.5%, As between 0.02% and 0.06%, Zn the remainder)		

C. Stainless Steel

S.No.	Material	Size
	Circular Tubing (All 6 metres long)	
1.	Stainless steel	Inner diameter ranging between 6 mm and 40 mm Wall thickness ranging between 0.5 mm and 3 mm

Part II

SPECIFICATIONS FOR EQUIPMENT, SERVICES OF EXPERTS AND TRAINING FACILITIES FOR INDIAN PERSONNEL FOR THE ESTABLISHMENT OF PILOT AND DEMONSTRATION FACILITY IN MATERIAL SYNTHESIS AT THE NATIONAL PHYSICAL LABORATORY, NEW DELHI (INDIA)

1. Project Objectives

The material synthesis project is to satisfy the following specific goals:

(i) Provide a capability in the National Physical Laboratory at New Delhi, India, for synthesizing materials using high pressure-high temperature techniques;

(ii) Demonstrate the ability of the technique to produce materials now imported into India.

The contract covers three requirements:

(i) Equipment and process technology for each of several products;
(ii) Training of Indian scientists in research and development laboratories abroad;
(iii) Foreign experts to assist Indian scientists in their research and development effort.

2. Definition of Items

Item 1: Cubic Press with spares

Product classes

Item 2: Synthetic Diamond, Cubic Boron Nitride and Sintered Diamond (Carbonado)

Item 3: Personnel Training

Item 4: Foreign Expertise

Item 5: Commissioning of machine

Item 6: Consummables and replacement parts.

3. Instructions

Item 1: is the cubic press with the following specifications:

200 ton cubic press including all hydraulic and electrical systems, 3 sets of anvils (with $\frac{1}{2}$ inch on edge square face) and 3 sets of binding rings for these anvils and also

including 100 each pyrophyllite sample cubes for use on 3 phase 440 volts or single phase 220 volts, 50 c/s electric supply.

The following spares and consummables may also be included in the tender

(i) 24 sets of spare anvils
(ii) 24 sets of binding rings
(iii) 1000 pyrophyllite sample cubes.

Item 2: lists items which are desired to be developed on a laboratory scale on the equipment described in Item 1. The tender clearly state whether it is possible to develop these products on the equipment offered.

Item 3: An important part of the project is the training of NPL scientists, not only in the use of the equipment for the purpose specified in Item 2, but also in the more fundamental aspects of the synthesis of materials and composites at high pressures and high temperatures. It is intended to provide a total of 6 man-months of training for 2 NPL scientists.

The tender may specify whether such training is possible at contractors' laboratories or whether the contractor is in a position to arrange training at other laboratories where such facilities exist.

Item 4: Expert services totalling 6 man-months will be needed to assist Indian personnel in the research and development effort pertaining to the development of products listed in Item 2.

The tender may specify whether the contractor agrees to provide experts from his own organisation or is in a position to arrange for experts from other organisations possessing competence in this area.

Item 5: It is intended that the cost of Item 1 will include the cost to the contractor of assembling and demonstrating the cubic press before shipping. The cost of re-assembling and demonstrating the machine should be listed here. The press should be guarantteed to operate at rated capability for two years. If this involves additional cost, list here.

Item 6: List the cost of replacement parts or any other parts judged to be easily damaged or short lived. Indicate also the cost of consummables.