**Government of India**
**Bhabha Atomic Research Centre**
**Multidisciplinary Research Group**
**Applied Physics Division**

**Ref: APD/CB/MF/22/AC/419**

08/07/2022

Sub:-**"Repair work on existing High-Current switching cum crowbar setup for pulse power applications"**

**Due Date: 16th JULY, 2021**

Dear Sirs,

1. Quotations are invited for the repair job, as per the enclosed specifications and drawings.
2. Bidder shall quote for repair of these components with material.
3. Bidder shall take out an insurance policy in favor of BARC for any free issue material supplied.
4. Taxes shall be quoted separately. Form H shall be provided where necessary.
5. The quotations must send their bid through speed post and must reach Head, Applied Physics Division on or before the due date referred.
6. The bidders must quote in a two part tendering system, which means that they will mention the technical specifications and financial terms in separate sealed envelopes, clearly mentioning which is which. These two separate envelopes viz. technical and financial will be enclosed in a bigger sealed envelope super scribed with the above reference number and due date.
6. The address on the envelope should read:

The Head,
Applied Physics Division, PURNIMA LABS,
Bhabha Atomic Research Centre
Trombay, Mumbai - 400 085.
Attn: Mr. Ankur Chowdhury

7. The repair work shall be subject to inspection by our representative. The finished components shall not be dispatched prior to approval by our representative at the bidder's works. Necessary inspection facilities should be provided to our engineers during repair at bidder's premises.
8. The bidder shall deliver the finished components after approval by our representative, within 45 days from the date of the firm purchase order issued to the bidder. The finished components shall be delivered by the bidder at **EHPPL, BARC, Near Chinchawali Village, Haji Malang Road, P.O. Kate Manivali, Kalyan, Thane, Maharashtra-421306**.
9. Head, Applied Physics Division, BARC, reserves the right to accept/reject any or all quotations without assigning any reason.
10. Payment will be made by cheque only after satisfactory completion of work on production of bill, delivery challan and advance stamped receipt. It may be noted that IT @ 2% and surcharge on tax at 15% shall be deducted from your bills.
11. Job will be guaranteed against material and manufacturing defects for 1 year from the date of supply.

(Mr. Ankur Chowdhury)
For and on behalf of
Head, Applied Physics Division

# Repair work on existing High-Current switching cum crowbar setup for Pulse Power Experiments

This job includes the repair work on existing High Current switching cum crowbar setup for High voltage applications at voltages exceeding 15,000 volts for high voltage experiments. The concerned setup is located in **EHPPL, BARC, Near Chinchawali Village, Haji Malang Road, P.O. Kate Manivali, Kalyan, Thane, Maharashtra-421306.** The bidder needs to be well versed in the various aspects of working of high voltage, high current systems (including high voltage, high current PCBs and compact enclosures) as well as high current system (handling current pulses of the order of a few hundred kilo-amperes).

## Description of existing setup and constituent components:

The setup under consideration consists of a Switching cum crowbar setup consisting of the following components:

a. Low-inductance Termination Plates for mounting multiple numbers of coaxial cables.
b. High Voltage Electrolytic Resistors and Pneumatic Isolation switch for safety and isolation during high voltage operation.
c. High Voltage (15 kV), high current, high coulomb-rated switches for switching and crowbar operation.
d. Five numbers of high current driver modules (U-3 rack enclosed) for operation of the setup.
e. DC Supply units, Optical Trigger generators and other accessory control components.

## Repair Work in the scope of the bidder:

The concerned system was operated for a long period of time at high voltages for generating of current pulses for various Pulse Power applications. During the period of its extended operation, various problems have developed causing its operation to stall completely. The repair work concerned with this job, is aimed at repairing known and already-identified damages along with identification and redressal of unknown damages that might have occurred in the course of its extended operation. The repair work will be carried out on-site i.e. EHPPL, Kalyan, BARC. All equipments, components and systems required during repair work shall be provided by the repair personnel provided by the concerned party. The concerned bidder must visit the concerned site for job assessment before commencement of the said repair work. The following repair works are in the scope of the concerned party:

1. Re-soldering and repair of the High Current PCB section of the five numbers of high current driver modules for removal of HV tracks, re-masking, re-soldering of damaged joints, re-configuration for obtaining lower inductance etc. among others.
2. Re-winding of ferrite-cored 900 mm X 900 mm X 900 mm pulse transformer involving removal of old winding and replacement with new winding, as provided by divisional

representative. The repair personnel shall also conduct turns ratio testing, insulation testing (winding to winding, winding to core) up to 5 kV and mutual inductance measurement testing for the repaired transformers.

3. Repair of Front and Back Panel facia of driver modules for more compact and low-inductance connections. This also involves ensuring adequate high voltage isolation between adjacent connections and the minor repair and installation in the 36 U cabinet.
4. Repair of damaged HV Card (3 Nos., Dimensions: 35 mm X 75 mm X 160 mm) involving dis-assembly of existing Card, re-soldering/repair of damaged joints and re-assembly of HV Card to generate DC Voltages up to 5 kV, without any operational problems.
5. Repair of High Voltage Electrodes includes cleaning and polishing of eroded HV components to achieve mirror finish (Ra value of 0.1) (polishing of eroded parts, placement of crowbar setup), rounding (Fillet radius up to 5 mm) of termination plates, dis-assembly and identification of HV tracks followed by their subsequent repair and re-assembly etc. are in the scope of the concerned party. Other that these, repair of all damages that may be revealed during setup dis-assembly (including the repair work on damaged RG-213U coaxial cables) are also in the scope of the concerned party.
6. Soldering of LV Control units (including soldering of SMD joints and components) is also in the scope of the concerned party.