Power Transformer Design Software integration, Optimization and Drawing Automation System

Transformer Engineering Department

BHEL Jhansi

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NOTICE INVITING TENDER

1. Scope of Work   :Development of customized software for " **Power Transformer Design software integration,Optimization and Drawing Automation System"**

2. Tender Evaluation Criteria : As per Annexure – D

3. Duration of the Contract   : Two year from the date of the award of the contract.

4. Last date of receipt of the Tender   :   1315 hours on _12/10/2012_

5. Date of opening of Techno Commercial Bid   :   1400 hours on _12/10/2012_

6. Address for receipt of Tender   :   **Additional General Manager (TRE/FES/Test/RPD)**
     Bharat Heavy Electricals Limited,Khailar,
     Jhansi-284120 U.P.

7. Earnest Money Deposit   :   Rs.2,00,000/- (Rs Two Lakhs Only)
     payable in the form of Demand Draft/   Banker's Cheque favoring BHEL, Jhansi

(i)In case of successful bidder EMD shall be converted and adjusted against the security deposit .

(ii) In case of others the EMD shall be returned within 15 days of acceptance of award of work
    by the successful tenderer.

(iii)EMD shall not bear any interest in any manner whatsoever.

(iv)EMD by the Bidder will be forfeited if,

(a)After opening the tender, the Bidder revokes his tender within the validity period or increases his earlier quoted rates.

(b)The successful Bidder does not commence the work within the period as specified in the LOI / Contract.

8. Cost of tender documents   : Rs.1000/- + 13.5% VAT = Rs 1135/- payable through a separate
    Demand Draft in favour of "BHEL, Jhansi" along with technical bid.

9.The Bidders shall bear all costs associated with the preparation and submission of the bid. BHEL shall
    in no case be liable for these costs regardless of the conduct or outcome of the process.

10Any clarifications may be sought by Bidder from BHEL jhansi with due written requests   prior to
    Tender Due Date.

11.At any time prior to the Tender due date, BHEL may, at its sole discretion or in response to a
    clarification sought by a Bidder, modify the bidding documents. For compliance of the requirements
    by the Bidder owing to the change, BHEL may, at its sole discretion change the Tender due date.

12.BHEL reserves the right to accept or reject any bid and to annul the bidding process and reject all
    bids at any time prior to the award of contract without assigning any reason therefor.

    A)   <u>**TECHNO-COMMERCIAL BID AND PRICE BID SHOULD BE SUBMITTED IN SEPARATE SEALED ENVELOPES. IN CASE THE BIDS ARE FOUND IN ONE SINGLE ENVELOPE THE "BIDS" ARE LIABLE TO BE REJECTED.**</u>

    B)   <u>**THE CONTRACTORS MAY PHYSICALLY VISIT THE WORK PLACE BEFORE QUOTING THEIR RATES.**</u>

     I/We agree with the above
         Signature of Contractor with Seal   Executive Incharge

QUALIFYING REQUIREMENTS

1. The party should have the minimum experience of two years in providing software applications for design calculation & drawing automation, valid proof of project done earlier to be provided. Minimum annual Turnover of Rs 50 Lakhs/annum in last two years is required.

2. The software is required to be developed using building block approach only and necessary proof of concept / details of earlier project completed based on this approach must be furnished along with the offer and also to be demonstrated during evaluation stage.

3. The successful vendors shall have to sign a confidentiality agreement (Non Disclosure Agreement) with BHEL to maintain the confidentiality of the information passed on to them by BHEL during the execution of the contract. The proforma of 'Non Disclosure Agreement' is attached as Annexure-H.

4. Should have valid PAN based Service Tax registration No. and CST-VAT registration number as applicable.

5. Should have Income tax PAN Number as applicable.

6. Income Tax Return for the last three years as applicable.

7. Self certificate that he is not blacklisted by any of the BHEL Unit and other organization where he worked.

8. Declaration that he is not guilty by a Court of Law in India for any offence involving fraud, dishonesty and moral turpitude.

I/We agree with the above
Signature of Contractor with Seal   **Executive Incharge**

INSTRUCTIONS TO TENDERERS

1. The tender is to be processed in two parts viz. Technical bid and price/rate bid. The Technical Bid Application (Annexure - F) and its enclosures along with the Contractor's Obligations, General Terms & Conditions must be submitted in one sealed envelope superscribed as "**TENDER FOR POWER TRANSFORMER DESIGN SOFTWARE INTEGRATION, OPTIMIZATION AND DRAWING AUTOMATION SYSTEM FOR TRANSFORMER ENGINEERING DEPARTMENT OF BHEL, JHANSI – Technical Bid**". The second envelope duly sealed should contain the price bid (Annexure – G) only super scribed as "**POWER TRANSFORMER DESIGN SOFTWARE INTEGRATION, OPTIMIZATION AND DRAWING AUTOMATION SYSTEM FOR TRANSFORMER ENGINEERING DEPARTMENT OF BHEL, JHANSI- Price Bid**". Any other enclosures, which the tenderer wishes to submit, must be enclosed with the Technical Bid only. The price bid envelope should contain the rates only. Offers not in line with the above procedure or quoted in any other format will be rejected.

2. Both the technical bid and price bid sealed envelopes must be enclosed together in a single envelope duly sealed and super scribed as "**TENDER FOR POWER TRANSFORMER DESIGN SOFTWARE INTEGRATION, OPTIMIZATION AND DRAWING AUTOMATION SYSTEM FOR TRANSFORMER ENGINEERING DEPARTMENT OF BHEL, JHANSI**". The same should be dropped in the tender box kept in the CISF gate of Administrative Building, BHEL, Khailar, Jhansi, within the specified date and time by the representative of the tenderer. Late offers / quote through e-mail / fax / courier will not be considered. However, tenders sent by Registered / Speed post to "*Address of Receipt of Tender*" mentioned in Annexure A and received before the time/date of tender opening will be considered.

3. All tenderers can witness the opening of the Technical Bid. After evaluation of the Technical Bid which may involve visit to the tenderer's / clients place by authorized officials, price bids of only those tenderers who are technically/commercially found suitable will be opened on a subsequent date which will be informed to the concerned parties in advance for witnessing the Price Bid opening.

4. All entries in the tender document should be in one ink. Corrections, over writing, cuttings, etc. will not be permitted. All the columns in the tender form should be filled without leaving blank in any page of the tender and all the pages must be duly signed & stamped by the tenderer before submission.

5. The Bidder shall quote the PRICES in English Language and international numerals. These rates shall be entered in figures as well as in words. In case of difference in rates between words and figures, THE LESSER OF THE TWO will be treated as valid for the purpose of the tender. In case of difference in (i) sum of the items and (ii) total indicated, the former will be considered. The metric system of units shall be used.

6. The vendors are required to visit BHEL Jhansi to assess complete scope of work in detail.

7. Tenders shall be signed by persons duly authorized / empowered to do so. Certified copies of such authority and relevant documents shall be submitted along with the tenders.

8. In the event of the Bidder merging with or getting acquired by another company, all obligations under the contract shall automatically get transferred to the acquiring company till the end of the period, including the guarantee period and AMC, if opted for. Bidder shall intimate BHEL if there is any change in their legal status, within fifteen days of such change. BHEL shall review the implications and take necessary action.

9. Should a Bidder or, in the case of a Firm or Company, its Partner(s) / major Shareholder(s)/ Director(s) have relation(s) employed in BHEL, the authority inviting tender shall be informed of the fact along with the offer. Otherwise, BHEL may, at its sole discretion, reject the tender or cancel the contract at any stage of the contract.

10. Any attempt by a Bidder to exert influence on BHEL during the process of bid evaluation or award of the contract, would make their bid liable for rejection.

11. The offer shall be kept open for acceptance for a period of 180 days from the date of opening of Technical Bid. Only the Technical Bid will be opened on the due date mentioned in the enquiry.

12. Bidders shall not be permitted to make changes in their Technical or Price bids after bid submission, unless asked to do so by BHEL. Unsolicited clarifications are liable to be rejected.

13. Price Bids of only the qualified and technically acceptable Bidders will be opened.

14. In case BHEL calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer, which shall be binding, on the Bidder. All expenses for attending such negotiations are to be borne by the Bidder.

15. The entire work covered in this Tender shall be entrusted to a **single Bidder.** The successful Bidder is not permitted to off load part or whole of the work to a sub vendor, without the prior written consent of BHEL.

16. In case of consortium / partnerships, the lead partner participating in the tender must posses valid experience and other certificates as required.

17. The successful Bidder shall attend the office of the Official as mentioned in the Notice Inviting Tender on the date fixed by the Official through a written intimation. The Bidder shall forthwith accept award of the contract and complete the execution of the agreement by signing all documents connected therewith.

TENDER EVALUATION CRITERIA

The evaluation of the Tender will be carried out as follows:

1. The tenders confirming to the Notice Inviting Tender, Qualifying requirements, Instructions to the Tenderers, Technical and Price bids conditions only will be evaluated.

2. Such of those tenders which confirm to the technical bid (Annexure - F) only will be evaluated.

3. BHEL officials may visit the tenderer's office & their client's place to evaluate the capability and assess the performance and may refuse the proposal if not found satisfactory.

4. Capability of the Contractor will be assessed on the basis of previous track record, experience in other organizations, etc.

5. The bidders shall be required to provide a high level design document of the entire solution proposed along with technical bid.

6. During technical evaluation BHEL may ask the bidders to demonstrate their capability to provide the solution and features to meet the tender requirements through previously developed production level solutions and or proof of concept level applications for design software and drawing generation using 3D models. Bidders may be required to do a pilot project for the same.

7. The bidder shall be required to demonstrate the approach followed in previous works and proposed approach for present work to satisfaction of BHEL.

8. Successful tenderers after the above process only will be invited for opening of the price bid / RA.

9. The Contract shall be awarded on overall L1 basis. (Refer blank price bid form and with suitable loading factors as applicable)

TECHNO COMMERCIAL REQUIREMENT

About Bharat Heavy Electrical Limited

BHEL is a premier engineering and manufacturing organization, majority owned by Government of India, catering to core infrastructure sectors of India economy viz Power Generation and Transmission, Industry, Transportation, and Renewable Energy. The company has 14 manufacturing units, 4 Power sector regions, 8 service centers and 15 regional offices, besides host of project sites spread all over India and abroad. BHEL supplied equipments account for 65% of total thermal generation capacity in India and contribute 73% of the total Power generation in the country.

BHEL Jhansi is one of the manufacturing units of BHEL. BHEL Jhansi is having two Main Products i.e. Transformers and Locomotives. The Transformer division is in the market of all type of Transformers i.e. Power Transformer, Rectifier Transformer Dry type transformer, Instrument Transformer, EMU Transformer, Furnace Transformer, ESP Transformer, Earthing Transformer, and Single phase railway Transformer. BHEL Jhansi manufactures Power Transformer of upto 220kV and 250MVA. The Locomotive division is in manufacturing of Electrical and Diesel Locomotives. BHEL Jhansi is presently developing AC EMU coaches for Indian Railways and has developed WAG7 electric loco, DE Shunters in the range of 350 hp to 1400 hp, various other utility vehicles including Rail cum Road Vehicle, Battery Powered Road Vehicle, dynamic track stabilizer, ballast cleaning machine, Hoist assembly for ship lift system etc. BHEL has also done many enhancements in existing products like eye bolt CT, Aluminum foil cast resin Dry type Transformer, 132 KV Live Tank CT, 400KV CT Design, StepLap Core and many more. BHEL Jhansi is also expanding its manufacturing capacity in Power Transformer and Locomotive, and also entering in 400kV Power Transformer market. Presently BHEL Jhansi is having huge order of Transformers and WAG7 Locos.

Familiarization of the Product

As has been mentioned above, transformer is a tailor made product. There are many features in a transformer, which vary from one customer to the other. Design of transformer is a complex process and involves lot of iterations to come to final results.

The Power Transformer has the following main assemblies upon which drawing generation work is to be done. (The list is indicative and shall be finalized during execution of contract)

1. Core & Endframe Assembly

Any transformer consists of core and winding. Core is the magnetic circuit through which flux flows. Core is made by stacking the 0.23 to 0.30mm thick CRGO steel. Core is clamped by Yoke bolt/ Belt and Top/ Bottom Endframe. Clamp Plate of rectangular cross section/ Tie Rod are used to clamp the top and bottom end frames through pin pad assembly. Pressure pad are placed on projected edge in Top Endframe and are used to exert pressure on the coil in axial direction .

There are following major types of cores :-
a. Three limb core
b. Two limb core
c. Five limb core
d. Core with elliptical yoke section
e. Core with flat yoke

There can be some more variation keeping the basics same. Core & Endframe assembly is a standard assembly with variations in type of Core, Endframe, Yoke bolt/ belt, clamping arrangement, Lifting arrangement, Ring , end clamping, pressure bolts,etc.

2. Tank & Base Assembly

A. Tank body

Transformer tank is an enclosure which contains inside it the live parts such as core and winding assembly, electrical connections and insulating oil. Generally few transformer tanks falls exactly in any one of the categories described below. Most of the tanks have a combination of the features described in these categories.
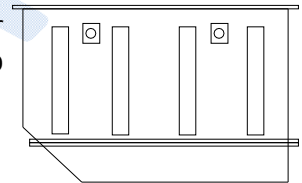
a. Conventional tank

A tank in which the tank to cover junction is at the top of the tank.
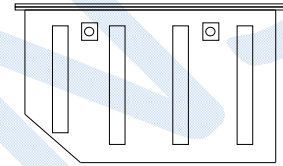
b. Bell type tank

A tank in which the cover is not flat in shape and the tank to cover junction is near the bottom of the tank. Thus the tank has got two parts – 'top tank' and 'bottom tank'.

There are variants to both the above types.

Theoretically a transformer tank can have any shape. They can be rectangular , semi cylindrical at one end, semi cylindrical on longer walls, tapered at bottom, etc. Broadly there can be 30 to 40 tank shapes with some similarity.

The tank plates are joined at ends. Standard plate sizes available in market are used and plate are suitably joined as per requirement. Each plate is to be specifically indicated in BOM.

B. Tank Base

Base can be with or without rollers. Rollers are generally of standard design. Base is with or without stiffener

C. Tank Assembly

Tank body is the skeleton of final tank that goes into the product. Various operations to create circular, elliptical or rectangular openings on the tank wall or tank cover are carried out in the assembly stage. Pads for mounting valves, inspection covers, terminal boards, turrets etc are placed in Tank. Pads for mounting name plates /rating plates are welded on the body. Arrangement to mount motor drive unit and marshalling box. Arrangement to mount radiators/ integral coolers. Arrangement of mounting of major assemblies like motor drive, ladders, terminals, etc. varies based on requirements.

To give adequate strength and rigidity to tank different types of stiffeners like ribs, gussets, channel sections, etc. are welded on the tank body.

Jacking pads meant for jacking the transformer, lashing lugs , Lifting bollards or lifting lugs used for lifting the transformer are welded on transformer tank.

The routing of wiring of various components are required to be taken to the marshalling box is to be decided and corresponding pads,tray arrangement to be provided on tank.This may be done in automated / semi automated manner to meet the requirement in a practical manner.

3. Cover Assembly

Tank cover assembly is of following major type like Flat type, Slopes at either ends and centre is flat, Slope on one side only , Dome at the centre and flat plates on either side, Flat on one side of the dome , Stepped on the end wall side, etc.

On cover end leads of Transformer Winding is connected to the system by any of following methods. It is mounted on the tank cover (or topmost horizontal plane in the tank) or in some cases some bushings are mounted on vertical end walls.

A. Over head bushings

High voltage, low voltage and in some cases third winding "Tertiary" or "Stabilizing" leads are brought out through bushings. They are called HV bushing, LV bushing and tertiary bushing. These bushing are mounted directly or on Turrets. Turrets are Round or Rectangular in shape.

B. Cable boxes

In sites where customer has laid cables instead of overhead conductors the termination (connection) is through cable boxes. Cable boxes are enclosures attached externally to the transformer tanks.

C. Bus duct

Generator transformer primary is connected to the generator through Busduct. For Busduct connections bushings are brought out through cover or through independent/ common turrets. These bushings are enclosed circumferentially by hoods which in turn receive the Busduct flange.

D. A combination of above

Termination of different windings can be through different combinations e.g. ("HV-bushing, LV-cable box", "HV-bushing, LV- Busduct", etc).

On Load Tap changer (OLTC) is mounted on Tank cover/ walls. It is generally housed inside the transformer tank except a few types. These are the standard products and based on the variant in use their dimensions are known in advance. Like one tap changer is housed in a pocket on one end of the tank. One type of tap changers are placed along the longer wall on LV or HV side,one type of tap changers have their own housing attached externally to main transformer tank. Their sizes are also standard.

4. Cooling pipe work

When the transformer is in service the windings get heated up. In oil filled power transformers oil is the cooling medium for windings. Oil is in turn cooled by means of radiators/ integral coolers with water/ air as cooling medium. Cooling are of following types

A. ONAN COOLING: Oil flow is through natural convection. Air flow is also natural (not forced). Cooling equipment is radiators.

B. ONAF COOLING: Oil flow is through natural convection. Air flow is not natural but forced. Cooling equipment is radiators and fans, ONAF coolers.

C. OFAF/ OFWF COOLING: Oil flow is forced by means of inline oil pumps. Air flow is forced by means of fans/ blowers. Cooling equipments is radiators, fans and pumps or integral OFWF coolers.

Radiators: Radiators (a bought out item) used in Transformer cooling are of standard profile. They are normally described in the following fashion: e.g. 10 - "5 or 9" – 34 – 3000 where 10: no. Of radiators, "5 or 9": no. of flutes in a radiator element, 34: no. Of elements in a radiator, 3000: distance between valve centers. Radiators can be directly mounted on the tank wall, if the no. of radiators is not large. Radiators can be mounted in a bank formation i.e. Group of radiators are mounted on headers and are placed separately from tank.

Header: Headers are pipes of square /round cross section. There shall be one top header and one bottom header for a group of radiators. The header and radiator assembly is supported over support frames or can be supported from transformer tank walls.

Header pipe work: Headers are in turn joined with the tank where suitable valves for connecting pipe work are provided. These pipes require pipe supports with suitable foundation. The routing of pipes varies depending upon space, radiator/cooler arrangement, etc. Header pipe work or cooler pipe work drawing shows the arrangement of radiators, headers supporting structures and the interconnecting pipe work. Arrangements of fans/ inline pumps along with their supports are also shown in the header pipe work drawing.

Coolers: These can be OFWF, OFAF types with their variants. Necessary pumps, flow indicators, valves are also required to be arranged and pipework to be decided.

5. **Main Conservator pipe work**

A conservator is generally a cylindrical vessel which provides space for expansion of oil inside the transformer or supplies oil to the transformer when the transformer oil cools and contracts in volume. A conservator is always placed above the transformer supported from tank or above conservator. Some standard drawings for the conservator are also used. When the conservator is used for the main transformer it is called "main conservator" and when it is used for the OLTC it is called "auxiliary or OLTC conservator".

6. **OLTC conservator pipe work**

Similar to main conservator this is provided for OLTC. This is also generally placed above the transformer

7. **Winding Assembly**

Winding looks like concentric cylinder with inner and outer diameter, length. It is lowered in the core limb. It is of various types having same basic shape.

Windings are of following class
   a. Power transformer
        i. Low voltage
        ii. Intermediate voltage
        iii. High voltage
        iv. Tapping
   b. Auto transformer
        i. Series
        ii. Common
        iii. Intermediate
        iv. Tapping

All windings are made separately in the mould. Each winding is wound on strips and blocks. All windings of same phase are lowered on single core limb. They can have any arrangement like. "LV-HV-Tap", "SV-LV-Tap-HV", "Common-Tap-Series" etc.

Initially bottom wooden ring and bottom block washer are lowered in the core limb. Then all coils of one phase are lowered in the limb and rests on the block washer. Cylinders and strips insulation are placed between each coil. Then again top block washer and top wooden ring are lowered.

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8. **Terminal Gear (TG) Assembly**
   TG is of following types:
   A. **High Voltage Side Connection (HV TG):** taking out and termination methods, insulation and lead holding arrangements are shown in HV TG drawing. If there is a tapping winding associated with this winding then tapping connections and connections with the on load tap changer or off circuit tap switch as the case may be are also shown.
   B. **Low Voltage Side Connection (LV TG):** leads termination and connections with respect to forming star or delta formation are shown in this drawing. In case tapping winding is also associated then termination arrangement of tapping leads are also shown.
   The routing of various cables is to be frozen in manner that it meets requirement of electrical clearances from various components.
   After preparation of Electrical design first Transformer Layout is prepared. Layout is prepared by keeping the core and winding assembly in focus and deciding various clearances and placement of fittings on the tank. Once layout is prepared the profile of the tank, placement of various fittings including cooler/ radiator banks and conservator, air clearances in bushings are known. From layout information for fabrication drawings like tank, end frame, header pipe work and conservator drawings and for electrical drawings like TG and winding assembly drawings are obtained. Outline General Arrangement (OGA) drawing can immediately be taken up with information available from layout.

Bought out items

While BHEL designs and manufactures many of the components used in the power transformers it also procures certain components / sub systems from vendors. The sizes and ratings of such bought out items are determined during the design process. Following bought out items are generally used in a transformer. Depending upon the solution proposed a library of 3 D models of such bought out items also needs to be prepared so that the items / models can be used in the final transformer assembly. Each of these items have several variants of their own

1. Radiators
2. Pump
3. Fan
4. Integral cooler
5. Bushings
6. Insulator
7. Valves
8. Relays (Buchholz / PRV)
9. On load tap changer and motor drive unit
10. Marshaling Box
11. Silica gel breather
12. Rollers
13. Magnetic Oil Gauge
14. Prismatic Oil Gauge
15. Gas cylinder
16. Thermosyphon filter
17. etc.

Power Transformer Drawings

Following major drawings are generated for a Power Transformer:

1. **Layout:**

   Following details are available in Layout (Outline of core, Outline of outermost coil superimposed on core, Tank base, Two longer walls parallel to core length (taking into consideration type of terminal gear and OLTC being employed), position of bushing lower end, position of Cover, position of bushing top end, Bushing air clearance, fittings on Tank cover, position of internal fittings, Side walls, Tank profile, placement of cooling equipments, connection of cooling equipment and tank through pipes, placement of main conservator and OLTC conservator along with associated pipe work, placement of welded parts on tank and any other fittings external to transformer).

2. **Customer Drawings:**
   a. OGA Drawing: OGA as the name suggests is the outline of a transformer and depicts how a transformer along with its accessories would look like when erected at site. OGA drawing preparation gets top most priority as this drawing is to be supplied to the client for their approval and ideally any manufacturing activity starts after getting approval from the client on this drawing. Normally internal details are not shown in this drawing. In addition some dimensions like overall length, breadth, height, transport (shipping) dimensions, phase to phase bushing air clearance, rail gauge etc.
   b. Foundation Drawing: This drawing shows the foundation detail (foot print) like roller position, Foundation bolt position in a ground, position of coolers, fans, etc. It is required to customer to plan the civil work in advance.
   c. Bushing Drawings
   d. R&D plate, valve schedule plate, Rollers, etc.

3. **Manufacturing Drawings**
   a. End frame drawings
      1) End frame fabrication (Top and bottom)
      2) End frame insulation (Top and bottom)
      3) End frame assembly (includes Top & Bottom Ring Drawing, Core to coil packing drawing, Ring Packing drawing)
   b. Tank drawings
      1) Tank body
      2) Tank assembly (includes Turret Assembly Drawing, Neutral Grounding Drawing, Cable Box/ Busduct hood Drawing)
      3) Tank details
      4) Tank Base
      5) Tank Cover
   c. Cooling Pipe Work
   d. Main Conservator Pipe Work
   e. OLTC Conservator Pipe Work
   f. Winding drawings
      1) Individual windings (rarely exceed five)
      2) Winding assembly
   g. Terminal Gear (TG) drawings
      1) HV TG Copper details
      2) HV TG Cleat details

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3) LV TG Copper details
4) LV TG Cleat details

Each of these drawings has their further details and component level drawings are prepared.

Standard drawings:

Other than above drawings related to a product, BHEL also uses standard drawings. The standard drawings are the drawings of standard parts/ assemblies. For standard parts these drawing are referred in the parent drawing BOM.

Standard drawings / documents are available related to the following components/assemblies. (This means parameters to define these objects are identified.) Each of these have their further variants also.

1. Core
2. Inspection cover
3. Conservator
4. A-frame
5. Endframe (in some cases)
6. Turrets
7. Cable Box
8. Bus Duct termination
9. Bollards / Lugs
10. Thermometer Pocket
11. Tap Switch
12. Clamp plate
13. Tie rod
14. Expansion Joint
15. Gas cylinder mounting arrangement
16. Header
17. Ladder
18. Fan / Pump / cooler support
19. Jacking Pads
20. Foundation Bolt arrangement
21. Many of other standard drawings and documents
22. Etc.

The above list is indicative and not exhaustive in nature.

(A) TECHNICAL REQUIREMENT:

(A 1) TECHNICAL CONDITIONS:

The parties should fulfill all the technical requirements mentioned below. Documents or self statement in support of the requirement should be submitted with the offer.

(A 2) SCOPE OF WORK:

Power Transformer is a tailor made product and its engineering totally depends upon customer requirement. For each type of transformer detail design/ engineering is done. For the detail designing of the Power Transformer, BHEL Jhansi is having many different software programs for different design calculations. Transformer Engineering Department (TRE) wants to integrate these Power Transformer designs programs. Further it wants to seamlessly link the data generated in the design process to take it to the next step and automate the drawing generation process involving manufacturing/ customer drawings of Power Transformers for components listed above.

For the sake of clarity described below are these two main parts of the project, identified as Part I and Part II.

Part I- Integration of Design Programs and Setting up capability for Design Optimization

The software programs used by BHEL are in different software platforms and run in different operating systems. These programs are developed in FORTRAN, C and Excel and runs on Sun Solaris 5.5 O/S, Linux & windows. The source code for some of the programs is not available. The output of one program is used to run other programs. The designer manually enters the output details of one program to feed the input to another program. This involves lot of manual effort and lengthens the total design time. In present system, output of some of the programs is verified by manual calculations and further refinement of parameters is done. After completion of this design process and based on the results of final design, designer generates Electrical Specification in AutoCAD in form of text and 2D sketch. Electrical Specification is having all technical information that is required to generate manufacturing drawings and it is also have winding specification sheet which is used for manufacturing of windings. A tentative summary listing of the various programs as on date is provided in the attached Annexure J.

BHEL wants to automate this design process by upgrading and integrating the existing design software programs and manual calculation. This integration of design programs shall also include the auto generation of final summarized output sheets (Electrical Specification, Design sheets, Top sheets, etc.) in a suitable form that provides an output that is similar in look and feel to that what is being used at present. The integration process shall consist of the following key steps:

1. To the maximum extent feasible all the programs wherein BHEL has the source code are to be rewritten in a common programming environment / platform. Where appropriate some of the newly written programs should be consolidated for enhanced optimization facilities and future ease of maintenance.
2. Where BHEL does not have the source code the data flow is to be set up from the newly written programs such that the programs in Unix / Linux or DOS or any other platform where source code is not available can be used and integrated on a common platform. This means being able to establish communication / data transfer between the various programs where feasible, especially in case of consolidation between the   new Windows based applications and previously compiled Unix / Linux and DOS/other programs.

3. An optimization capability shall be added to all these integrated programs, to the extent feasible and BHEL shall provide the optimization logics for the same.

4. Generation of summarized results in standard formats that will be provided by BHEL during execution.

Part II - Drawing Automation

Each Power transformer design involves preparation of approximately 30 to 60 manufacturing drawings of about eight different sub assemblies. The preparation of manufacturing drawings takes an average of 12 weeks of calendar time. Due to market pressure to reduce the delivery cycle time and to save on engineering manpower cost, it is intended to carry out the automation/ customization of engineering drawings. Our goal is to bring down the engineering cycle time from present 12 weeks to 2-3 weeks for issue of manufacturing drawings and information to our production section.

Presently BHEL generates 2D Drawings and Bill of Materials (BOM) in AutoCAD. BHEL has also developed BOM in Oracle database, which is directly linked to BHEL in-hose developed ERP system (like planning, material handling etc). The creation of 2D drawing in AutoCAD takes lot of time in drafting & BOM calculation like weight, Material, Size etc. To reduce this time and to increase accuracy, BHEL wants to upgrade to a 3D solid modeling system and to automate generation of Power Transformer shop ready 2D manufacturing/ customer drawing through 3D Models and export of BOM to BHEL Oracle/ERP system through a suitable file format to be determined through future discussions.

The drawing automation system will require facilities for routing of piping and cables to get certain features. Vendor may take a note and provide solutions accordingly. This to be done in consultation with BHEL so that an automated or semi automated routing process, to the extent feasible, can be implemented in a practical manner.

Specific requirements regarding the programming environment and 3D CAD system to be used in the project

BHEL's vision is to become a world-class engineering enterprise, committed to enhancing stakeholder value. As a part of this mission BHEL Jhansi / TRE is looking to introduce excellence in its various product engineering processes. In that regard BHEL is interested in implementing the next generation of engineering design optimization and automation systems to meet its current growth requirements.

The Architecture of software System shall broadly consist of three layers-
1. Layer1 will comprise of dumb CAD models
2. Layer2 will comprise of Rule engine, inference engine, interface with CAD platform/ data base/ optimization tools.
3. Layer3 comprises of Collaboration with PLM platform and other systems

All interfaces between layers shall be built through suitable API's/connectors/adapters for flexible design which would not require specialized IT skills in native software of the OEM. Vendor to confirm compliance to this requirement in the offer proposed and furnish full details.

The overall requirements for components of such a system shall be as follows:

1. A Suitable software to automatically generate 3D models and subsequently 2D drawings using a building block approach that is driven by optimized design results from the engineering rules is required. Provision of manual entry of data is also to be provided. The software proposed should not be just for "power transformers", but a generic one with tool based approach for maximum reuse capability. The system should have a facility to save the resulting 2 D drawing as in a format that can be read by AutoCAD. Also the solution proposed must have the following capabilities:

    a. Facilities for setting up geometric rules for the placement of various components used in a sub assembly and for assembling such sub assemblies into higher levels of assemblies.

    b. Facilities for defining the specifications of various 2D manufacturing drawings.

    c. The rules should be saved in the suitable database so that they can be subsequently maintained in a convenient manner.

    d. The building block approach should be developed by configuration and not from complex coding.

2. An efficient software platform with off the shelf products shall be used to the extent possible for programming of engineering rules, formulas and empirical data in the form of data tables or families of curves that displays superior scalability and life cycle maintenance. Such a platform should be easy to learn, easy to program, easy to use and should have ability to optimize designs in an efficient manner. It must display the minimum demand on programming time as well as the least requirement of programming or information technology expertise.

3. Software platform must be able to consolidate all design programs on one common platform before proceeding for optimization. Consolidation means being able to establish communication / data transfer between the various programs, to the extent technically feasible, especially in case of consolidation between the new Windows based applications and previously compiled Unix / Linux and DOS/other programs.

4. An ability to manage the above calculation based engineering knowledge in a centralized manner consisting of easy to use interfaces, rapid generation of custom and standardized reports, rapid application deployment, version control, access control, appropriate search facilities and audit trail. Suitable mechanism for version / revision control to be provided.

5. Ability to connect and run multiple building blocks of software solutions created in the platform into an integrated system level application and to get optimized results.

6. Provision of adding new design programs later must be available in the software proposed.

7. The application has to be web based and all software license shall be WAN/LAN based. This means being able to launch the application from the browser within the BHEL Intranet on the local area network.

8. Suitable error reporting and debugging features to be provided while editing and executing the rules.

<u>Vendor to note following</u> -

1. Demo/ own software license shall be provided by the vendor for the testing & implementation of the solution to BHEL. BHEL shall procure the required software for each phase as mentioned in blank price bid only after successful completion of each phase.
2. The vendor should possess valid license of all software proposed to be provided by the vendor for implementation of solution.
3. While submitting the offer vendor has to verify with BHEL / software OEM for rate contract of the different software proposed including 3D CAD software . In case of a rate contract the rates of the same shall be taken in price bid .

3D models and 2D drawings to be generated using suitable 3D CAD platform having all required features, preferably Solidworks/UG/ProE (latest versions). The 3D solid modeling platform proposed to be provided shall be able to meet all the technical requirements to programmatically and efficiently accomplish the requirements of the project scope and deliverables. The bidder has to demonstrate the general requirement mentioned in this Tender Document on proposed 3D CAD Software to BHEL's satisfaction.

BHEL requires that product sizing, component assembly and any other rules must be maintained outside of 3 D CAD , in a suitable form reviewed and approved by BHEL during the technical bid evaluation process, so that same can be used for different versions of software.

Implementation stages

The project will have the following phases and bidder should quote for each stage separately.

Phase 1: Phase 1 comprises of completion of stage I and stage II.

Stage I

This stage will consist of the following tasks for the one variant of power transformer:

1. Create a library of 3 D solid models for the parts that are custom designed.
2. Create a library of 3 D solid models for the standard parts for all variants of transformer such as fasteners, seals, etc. for which only the dimensions change during a design process.
3. Gather engineering and assembly rules and set these rules in a rule based environment.
4. Assigning parametric values to the appropriate parts in the library, create sheets with pulled out parameters and automatically generating 3D models of each part as per the specific design of a given order. Provide a system for automatically generating lowest level sub assemblies going up in hierarchy to higher levels of sub assemblies and finally producing the overall assembly in 3 D.
5. Automatically Generate 2 D customer drawings of the final assembly with all details like dimensions, BOM, notes, section views, etc. as per BHEL requirement.
6. Automatically Generate 2 D manufacturing drawings from 3D model of the above custom designed and standard parts with all details like dimensions, BOM, notes, section views, etc. as per BHEL requirement. This will consist of a set of approx 5 nos of A0, 10 Nos of A1, 10 Nos of A2 & 20 Nos of A3 size 2D drawings.(The number may vary depending upon requirement)
7. Development of O&M manual using specified software tools.
8. The software proposed for the solution will have to be arranged by the vendor. The vendors are required to possess licensed copies . Demo version of all software shall be provided to BHEL during execution period. After implementation BHEL may procure additional licenses based on its requirement on same rates as quoted.
9. Training of BHEL Engineers to test and implement Stage-I .

Stage II

This stage will consist of the following tasks:

1. To the maximum extent feasible all the programs wherein BHEL has the source code are to be rewritten in a common programming environment / platform. Where appropriate some of the newly written programs should be consolidated for enhanced optimization facilities and future ease of maintenance. The details of the proposed platform to be furnished in the proposal.
2. An optimization capability shall be added to these newly written programs.
3. Where BHEL does not have the source code the data flow is to be set up from the newly written programs and the programs in UNIX / Linux / DOS or other platforms.
4. To generate output reports in required formats.
5. To link the solutions with the drawing generation software above. All major inputs for above stage to be exported from this package in a file format as mutually decided between the vendor and BHEL.
6. Training of BHEL Engineers to test and implement Stage-I I.

Stages I and II will be implemented in parallel. Expected Stage-1 completion time is 6 months & Stage-2 completion time 12 months from the date of award of contract.

After completion of phase 1 BHEL will   review the project and decide upon further work.

Phase 2 : Phase comprises of completion of stage III and stage IV.

Stage III

This stage will consist of the following tasks:

1. Complete the process of development of 3 D assemblies and automatically generating 2 D manufacturing drawings for other 2 variants of Power Transformer as done in stage I above.
2. Stage-3 tentative completion time is 15 months from the date of award of contract.

Stage IV

This stage will consist of the following tasks:

1. Complete the development of 3 D assemblies and 2 D manufacturing drawings for the remaining variants of Power transformers.
2. Develop user training manuals.
3. Develop interactive, self paced training modules.
4. Training of BHEL trainers to enable setting up the rules using in house BHEL resources with appropriate training to be provided by the Vendor .
5. Stage-4 tentative completion time is 24 months from the date of award of contract.

Software Capabilities

As stated earlier that Power Transformer is a highly tailor made product and it is not possible to standardize the profile / layout of the Transformer.

The software should be very user friendly and shall be able to use by all groups of BHEL including ITI qualified draftsman. User should not get confused in clumsy menus/ toolbars. The BOM should be generated as per BHEL format and the part attribute like weight, length, width, height, ID, OD, Material code etc. should come directly from the model without any manual intervention. Upward integration with oracle/ ERP system used in BHEL must be possible. Such upward integration will be accomplished by exporting data from the system being provided by the vendor into a file format to be determined through future discussions so that the BHEL Oracle/ERP system will be able to import such data through a suitably developed import facility. Also the complete system must be compatible with PLM platforms. Such compatibility will be through import and export of files. Vendor's responsibility will be creating the file required for import by PLM system and being able to import files provided by PLM system based on a mutually agreed file format.

Overall Scope

1. Requirement study by vendor
2. To develop the solution for integration of all design programs being used for design of transformers under one common platform.
3. Generation of 3D components part library with parameters pulled out in separate sheets and their 2D drawings with details like section views, notes, dimensioning as in original drawings.
4. Development of a suitable software package to generate 3D model assemblies using a building block approach that is driven by optimized design results from the engineering rules (sl. No.2 above) and subsequent generation of 2D drawings. The 2D drawings to have B.O.M. and detailing of parts, inclusion of notes, calculating mass properties (weight or volume) in BHEL format and any other feature as may be required to be communicated to the end user via these drawing, testing, validating, modifying wherever required. BHEL goal is to minimize any further dimensional clean

up. BHEL and vendor to establish benchmarks for allowable clean up times for drawings of various complexities.
5. Integrate the design and drawing generation software.
6. Output of design and drawings in line with specification requirement & BHEL's standard practices.
7. Testing, review & validation.
8. Training
9. Supplying the software along with complete source codes and provide AMC.
10. Issuing the documents in the form of user's manuals / Guides.
11. Onsite technical support for 3 months after the successful completion of the project. (i.e. after all the deliverables including Training).
12. All other requirement specified in the document and agreed.
Bidder may include anything else required for the development of & adding value to the package.

Any onsite facility like Boarding (depending on availability), office furniture, light, power, etc shall be provided by BHEL on chargeable basis. Vendor to quote pricing in case BHEL is not able to provide accommodation in its guest house.

Note: - Development work may be done offsite but BHEL require that basic study, reviews and testing as may be required, be done onsite.

Training
- Two-tier training is envisaged.
    - Higher end training to select Engineers who will be apprised of the software. Minimum two week training of 2 batches is required.
    - Lower end training to Draftsman who will use customized solution for generation of drawings. Minimum Two week training for 4 batches is required.
- The training specified is indicative. The vendor shall indicate precise training requirements as per the solution offered. However training is required after implementation of all the stages.
- The vendor shall provide training at BHEL premises. Training shall include both pre- and post-installation training. The schedule for training shall be indicated by the vendor and finalized based on mutual agreement between the vendor and BHEL.
- Complete training program including contents and course material etc. shall be approved by BHEL before commencement of training.
- Course material / book and facility shall be provided by the vendor.
- Interactive, self paced e-Learning module to be used in conjunction with the face to face training to be provided by the vendor.

Software Maintenance, Enhancement and Support

1. Up gradation of all application software provided by the vendor.
2. Services for maintaining compatibility with updated / upgraded versions of software and migration to updated / upgraded versions of software.
3. Customization and attending complaints on day to day basis for 3 Months after the project completion. The cost of the support of Engineer for this period shall be separately indicated in price bid.

Tender Notification No: 406-TE-0-03

Power Transformer Design Software integration, Optimization & Drawing Automation system

General requirements

1. Effective GUI is required for guiding design inputs. Suitable tool for configuring the GUI to be provided to customize it as and when required.
2. Calculating weight and volume of different objects to be done.
3. Calculating inside volume of a hollow enclosure e.g. Inside volume of tank, conservator, pipes, headers, etc.
4. BOM should be generated as per BHEL standard format.
5. Any change in the 3D model should automatically get reflected in the 2D views. Similarly any addition / deletion of the object in the assembly should update the BOM accordingly. If drawing is released to shop then any addition/ deletion of the part should not change the part no of previously placed items. Details shall be furnished to vendor at the start of the project implementation.
6. This software should be capable of exporting the BOM to our ORACLE / ERP database in required format.
7. Automatic ballooning, note on parts, common notes, sectional view, cross hatching, scaling, machining and welding symbols should appear in the 2D view.
8. Some drawing requirement to be met like bending a plate along a line should modify the associated parts conforming to the new profile so generated. (Ex; when bottom part of Tank wall is not vertical), etc.

Note:

The requirements or features listed here are not limited to these only . Also the bidder may suggest and include any feature or tool as felt necessary to deliver a quality product. Similarly for such engineering specific product it is likely that some requirements may surface during the course of execution / development which bidder shall fulfill .

Tender response should be accompanied by:
1. Commitment by the vendor to demonstrate products and technologies proposed and required to be used in this project. This will be a part of the evaluation of the technical part of the bid.
2. Details on company background
3. Description of the products, technologies and technical competence in terms of being able to undertake the project for BHEL
4. Demonstration of the ability to customize the solution as required.

Tender response should be sent to:

AGM (TRE/FES/Test/RPD)
Transformer Engineering Department
Bharat Heavy Electricals Limited
Jhansi (Uttar Pradesh) – 284120

Phone No: 0510-2412709
Fax No: 0510-2412118
e-mail: arkuls@bheljhs.co.in

Any clarification on technical details may please be addressed to following:
Rahul Dixit, Sr.Manager (TRE), Phone No: 0510- 2412697
e-mail: rahul@bheljhs.co.in

(B) COMMERCIAL AND STATUTORY REQUIREMENT:

(B1)   DELIVERABLES & DELIVERY SCHEDULE:
The Automation programs along with source codes will be delivered in CD in soft copy for each activity defined in Annexure "G" with valid licenses. Each software to be installed on TRE BHEL Jhansi computers and their operation shall be demonstrated. All other requirements as specified in project scope to be delivered as required. Total activities are to be completed within 24 months time from the award of contract. The time for each stage is as defined above

(B2)   TESTING:
After delivery of each phase, BHEL will test the deliverables for all the test cases. The final testing will be done on the variant of transformer which has been selected for 3 number transformers. Final approval of testing and completion of each deliverable for each phase will be given by a committee of 2 members from TRE.

(B3)   PERIOD OF CONTRACT:
The total contract is expected to be completed in 24 months from the date of award. The suppliers to quote the delivery schedule for different stages. A bar chart showing different milestones is to be submitted.

(B4)   BHEL reserves the right to terminate the contract and forfeit security deposit at any time if it is found that the assigned work is not being promptly attended or that there is a deliberate negligence on the part of the vender or BHEL equipments are being tempered by the vendors / their representatives /or confidentiality of the information is breached.

(B5)   PENALTY CLAUSE:
Failure to supply of solution of each stage in time as mentioned in Clause (B1) and agreed delivery schedule will make supplier liable to pay penalty of 0.5% of the price of the item in arrears per week or in part thereof limited to max 10% of the order value.

(B6)   SUB LETTING:
The vendors will not sub-let complete job allotted/ allocated to him without due consent of BHEL.

(B7)   Intellectual Property Rights

7.1   Bidder shall treat all information that is generated in connection with this assignment as absolutely confidential. All information, analysis, reports and recommendations, both in the form of hard copy or on electronic media, will be the property of BHEL and is prohibited from being used by the Bidder for any purpose other than this assignment. All Bidders are required to sign non-disclosure agreement with BHEL. The NDA as per Annexure 'H' to be furnished on Rs. 100/- stamp paper along with the offer. This shall be binding on all employees, associates and affiliates of the Bidder.

7.2   Bidder shall indemnify BHEL against any copyright or legal liabilities that may arise in use of the developed software or the methodology / models / techniques used by the Bidder in development / implementation of the software module.

7.3   In the event that the services provided by Bidder in connection with software programs and related documentation supplied to BHEL in relation to which rights may be owned by third parties, Bidder shall warrant and represent that:

     7.3.1 BHEL has all necessary permissions, express or otherwise, to enable the software programs and documentation to be copied or otherwise used by Bidder during the course of the services without infringing any third party copyright, patent or trade secret;

     7.3.2 In providing the services Bidder shall not be infringing upon the intellectual property rights of any third parties;

     7.3.3 The disclosures or use of the software programs and documentation during the course of services shall not involve the breach of any confidential or contractual relationship.

7.4 All source code as well as other deliverables generated under this work shall become the sole property of BHEL. Vendor will not have any right to use the source code any where else in any form.

(B8)   EARNEST MONEY DEPOSIT (EMD)

The earnest money of Rs2,00,000/- (Rs Two lakhs only) to be deposited through a demand draft in favor of BHEL Jhansi shall be submitted along with the offer. In case of successful bidder EMD shall be converted and adjusted against the security deposit and for unsuccessful bidder the EMD shall be returned after 15 days of start of work by successful bidder.

(B9)   SECURITY DEPOSIT AND PERFORMANCE BANK GUARANTEE:

(B8.1)   The vendor shall deposit security deposit for execution of the contract, as prescribed under Clause 8.2.1 of Works Policy of BHEL (Annexure-I). Security deposit should be in the form of Bank Guarantee (BG) established thru nationalized bank in india and to be acceptable to BHEL. This security deposit shall be submitted within 15 days of LOI and award shall be released after receipt of the same. This security deposit shall be returned to vendor after successful completion of the contract, compliance of statutory obligations, submission of service tax challan, return of engineering design documents / drawings etc supplied by BHEL. The SD shall not bear any interest in any manner whatsoever.

(B8.2)   In case of non satisfactory performance of the contract or abandoning the contract BHEL reserves the right to forfeit the security deposit which shall be final and binding on contract.

(B8.3) After final acceptance of each phase the bidder shall be required to furnish Performance bank guarantee equal to 10% of the amount paid, to be valid upto 24 months warranty period of the project. This BG shall be required to be submitted thru nationalized bank in india and to be acceptable to BHEL. Any payments of each phase shall be released only after submission of required BG.

(B10)   PAYMENT TERMS:

Payment shall be made as following on completion of each phase against –

(i)Bills ,

(ii) Completion certificate of the phase duly certified by Transformer engineering department ,

(iii) Submission of performance bank guarantee as in cl. B8.3 above.

70% of cost of each phase(as per Annexure "G") along with taxes and duties shall be released on submission of the above documents. Balance 30% payment shall be released after successful completion of the project. The vendors to quote as per this. Suitable loading factors shall be applied to the bids not complying to the above. No over run charges shall be paid.

(B11)   TAXES AND DUTIES:
Taxes and duties shall be applicable as per govt. of india norms. Service tax shall be claimed separately to enable BHEL to avail CENVAT credit.

(C)   SAFETY:
The persons appointed by the vendor for the work should follow all safety instructions applicable in BHEL factory.

(D)   RISK AND COST:
In the event of vendor abandoning the work BHEL reserves the right to get the unfinished work completed at vendor's risk and cost.

(E)   STATUTORY
(E.1) The vendor shall be responsible for any statutory requirement of state / central Government pertaining to their staff such as Provident Fund, ESI etc.
(E.2) The vendor shall comply with the provision of all relevant rules enforced from time to time by Central Govt. / State Govt. / Municipal Corporation etc.

(F)   ARBITRATION AND LAW:
The disputes if any shall be referred to the sole arbitration of the concerned divisional Head of BHEL or any other person appointed by BHEL. The venue of arbitration shall be JHANSI only. The contract shall be governed by the Laws of India.

(G)   AFTER SALES SUPPORT:
The vendor shall render after sales on site support for a period of 3 months from the completion of contract date or till the time bugs/ errors if any arising during this period are removed.

(H)   **WARRANTY/ Annual Maintenance Contract (AMC) :**
The developed software shall be warranted for trouble free operation for a period of 24 months from its installation and acceptance at BHEL. In case of any defects observed during the operation of this module during this period, the bidder shall render their service without any additional cost for the repair / rectification of the same. Bidder shall give support/ updates of the software during warranty period. The bidder shall quote AMC charges valid for a period of 3 years in the price schedule. AMC shall commence after expiry of 24 months warranty period. The warranty / AMC shall cover following –
1.   Services to ensure trouble free operation and full uptime of software.
2.   Installation of software on machines.
3.   To provide new release / upgrades of all software and ensuring compatibility with latest versions of all software including 3D CAD software by providing necessary upgrades / modifications in the supplied software.
4.   Training of all new release/ upgrades of any software.
5.   Assistance in utilization of software.
6.   Fixing of bugs in the software i.e. 3D modeling, calculations, 2D drawings generation, database, etc.
7.   Support for integration of system with BHEL oracle system.

Payment towards this shall be made on annual basis.

(I)   Reverse Auction (RA)

1. BHEL may go for Reverse Auction (on line bidding on Internet) instead of opening the submitted sealed price bid. The decision to go for Reverse Auction will be taken afte r techno-commercial evaluation. Information and general terms and conditions governing RA are given below.

2. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

3. BHEL will engage the services of a Service Provider who will provide all necessary training and assistance/ demonstration before commencement of on line bidding on internet.

4. BHEL will inform the Vendors in writing the details of Service Provider to enable them to contact for training/ demonstration.

5. Business rules like event date, time, start price, bid decrement, extensions etc. also will be communicated through Service Provider for compliance.

6. Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse Auction. Without this, the vendor will not be eligible to participate in the event.

7. BHEL will provide the calculation sheet which will help the Vendors to arrive at "**Total Cost to BHEL**" by including items like Packing & Forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL Commercial terms & conditions, if any) for each of the Vendors to enable them to fill-in the price and keep it ready for keying in during the Auction.

8. Reverse auction will be conducted on a scheduled date & time.

9. At the end of Reverse Auction event, the lowest bid value will be known on the network.

10. The lowest bidder has to fax the duly signed filled-in prescribed format as provided to BHEL through Service Provider within 24 hours of Auction without fail.

11. Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct business with BHEL as per prevailing procedure.

12. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids already submitted and available with BHEL shall be opened as per BHEL's standard practice.

(J)   The obligation stipulated in this specification can only be suspended in the case of any particular item of work, in the event of Force Majeure or as the result of an agreement between the parties. In the event of Force Majeure, neither of the parties may be considered in default of its obligations under the terms of this tender.

Force Majeure is hereby defined as any cause which is beyond the control of the Bidder or BHEL, as the case may be, which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affect the performance of the contract, such as:

- Natural phenomena including, but not limited to, floods, droughts, earthquakes and epidemics;

- Acts of any government, domestic or foreign, including, but not limited to, war, declared or undeclared, priorities, quarantines, embargoes; provided either party shall within fifteen (15) days from the occurrence of such a cause notify the other in writing of such cause.

(K) Termination of contract

BHEL has the right to terminate the contract after due notice and forfeit the Security Deposit and recover the loss sustained in getting the balance work done through other agencies in addition to liquidated damages/ penalty in the event of:

(a) Bidder's continued poor progress.

(b) Withdrawal from or abandonment of the work before completion of the work.

(c) Corrupt act of the bidder.

(d) Insolvency of the bidder.

(e) Persistent disregard of the instructions of BHEL.

(f) Assignment, transfer, subletting of the contract work without BHEL's written permission.

(g) Non-fulfillment of any contractual obligations.

Tender Document　　　　　　　　　　　　**Rev 01**

Tender Notification No: 406-TE-0-03
Power Transformer Design Software integration, Optimization & Drawing Automation system　BHEL JHANSI

Annexure'F'

PROFORMA FOR SUBMITTING TECHNICAL BID FOR POWER TRANSFORMER DESIGN SOFTWARE INTEGRATION , OPTIMIZATION AND DRAWING AUTOMATION SYSTEM

1. Name of the firm　　　　　　　　　　　:

2. Name of the Proprietor /CEO/Partner　:

3. Address and Contact Numbers　　　　:

4. Service Tax Registration Number　　　:
    Copy of the Certificate　　　　　　　　: Enclosed / Not Enclosed

5. PAN Number　　　　　　　　　　　　:
    Copy of PAN　　　　　　　　　　　　: Enclosed / Not Enclosed

6. Income Tax Return for last 3 years　　: Enclosed / Not Enclosed

7. 2 years Audited annual accounts　　　: Enclosed / Not Enclosed
    (in support of Turnover)

8. 2 years Experience Certificate　　　　: Enclosed / Not Enclosed
    (Of similar work)

9. Details of Proposed Softwares license　: Enclosed / Not Enclosed
    (including each software module)

10. Phase wise Delivery Schedule　　　　: Enclosed / Not Enclosed

11. Self Certificate　　　　　　　　　　: Enclosed/Not Enclosed
    (As per Qualifying Requirement clause 7)

12. Declaration　　　　　　　　　　　　: Enclosed/Not Enclosed
    (As per Qualifying Requirement clause 8)

13. Earnest Money Deposit　　　　　　　: Rs. 200,000/-
    a) Demand Draft Number & Date　　　: _____
    b) Drawn on　　　　　　　　　　　　: _____

14. Tender Cost　　　　　　　　　　　　: Rs. 1315/-
    D.D.No　　　　　　　　　　　　　　: _____

15. Any other relevant information　　　　:

16. Un-priced (Blanked) price bid　　　　: Enclosed/Not Enclosed

We will fulfill all the obligations of the contract and abide by the Terms & Conditions mentioned in the enquiry.

Date:　　　　　　　　　　　　　　　　　　　Signature with Name
　　　　　　　　　　　　　　　　　　　　　　 & Office Seal

Annexure'G'

PROFORMA FOR SUBMITTING PRICE BID FOR POWER TRANSFORMER DESIGN SOFTWARE INTEGRATION , OPTIMIZATION AND DRAWING AUTOMATION SYSTEM

1. Name of the firm   :
2. Name of the Proprietor /CEO/Partner   :
3. Address and Contact Numbers   :

		Rate	Taxes with details	Total cost
1	Customization Charges for one variant of Transformer (Stage 1)			
2	Customization Charges for Design Integration (stage II)			
3	Training Charges for stage 1 & stage 2			
4	3 Months Onsite Support for phase 1(stage 1 & stage 2)			
5	3D Solid modelling and 2D Template development charges (Creation of basic library)			
6	Design Integration Software Cost (2 Nos)*			
7	Design and drawing Automation Software Cost (2 Nos)*			
8	3D CAD Software (2 licences)*			
9	Software for preparation of walk thru manual (1 license)*			
10	Any other software *			
	Total (Phase 1)			
11	Customization Charges for two variants of Transformer (Stage III)			
12	Customization Charges for remaining variants of Transformer (Stage IV)			
13	Design Integration Software Cost (3 Nos)*			
14	Design and drawing Automation Software Cost (1 Nos)*			
15	3D CAD Software (8 licences)*			
16	Any other software*			
17	Training Charges			
18	3 Months Onsite Support			
	Total (Phase 2)			
19	**Total** (For tender rates finalization)			
20	AMC for 5 years for Design integration software#			
21	AMC for 5 years for Design & drawing automation software#			
22	AMC for 5 years for 3D CAD software#			
23	AMC for 5 years for walk thru manual#			
24	AMC for 5 years for all other software used#			

*Details of software with price break up against each head to be attached as a annexure to it.

Order for AMC shall be placed separately as required.

(Sign of Authorized Signatory with date & stamp)

Date:

(To be executed on `100 Stamp Paper) **Annexure'H'**

BHARAT HEAVY ELECTRICALS LIMITED

UNIT NAME: BHEL JHANSI

THIRD PARTY NON-DISCLOSURE AGREEMENT

I/we   , on behalf of the
(Name of Company), acknowledge that the information received or generated, directly or indirectly, while working with BHEL on contract is confidential and that the nature of the business of the BHEL is such that the following conditions are reasonable, and therefore:

I/we warrant and agree as follows:

I/we, or any other personnel employed or engaged by our company, agree not to disclose, directly or indirectly, any information related to the BHEL. Without restricting the generality of the foregoing, it is agreed that we will not disclose such information consisting but not necessarily limited to:

- Technical information: Methods, drawings, processes, formulae, compositions, systems, techniques, inventions, computer data/configuration and research projects.

- Business information: Customer lists, project schedules, pricing data, estimates, financial or
  marketing data,

On conclusion of contract, I/we, or any other personnel employed or engaged by our company shall return to BHEL all documents and property of BHEL, including but not necessarily limited to: drawings, blueprints, reports, manuals, computer data/configuration, and all other materials and all copies thereof relating in any way to BHEL' s business, or in any way obtained by me during the course of contract. I/we further agree that I/we, or any others employed or engaged by our company shall not retain copies, notes or abstracts of the foregoing.

The obligation of this confidentiality agreement shall continue even after the conclusion of the contract also.

I/we acknowledge that the aforesaid restrictions are necessary and fundamental to the business of the BHEL, and are reasonable given the nature of the business carried on by the BHEL. I/we agree that this agreement shall be governed by and construed in accordance with the laws of country.

I/we enter into this agreement totally voluntarily, with full knowledge of its meaning, and without duress.

Dated at _____, this _____ day of _____, 20 ___ .

SIGNATURE   :
NAME   :
DATE   :
SEAL OF COMPANY   :

Tender Document   **Rev 01**

Tender Notification No: 406-TE-0-03
Power Transformer Design Software integration, Optimization & Drawing Automation system   BHEL JHANSI

Annexure'I'

		Document No.: AA:MM:WP
बी एच ई एल BHEL	**WORKS POLICY**	Rev. No: 00 Date: 06-08-2008

8.2   Security Deposit:

8.2.1   Security Deposit should be collected from the successful tenderer. The rate of Security Deposit will be as below:

-   Up to Rs. 10 lakhs: 10%
-   Above Rs. 10 lakhs up to Rs.50 lakhs: Rs.1 lakh + 7.5% of the amount exceeding Rs. 10 lakhs.
-   Above Rs. 50 lakhs: Rs 4 lakhs + 5% of the amount exceeding Rs. 50 lakhs.

The security Deposit should be collected before start of the work by the contractor.

<div align="right">**Annexure'J'**</div>

<u>**Summary of programs**</u>

SI no	Number of programs	Source code	Platform
1	23	Not available	Sun / linux
2	4	Available	Windows (Fortran)
3	10	Available	Windows Excel

<div align="right">**Annexure'J'**</div>