



Expression of Interest (Eol) for Technology Tie-up for Slurry Re-Circulation Pump

Subject: Expression of Interest (Eol) for Technology Tie-up for Slurry Re-Circulation Pump

1) Introduction:

This Expression of Interest (Eol) seeks response from prospective collaborators who are meeting the requirements of this Eol and are willing to be associated with BHEL through a License & Technology Collaboration Agreement (TCA) on long term basis to enable BHEL to design, engineer, manufacture, assemble, test, supply, erect, commission, retrofit, repair and service the Slurry Re-Circulation Pump as specified in this Eol.

1.1) About Bharat Heavy Electricals Limited:

BHEL is a leading state owned company, wherein Government of India is holding 63.17% of its equity. BHEL is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing organization in India, catering to the core infrastructure sectors of Indian economy viz. energy, transportation, heavy engineering industry, defense, renewable and non-conventional energy. The energy sector covers generation, transmission and distribution equipment for thermal, gas, hydro, nuclear and solar photo voltaic. BHEL has been in this business for more than 50 years and BHEL supplied equipment's account for more than 59% (approx. 190 GW) of the total thermal generating capacity in India. BHEL is also listed in both major Indian stock exchanges. BHEL has 17 manufacturing units, 4 power sector regions, 8 service centers, 3 overseas offices and 15 regional offices besides host of project sites spread all over India and abroad. The annual turnover of BHEL for the year 2017-18 was around USD 4 million. BHEL's highly skilled and committed manpower of approx. 36000; state-of-the-art manufacturing facilities and latest technologies helped BHEL to deliver a consistent track record of performance since long. To position leading state owned companies as Global Industrial giant and as a recognition for their exemplary performance, Government of India categorized BHEL as "Maharatna Company" in 2013.

Our ongoing technology tie-ups with leading technology providers are GE Technology GmbH, Switzerland (for Once through Boilers and Coal Pulverisers); Siemens, Germany (for Steam Turbines, Generators and Condensers); Metso Automation Inc., Finland (for Control & Instrumentation); MHI, Japan (for Pumps); MHPS, Japan (for Flue Gas Desulfurization Systems); Vogt Power International, USA (for HRSG); OTO Melara, Italy (for SRGM); GENP, Italy (for Compressors); TLT Turbo GmbH, Germany (for Fans), Sheffield Forge Masters International, UK (for Forgings); ISRO, India (for space grade li Ion cells); BPE, USA (for SCR System), NANAOK, Korea (for SCR Catalyst); HLB Power Co. Ltd., Korea (for Gates and Dampers) and Kawasaki Heavy Industries Ltd., Japan (for Stainless Steel Metro Coaches & Bogies).

More details about the entire range of BHEL's products and operations are available at www.bhel.com

1.2) About Heavy Power Equipment Plant, Hyderabad (HPEP)

BHEL through its manufacturing unit named Heavy Power Equipment Plant (HPEP) based at R.C. Puram, Hyderabad (State: Telangana) has been manufacturing various rating of Pumps for Power and Industrial applications since 1965. Pumps being manufactured are Boiler Feed Pumps, Feed Booster pump, Condensate extraction pumps, Cooling water pumps (metallic and

(*Note: Currency conversion rate considered: 1 US \$= Rs. 65 (approx.) as on 31st March 2018)



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Concrete volute type). HPEP also manufactures Gas Turbines, Compressors, Generators, Bowl Mills and other products of strategic importance for defence sector.

2) Scope of cooperation:

BHEL is seeking responses from reputed Original Equipment Manufacturer (OEM) of Slurry Re-Circulation Pump for technology transfer and collaboration on a long term basis to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Slurry Re-Circulation Pump.

BHEL intends to manufacture these Slurry Re-Circulation Pumps under a long term licensing & technology transfer agreement which could be operationalized with transfer of technology. Interested parties/prospective collaborator meeting requirement of this Eol are invited to respond to this Eol.

Upon receipt of responses against Eol from the OEM, BHEL will review the responses to ascertain suitability of the offer made by the Prospective Collaborators and shortlist the parties for further discussions. Detailed discussions on commercial and other terms and conditions to finalise the Technology Collaboration Agreement (TCA) shall be held with shortlisted parties/Prospective Collaborators. The detailed terms and conditions for such a paid-up license agreement shall be mutually agreed upon.

Indicative scope of technology transfer for Slurry Re-Circulation Pump are given in Annexure-1.

3) Prequalification requirements (PQR):

The Prospective Collaborator shall meet following qualification requirements as on the date of submission of this Eol.

3.1 Prospective Collaborator should have designed, engineered, manufactured, performance tested, supplied, erected and commissioned centrifugal type slurry recirculation pump with minimum flow of 12000 m³/hr and with minimum head of 22 meters of liquid column for Wet limestone based FGD for Thermal power plant unit.

AND

3.2 Prospective Collaborator should have supplied at least two no's (02) Slurry Recirculation pumps meeting above requirement within last 5 years from closing date of Eol and out of which at least one no. (01) slurry re-circulation pump should have been in successful operation for a period not less than one (1) year as on the date of closing of Eol.

Note: Proveness criteria stipulated above shall be considered acceptable provided rating parameter of Slurry Re-Circulation Pump (i.e. flow and head) is covered within the operating regime of respective Slurry Re-Circulation Pump performance curve of the reference plant equipment.

Prospective Collaborator to provide relevant certificate(s)/ document to substantiate the PQRs.



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4) Brief Description of Eol Process:

The interested prospective collaborators shall ensure that their response along with following annexures are received by BHEL on or before **01st Mar 2019**:

Annexure-1- Indicative Scope of Technology Transfer

Annexure-2- Indicative technical features of Slurry Re-Circulation Pump for which the Transfer of Technology is sought

Annexure-3- Prospective Collaborator's experience in the field of Slurry Re-Circulation Pump

Annexure-4- Complete reference list of Slurry Re-Circulation Pump

The response shall necessarily be accompanied with details on company background, technical features/product catalogue, reference list, audited annual financial reports for last 3 (three) years including auditor's report etc.

In case any amendment/corrigendum issued to this Eol, it shall be notified only at www.bhel.com

5) Schedule of Eol & contact details:

5.1 Schedule of Eol:

The schedule of Eol shall be as follows -

Sl. No.	Description	Date
1.	Issue of Eol document	02.02.2019
2.	Last date for submission of Eol response	01.03.2019

5.2 Contact Details:

The respondent shall submit their response with all annexures duly signed to the following official:

Deputy General Manager (Technology Licensing)
Corporate Technology Management
Bharat Heavy Electricals Limited
BHEL House, Siri Fort
New Delhi - 110049, India
Phone: +91 11 66337213 / 7339
Fax: +91 11 26492974
Email: techeoi@bhel.in

6) Miscellaneous:

6.1 Right to accept or reject any or all Applications:

a) Notwithstanding anything contained in this Eol, BHEL reserves the right to accept or reject any Application and to annul the Eol Process and reject all Applications, at any time without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons thereof. In the event that BHEL rejects or annuls all the Applications, it may, at its discretion, invite all eligible Prospective Collaborators to submit fresh



Applications.

- b) BHEL reserves the right to disqualify any Applicant during or after completion of Eoi process, if it is found there was a material misrepresentation by any such Applicant or the Applicant fails to provide, within the specified time, supplemental information sought by BHEL.
- c) BHEL reserves the right to verify all statements, information and documents submitted by the Applicant in response to the Eoi. Any such verification or lack of such verification by BHEL shall not relieve the Applicant of his obligations or liabilities hereunder nor will it affect any rights of BHEL.

6.2 Governing Laws & Jurisdiction:

The Eoi process shall be governed by, and construed in accordance with, the laws of India and the Courts at New Delhi (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or in connection with the Eoi process.

Indicative Scope of Technology Transfer

a)	License & transfer of technology relating to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Slurry Re-Circulation Pump as specified in this Eol.
b)	Assistance during procurement of new machines, special tools, Jigs & Fixtures, setup of test facility etc required for manufacturing and testing of Slurry re-circulation pumps at BHEL works and also assistance required during erection, performance test at Site.
c)	Transfer of applicable and relevant knowledge and information/ Know-how and Know-why pertaining to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Slurry Re-Circulation Pump as specified in this Eol.
d)	Preparation of manufacturing drawings for all components, sub-assemblies required for Slurry Re-Circulation Pump as specified in this Eol. Preparation of Purchase Specification and Quality Plan for all applicable bought out items for which manufacturing drawings are not prepared by proposed collaborator.
e)	Transfer of all design, design calculations, manufacturing drawings. Transfer of applicable computer programs including Logics & Source code for design and generation of manufacturing drawings of Slurry Re-Circulation Pump.
f)	Technical and quality surveillance assistance and supervision during design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Slurry Re-Circulation Pump as specified in this Eol.
g)	Transfer of typical documents of Slurry Re-Circulation Pump, as specified in this Eol already supplied by Prospective Collaborator such as Pump General arrangement drawing, Pump performance curve, Pump technical data sheet, Pump sectional arrangement drawing indicating bill of materials, Quality assurance plan, Spare parts, Special tools, Actual pump hydraulic performance test data (at manufacturer's works and at site) including vibration and noise data.
h)	Transfer of improvements/modifications/developments/up gradations to be carried out by the Prospective Collaborator during the period of Technology Collaboration Agreement for taking care of new market requirements and obsolescence. Subsequent updates required due to component obsolescence or updates implemented by Prospective Collaborator due to safety consideration would also be provided.
i)	Transfer of information regarding sub-vendors to enable BHEL to procure items.
j)	Training of BHEL engineers to enable them to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Slurry Re-Circulation Pump for FGD application.
k)	Support through engineering services from Prospective Collaborator's design office / manufacturing facilities for Slurry Re-Circulation Pump.
l)	Deputation of Prospective Collaborator's experts to assist BHEL in absorbing the technology for Slurry Re-Circulation Pump.

(SIGNATURE)

Indicative technical features of Slurry Re-Circulation Pump for which the Transfer of Technology is sought

A) Pump parameters:

- | | |
|------------------------------|------------------------------------|
| 1) Flow Range | = 12000 m ³ /hr (min.) |
| 2) Discharge Head | = 22 meters of liquid column (min) |
| 3) Medium to be handled | = Gypsum Slurry |
| 4) Temperature of the medium | = 60 degrees C |

B) Pump Construction:

- | | |
|-----------------------|---|
| 1) Pump type | = Horizontal centrifugal, Axially or Radially split type casing, Impeller-Non clogging type |
| 2) Nozzle orientation | = End suction and top discharge |
| 3) Duty | = Continuous |
| 4) Location | = Out Door |

C) Materials of Construction:

- | | |
|---------------------------|--|
| 1) Impeller | = High Cr (or) Si C |
| 2) Casing | = Carbon Steel / C.I with rubber lining (or) High Chrome Steel (or) High Alloyed stainless steel |
| 3) Shaft | = Carbon steel
(No part of the shaft shall contact with the liquid medium) |
| 4) Shaft Sleeve | = CD4M Cu ASTM A-743 (or) equivalent |
| 5) Line Bearing | = Ball, Roller or Sleeve bearings |
| 6) Thrust bearing | = Self aligning thrust roller bearing |
| 7) Lubrication of Bearing | = Automatic lubrication type |
| 8) Shaft sealing | = Mechanical seal |

D) Materials tests:

- 1) Ultrasonic Testing on shaft forgings (greater or equal to 40mm) and MPI (Magnetic particle inspection)/DPT (Die penetrant test) shall be done on shafts and Impeller to ensure freedom from defects.
- 2) The pump casing shall be hydraulically tested at 200% of pump rated head or at least 150% of shutoff head, whichever is higher. The test pressure shall be maintained for at least half an hour.
- 3) The pump rotating parts shall be subjected to static and dynamic balancing.
- 4) Actual pump shall be tested at shop for capacity, head, efficiency and brake horse power at rated speed as per international standard (ASME/EN/Japanese).

E) Other technical requirements:

- 1) Instrumentation
- 2) Interlocks and protection scheme

(SIGNATURE)



Prospective Collaborator's experience in the field of Slurry Re-Circulation Pump

Sl. No.	Requirement	Prospective Collaborator's response YES/NO and remarks if any
a)	Whether the Prospective Collaborator is an OEM of Slurry Re-Circulation Pump.	
b)	Whether Prospective Collaborator has its own manufacturing facility for Slurry Re-Circulation Pump. If not, furnish details of where these are being manufactured.	
c)	Whether Prospective Collaborator has designed, engineered, manufactured, performance tested, supplied, erected and commissioned centrifugal type slurry recirculation pump with minimum flow of 12000 m ³ /hr and with minimum head of 22 meters of liquid column for Wet limestone based FGD for Thermal power plant unit.	
d)	Whether Prospective Collaborator has supplied at least two no's (02) Slurry Recirculation pumps meeting above requirement within last 5 years from closing date of Eol and whether out of these two no's at least one no. (01) slurry re-circulation pump should have been in successful operation for a period not less than one (1) year as on the date of closing of Eol.	
f)	Whether Proveness criteria of slurry recirculation pump w.r.t. rating parameter mentioned above (i.e. min flow rate and min head) is covered within the operating regime of respective Slurry Re-Circulation Pump performance curve of the reference plant by prospective collaborator.	
g)	Whether company background and its product profile along with technical details for Slurry Re-Circulation Pump in thermal power plants being offered to BHEL under this Eol enclosed.	
h)	Whether product data sheet, performance curve (Flow vs Head, power, efficiency, NPSHR) and General Arrangement (G.A) drawings enclosed as per above PQR.	
i)	Whether Prospective Collaborator's detailed reference list as per Annexure-4 enclosed.	
j)	Whether Prospective Collaborator's audited annual financial reports including auditor's report for last 3 years enclosed.	
k)	Whether the Slurry Re-Circulation Pump design offered for technology transfer is the latest being marketed by the Prospective Collaborator.	
l)	Whether Prospective Collaborator has provided relevant certificate/document to substantiate the PQRs at 3.1 and 3.2.	
m)	Whether the Prospective Collaborator owns the Intellectual Property Rights for the technology being proposed for transfer under the Technology Collaboration Agreement (TCA) or have an unencumbered right from the owner of the Intellectual Property Rights to sub-license the technology, if applicable. If yes, whether list of such Intellectual Property Rights enclosed.	



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n)	Whether Prospective Collaborator has any experience in establishing a new manufacturing, testing and assembly facilities, if so please specify.	
o)	Whether information on market share of Prospective Collaborator enclosed.	

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Annexure -4

Reference list of Slurry Re-Circulation Pump supplied by Prospective Collaborator in last 5 Years

Sl . N o.	Project Name / Locatio n	Customer & End user details	Type of Slurry Re- Circulation Pump	Application (coal fired thermal / others)	Quantity of Pumps	Flow (cub.m /hr)	Head (MLC)	Speed (rpm)	Month and year supply	Year of commissio ning

(SIGNATURE)