



BHARAT HEAVY ELECTRICALS LIMITED

HEEP HARIDWAR INDIA-PIN 249403

FAX NO: 0091 1334 226462

PHONE NO: 0091 1334 285858

BHEL ENQUIRY No: L/6432/2020/0614D/2

M/s.....

Sub: BHEL-HEEP/OPEN-TENDER (Tooling) / 2021

The Heavy Electricals Equipment Plant (HEEP) located in Haridwar, India is one of the major manufacturing plants of Bharat Heavy Electricals Ltd. The core business of HEEP includes design and manufacture of large steam and gas turbines, turbo generators and so on.

The tender is invited on **the E-Procurement Portal** (<https://eprocurebhel.co.in/nicgep/app>) from the manufacturers (registered as well as unregistered) for the item **PROFILE ROUGHING & FINISHING CUTTERS, END MILLS**) as per details mentioned in **Annexure - 3 (NIC Enquiry Detail)**. **The Offer shall be submitted on the E- Procurement portal only.**

SPECIAL INSTRUCTIONS OF ENQUIRY-

1. Items shall be procured from one source basis for compatibility consideration or individual item basis as under:
 - i. TLMW62809016, TLMW62811304 & TLMW62811312- From same source (Package X/Form 17-2). Evaluation of offers of L1 status shall be done on cost of all three offered items combined together.
 - ii. TLMW62811282, TLMW62811258 & TLMW62811266- From same source (Package Y/Form14-2). Evaluation of offers of L1 status shall be done on cost of all three offered items combined together.
 - iii. TLMW62811339, TLMW62743635, TLMW62811290 & TLMW62809466 shall be procured from L-1 source on individual item basis.
2. **For Package X/Form 17-2 & Package Y/form 14-2,** Technical acceptance shall be as per point no. 6 & 7 of Annexure 1 and 2.
3. **For Package X/Form 17-2 & Package Y/form 14-2,** Late delivery Penalty for Late Deliveries shall be applicable @0.5% per week or part thereof on total value of respective package subject to maximum of 10% of the total value of respective package. If vendor do not confirm late delivery penalty clause in their offer, then it shall be presumed to be acceptable. No further clarification shall be asked in this regard after opening of techno-commercial bid part-1.
4. **For remaining items to be procured on individual item basis,** Penalty for Late Deliveries shall be applicable @0.5% per week or part thereof on the value of respective delayed supplies subject to a maximum of 10% of the value of respective delayed supplies. If vendor do not confirm late delivery penalty clause in their offer, then it shall be presumed to be acceptable. No further clarification shall be asked in this regard after opening of techno-commercial bid part-1.
5. All vendors to provide point wise reply/confirmation along with relevant supporting documents to each and every point of Annexure (Pre-Qualification Requirement/PQR) for all enquiry items. Non-compliance of these may lead to rejection of offer as these are essential condition for participating in tender enquiry.

6. Vendor to offer best delivery schedule.
7. **For items of Package X/Form 17-2:** Vendor to quote and offer as per technical details vide Annexure-1 /Annexure-D/E/F. Vendor to submit compliance of each and every requirement of these annexures.
8. **For items of Package Y/Form 14-2:** Vendor to quote and offer as per technical details vide Annexure-2 /Annexure-A/B/C. Vendor to submit compliance of each and every requirement of these annexures.
9. **Payment term:** "100% after receipt & final acceptance of material at BHEL HEEP Haridwar". Final Acceptance of material shall be as per acceptance criteria vide point no. 9 & 10 of Annexure 1 & 2 (**for Package X/Form 17-2 & Package Y/form 14-2**) and Point No. 7 of Annexure G/H/I/J (for remaining items). If vendor deviates from above payment term, then offers are liable for rejection and BHEL reserves the right to reject the offer of the vendor.
10. For item code TLMW62811339, TLMW62811290, TLMW62809466 & TLMW62743635, Vendor to quote and offer as per technical details vide Annexure-G, Annexure-H, Annexure-I and Annexure-J respectively. Vendor to submit compliance of each and every requirement of these annexures.
11. The evaluation currency for this tender shall be INR.
12. Vendor Contract clause regarding GST ITC and provision for E-invoices w.e.f. 01.10.2020:
 - i. W.e.f. 01.01.2021, vendor to ensure submission of E-Invoice who is having turnover of more than Rs. 100 Crs. in any preceding financial year from 2017-18 onwards.
 - ii. It has been specified by the Govt. that it is mandatory to mention a valid unique invoice Reference No. (IRN) and QR code as generated from Govt. portal on a Tax Invoice. Based on such information, GST ITC as claimed by BHEL in GST Returns shall be matched with the corresponding details uploaded by supplier in E-invoicing System.
 - iii. In case the vendor /contractor delays or fails to provide all the documents as per the Purchase order / Work Order at the time of submitting Tax invoice to BHEL, any subsequent financial loss to BHEL on account of vendor/contractor shall be to vendor's / contractor's account. BHEL has further right to take necessary steps to protect its interest at the time of release of payment. This further requires inclusion of IRN and QR code on tax invoice as announced by Govt. of India w.e.f. 01.10.2020.
13. For this tender, only Class-I and Class-II Local suppliers as per MII order dated 4.6.2020 will be eligible to bid. Non - Local suppliers as per MII order dated 04.06.2020 are not eligible to participate. Bid of non-local suppliers (if any) shall be out rightly rejected.
14. Procurement directly from Manufacturers/ suppliers shall be preferred. However, in case of submission of offer through agents including dealers/ traders/ distributors/ stockiest/ Channel partners etc. on behalf of manufacturer or the manufacturer themselves insists for making suppliers through their agents only, following guidelines will be followed.
 - a. Either the agent could bid on behalf of the manufacturer / supplier or the manufacturer / supplier could bid directly but not both.
 - b. In case bids are received from both the manufacturer / supplier and the agent, the bid received from agent shall be ignored.
 - c. The agent shall not allow to represent more than one manufacturer / supplier in the same tender.
 - d. Agent should submit the authorization letter from the manufacturer clearly indicating details like Name, e-mail and address of manufacturer and relationship with agent and its validity to be submitted with bid. The authorization letter should be tender specific.
 - e. In case order is to be placed and executed by agent following aspects are to be ensured:
 - Manufacturer of the agent should meet the PQR as defined in tender.

- Agent should have annual turnover of at least equal to Rs. 100 Lacs during one financial year and the net worth of the agent should be positive.
- Manufacturer and bidder / agent should jointly confirm Guarantee for the quality of product and timely delivery as stipulated in the NIT.

15. Please submit your offer only for the above requirement subject to compliance of your **GENERAL INSTRUCTIONS AND STANDARD TERMS & CONDITIONS (GISTC: Version December-2020, Rev: 05)**. Please visit our site www.hwr.bhel.com for General Instructions and Standard Terms & Conditions (GISTC) for Tender Enquiries. All the bidders/vendors must ensure compliance of these GISTC. GISTC can also be referred by login to B2B Portal for Registered Vendors.

The tender documents can be downloaded from the web sites <https://eprocurebhel.co.in/nicgep/app/> / www.bhel.com / www.hwr.bhel.com.

Vendors must also remit the **requisite EMD (Earnest Money Deposit) of Rs. 1,50,000/- (Rupees One lakh Fifty Thousand only)** in the form of Pay Order/ E-payment / Demand draft (drawn in favor of 'BHEL HARIDWAR'). **If EMD is not submitted along with the offer (Part-I) then the offer shall be out rightly rejected.**

"As per the OM No. F.No. 1(2)(1)/2016-MA dtd. 09.02.2017 issued from the Office of Development Commissioner (Micro, Small & Medium Enterprises), "Traders and agents should not be allowed to avail the benefits extended under the PP Policy."

In view of this, it is clarified that benefits of MSE (such as EMD Waiver, Tender fee exemption, Price preference, Payment preference etc.) will be given only to those MSE Vendors who are manufacturers of offered items against the NIT. No MSE benefits shall be provided to Agents / Stockists / Dealers / Traders etc. for the items offered but not manufactured by themselves."

For E-Payment, the RTGS details are mentioned as below:

Bank Details	SWIFT Details of bank
STATE BANK OF INDIA RANIPUR BRANCH, OPP: BHEL MAIN GATE, SECTOR-5, sRANIPUR, HARIDWAR, UTTRAKHAND, INDIA PIN CODE : 249403	SWIFT NO: SBININBB225 CC ACCOUNT NO :10667995458 IFSC CODE : SBIN0000586

As per notification reference no. NSIC/HO/GP/15(4)/2013-14 dated 07.07.2013 Micro & Small Enterprises (MSEs) are not required to submit Tender fees. A Valid MSE certificate such as Udyog Aadhar (UAN)/Udyam Certificate/NSIC/EM (Part-II) as per GISTC shall be submitted in support of Micro & Small Enterprises (MSEs).

Central / State – PSUs / Government departments are exempted from submission of EMD subject to approval by BHEL management.

BHEL will forfeit the EMD if, the successful bidder / vendor refuses to honor the order after award of the same on him and / or withdraws his bid and / or unilaterally changes the offer and / or any of its terms & conditions within the validity period.

INSTRUCTIONS TO BIDDERS FOR SUBMITTING OFFER

DEFINITION

Registered Vendors - Are those who are registered with BHEL, Haridwar for Megawatt rating/ Size/ Weight of tendered components in respective steel grade or machining of such items.

Un-registered Vendors - Are those who are not registered with BHEL, Haridwar for Megawatt rating/ Size/ Weight of tendered components in respective steel grade or machining of such items.

TECHNICAL QUALIFICATION: Technical Requirement, Pre-Qualifying Requirements/PQR & Drawings to be submitted. It is the mandatory requirement. Offer of vendors not meeting these requirements may not be considered.

ESSENTIAL INSTRUCTIONS

Un-registered vendors may be approved by BHEL, if found suitable, on the basis of data furnished by them in Supplier Registration Form (SRF) for Foreign Vendors or Indigenous Vendors (as applicable). Vendor Registration Form shall be filled only by unregistered vendors on our website www.bhel.com.

BHEL team may visit the vendor(s) works for verification of capability and capacity claimed in tender documents/offer(s).

The tender shall be **submitted in three parts** in separate cover as described below on or before the due date:

Part I (Cover-1) - Containing the following:

1. Pre-Qualifying Requirements/PQR as per **Annexure (PQR)**
2. EMD (Earnest Money Deposit) **Or** Valid certificate/Document towards exemption of Tender fee and/or EMD (applicable for Micro and small Enterprises, Central / State – PSUs / Government departments, PMD vendors etc.)

Part II (Cover-2) - Containing the following

1. Techno -Commercial Bid.
2. Techno-commercial terms and conditions as per **Annexure (Techno-commercial terms and conditions)**
3. **Annexure** (Self-Certification Certificate (MII))
4. **Annexure** (Certificate required as per order no F.No.6/18/2019-PPD of department of Expenditure(DoE))

Part III (Cover-3) - Containing the following

1. **Price Bid as per attached Annexure (Price Bid Format)**

Salient Details of Notice Inviting Tender (NIT)		
Sl. No.	Issue	Description
1.	Item details	As per Annexure 3- <u>NIC Enquiry Detail</u>
2	Issue of Tender Documents	From BHEL eProcurement website https://eprocurebhel.co.in/nicgep/app (Tender documents will be available for downloading from BHEL e-Procurement website till due date of submission)
3	Due Date Of Offer Submission	Date: 26.02.2021 Time: 13:45 hrs https://eprocurebhel.co.in/nicgep/app Offer to be submitted in online only through e-procurement Portal. (Bidders are requested to visit website to view corrigendum/ addenda/ amendments/ extension/ modification etc. before submitting offer).
4	Opening of Tender (Techno-Commercial Bid, Part-1)	Date: 26.02.2021 Time: 14.00 Hrs Notes: <i>This tender being an e-tender, it shall be opened online only through the E-Procurement Portal. Participating bidders may witness the Opening online only.</i>

5	Latest Updates	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL e-tender portal https://eprocurebhel.co.in/nicgep/app and not in the newspapers. Bidders to keep themselves updated with all such information
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E-Procurement Portal Inputs

Procedure for Submission of Offer for E – Tender-Procedure for Submission of Tender is available in the “Bidder Manual for BHEL Bidders” at E-tender portal <https://eprocurebhel.co.in/nicgep/app>. Terms and conditions mentioned therein shall form integral part of the NIT and bidders shall abide by the same.

Hardware and Software requirements for participating in e-tender

Please refer the website for the minimum system requirements and setting document for Bidders under the link: <https://eprocurebhel.co.in/nicgep/app> ss

Digital Signature

To know the procedure for obtaining Digital Signature Certificate (DSC), suppliers who are not having the DSC are advised to visit our website [http://www.bhel.com/home.php/Tender Notifications/Sample Checklist](http://www.bhel.com/home.php/Tender%20Notifications/Sample%20Checklist).

NIC portal Helpdesk Contacts

For any technical related queries please call at 24 x 7 Help Desk Number

0120-4001 002

0120-4200 462

0120-4001 005

0120-6277 787

International bidders are requested to prefix 91 as country code

Email Support

Address: A) For any Issues or Clarifications relating to the published tenders, bidders are requested to contact the respective Tender Inviting Authority Technical - support-eproc@nic.in

Note

Offers/tenders submitted in the E-tender portal shall only be considered for further evaluation. Offers sent by FAX / E-mail / any mode other than E-tender would not be entertained and shall be outrightly rejected.

SPECIAL NOTE: All documents to be submitted should be uploaded in respective places in the E-Tender portal as per the list mentioned given in this NIT. BHEL shall not be responsible for in-complete documents.

Annexure 3
NIC ENQUIRY DETAIL

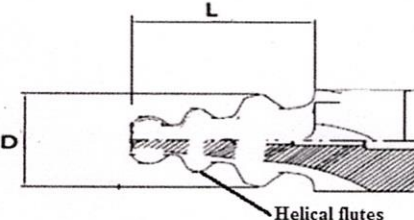
SNO	ENQNO	ITEM-NO	MATCODE	MDESC	QUANTITY	UNIT	Lot	Delivery Required
1	L/6432/2020/0614D/2	1	TLMW62743635	END MILL FOR LOCKING GROOVE, 4TH PHASE, FORM 17, SOLID CARBIDE,SUITABLY COATED, SHANK DIA:20MM,WHISTLE NOTCH DIN 1835-E,RH CUTTING,RH HELIX SIZE:DIA13X20X125MM,R2,Z=3,	8	NO	Lot-1: 08 Nos	31/05/2021
2		2	TLMW62809016	FORM 17 TAPER END MILL-1ST PHASE,24 DEG.,HSS-COPM(EMP6), Z4,ROUGHING PROFILE NRF SHANK D40 DIN1835-E WITH INTERNAL COOLANT HOLES,SUPREME COATING (1ST PHASE SLOT OPENING FORM 17), SIZE: D14/D54 X 95 X 180, Z4	10	NO	Lot-1 : 03 Nos Lot-2: 07 Nos	Lot-1 : 31/05/2021 Lot-2: On Intimation
3		3	TLMW62809466	SOLID CARBIDE END MILL FOR LOCKING GROOVE FOR FORM-11,RH HELIX,Z=3,SHANK DIA:20MM WITH WHISTLE NOTCH(DIN1835-HE),WITH SUPREME COATING SIZE: DIA:11X18X125,R2.0 DIM.: DIAFLXOAL	8	NO	Lot-1: 08 Nos	31/05/2021
4		4	TLMW62811258	FULL FORM PROFILE ROUGHING CUTTER FOR FIRTREE GROOVE PROFILE FORM 14-2,MADE OF HSS PM30/S390/HSS-CO PM(EMP6)/EQVL ,RH CUTTING,RH HELIX,SUITABLE RAKE,Z=4,HELICAL FLUTES,GROUND ROUGHING PROFILE NRF/ROUGHING THREAD,CHIP BREAKER,TIALN/ SUITABLE COATING,INT.COOLANT HOLES & BT50 INTEGRAL SHANK	9	NO	Lot-1 : 04 Nos Lot-2: 05 Nos	Lot-1 : 31/05/2021 Lot-2: On Intimation
5		5	TLMW62811266	FULL FORM PROFILE FINISHING CUTTER FOR FIRTREE GROOVE PROFILE FORM 14-2,MADE OUT OF HSS PM30/S390/HSS-CO PM(EMP6) OR EQVLT GRADE,RH CUTTING, RH HELIX,WITH SUITABLE RAKE, Z=4,HELICAL FLUTES,GROUND RELIEVED,WITH TIALN/SUITABLE COATING,WITH INTERNAL COOLANT HOLES & BT50 INTEGRAL SHANK	13	NO	Lot-1 : 04 Nos Lot-2: 09 Nos	Lot-1 : 31/05/2021 Lot-2: On Intimation
6		6	TLMW62811282	CONICAL END MILL FOR FORM 14-2 ,HALF TAPER ANGLE=12DEG, DIAFLXOAL:8.5X75X160, SHANK DIA:40MM WITH WHISTLE NOTCH(DIN 1835-E),MADE OUT OF HSS PM30/S390/HSS-CO PM(EMP6) OR EQVLT GRADE,RH CUTTING,RH HELIX,HELICAL FLUTES,Z=3/4, WITH CHIP BREAKER & INTERNAL COOLANT,TIALN/SUITABLE COATING SIZE: 8.5X75X160 MM DIM.: DIAFLXOAL	10	NO	Lot-1 : 03 Nos Lot-2: 07 Nos	Lot-1 : 31/05/2021 Lot-2: On Intimation
7		7	TLMW62811290	END MILL FOR BOTTOM MILLING FORM 14-2,3RD PHASE, DIAFLXOAL:12X20X115,R0.5, Z=3/4,SHANK DIA:20MM WITH WITH WHISTLE NOTCH TAPER DIN 1835-E,MADE OUT OF SOLID CARBIDE,RH CUTTING,RH HELIX,WITH CHIP BREAKER, GROUND RELIEVED,TIALN/SUITABLY COATED SIZE: 12X20X115 MM DIM.: DIAFLXOAL	10	NO	Lot-1: 10 Nos	31/05/2021
8		8	TLMW62811304	FULL FORM PROFILE ROUGHING CUTTER FOR FIRTREE GROOVE PROFILE FORM 17-2,MADE OF HSS PM30/S390/HSS-CO PM(EMP6)/EQVL ,RH CUTTING,RH HELIX,SUITABLE RAKE,Z=4,HELICAL FLUTES,GROUND ROUGHING PROFILE NRF/ROUGHING THREAD,CHIP BREAKER,TIALN/ SUITABLE COATING,INT.COOLANT HOLES & BT50 INTEGRAL SHANK	8	NO	Lot-1 : 04 Nos Lot-2: 04 Nos	Lot-1 : 31/05/2021 Lot-2: On Intimation

9		9	TLMW62811312	FULL FORM PROFILE FINISHING CUTTER FOR FIRTREE GROOVE PROFILE FORM 17-2,MADE OUT OF HSS PM30/S390/HSS-CO PM(EMP6) OR EQVLT GRADE,RH CUTTING, RH HELIX,WITH SUITABLE RAKE, Z=4,HELICAL FLUTES,GROUND RELIEVED,WITH TIALN/SUITABLE COATING,WITH INTERNAL COOLANT HOLES & BT50 INTEGRAL SHANK	13	NO	Lot-1 : 04 Nos Lot-2: 09 Nos	Lot-1 : 31/05/2021 Lot-2: On Intimation
10		10	TLMW62811339	END MILL FOR BOTTOM MILLING FORM 17-2,3RD PHASE, DIAFLXOAL:18X28X125,R0.5, Z=4,SHANK DIA:20MM WITH WITH WHISTLE NOTCH TAPER DIN 1835-E,MADE OUT OF SOLID CARBIDE,RH CUTTING,RH HELIX,WITH CHIP BREAKER, GROUND RELIEVED,TIALN/SUITABLY COATED SIZE: 18X28X125MM,R0.5 DIM.: DIAFLXOAL	10	NO	Lot-1: 10 Nos	31/05/2021

Note - Item sl. no. 4, 5, 6 (TLMW62811258, TLMW62811266, TLMW62811282) From same source (Package Y/Form14-2).

Item sl. no. 2, 8, 9 (TLMW62809016, TLMW62811304, TLMW62811312) From same source (Package X/Form 17-2).

Rest items sl. no. 1, 3, 7 & 10 i.e. TLMW62811339, TLMW62743635, TLMW62811290 & TLMW62809466 shall be procured from L-1 source on individual item basis.

Pre qualifying Requirement for Firtree groove milling Tool		
MATERIAL CODE: TLMW62809016, TLMW62811304, TLMW62811312, TLMW62811282, TLMW62811258, TLMW62811266 #2		
Sl. No.	PQR conditions :	Requirement
R1	Only those original tool manufacturers should quote who have manufactured and supplied Full form Helical fluted milling cutter for finishing of firtree full form with cutter material PM-HSS/HSS/solid carbide for any firtree groove profile no. of SIEMENS design 14/14-2/10.3/11/11-2/17/17-2/20S/20-2 for Rotor Or finishing similar Christmas/Fir tree shape Profile. The referred cutter for finishing similar Christmas/Fir tree shape Profile should be as per sketch given below with minimum 3 fir /Tool having major diameter D=45mm or more and length L=58mm or more. 	Vendor to confirm & submit their catalogue pages for referred/similar cutter.
R2	Authorised dealer/distributor/associate of original tool manufacturer can also quote for their principal company. Authorization certificate from Original Tool Manufacturer/principal company to be furnished by the authorized dealer/distributor/associate with the offer.	Vendor to submit.
R3	Above referred cutter should have been supplied against Purchase order & established with satisfactory performance for finish machining of full form profile within last 10 years (w.e.f. date of opening of tender).	Vendor to confirm
R4	Vendors are required to send the information of the referred cutter supplied against PO in compliance to R1 as per table given below :	
	1. Purchase order No., Month & Year of supply of referred cutter.	Vendor to inform
	2. Name, address, contact person details (Name, Phone & e-mail address) of the customer company where referred cutters have been supplied in compliance to R1 & R3.	Vendor to inform
	3. Drawing/sketch/photo of referred cutter showing no. of firs & mentioning details like major diameter, length of profile, cutter material & type of flutes.	Vendor to submit & inform.
R5	4. Application for which the cutter have been supplied i.e. type of rotor/job etc.	Vendor to inform
	As per reference given in R4, Vendors are required to submit satisfactory performance certificate for referred cutter Or Proof of repeat order of referred cutter by same customer company Or Proof of acceptance of referred cutter along with the offer. - The performance certificate of referred cutter can be provided in original certificate issued by customer company or through E-mail directly from customer. - In case of proof of repeat orders, two unpriced purchase order copies from same referred customer are to be provided. - In case of proof of acceptance of referred cutter, proof of supply/ unpriced purchase order copy and E-mail /Letter/ document from customer regarding its acceptance.	Vendor to submit
R6	BHEL reserves the right to verify information provided by vendor. In case the information is found to be false/incorrect, the offer shall be rejected.	Vendor to accept & confirm.
R7	Offers with no information / incomplete information / non-compliance to above requirements from R1 to R6 shall be rejected.	Vendor to accept & confirm.

Approved
27-01-21
(TOOL ROOM) SE/TE

27/1/2021
(N C TECHNOLOGY) SE/NCT

Indent - 20200614
MPR - 20200050 102

P.Q.R FOR END MILL OF SIEMENS FIRTREE GROOVE MATERIAL CODE: TLMW62811339,TLMW62743635,TLMW62811290,TLMW62809466		
Sl. No.	PQR conditions :	Requirement
R1	Only those vendors to quote who are Original tool manufacturer or authorized dealer/distributor of Original tool manufacturer. Authorization certificate from Original tool manufacturer to be furnished by the vendor with the offer.	Vendor to Confirm.
R2	Vendor should have supplied Solid carbide endmills during last 5 years as part of their standard product range. In support of it, copies of relevant pages of standard product range showing solid carbide endmills of Original tool manufacturer is required to be submitted.	Vendor to Confirm & submit required details.
R3	The following information is to be submitted by the participating vendor about the companies where solid carbide endmills have been supplied. This is required from all the vendors for qualification of their offer.	
	1. Name & address of the customer company where referred cutters have been supplied.	Vendor to inform
	2. Name, Phone no. and e-mail address of the contact person of the referred company.	Vendor to inform
	3. Application for which the cutter have been supplied.	Vendor to inform
	4. Month & Year of supply of cutters.	Vendor to inform
R4	BHEL reserves the right to verify information submitted by vendor. In case, the information is found to be false/incorrect, the offer shall be rejected.	Vendor to confirm acceptance.
R5	Offers with no information / incomplete information / non-compliance to above requirements from R1 to R4 shall be rejected.	Vendor to accept & confirm.

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Annexure-1

Supply and successful establishment of Full form Profile rough cutter, Full form Profile finish cutter & Conical cutter for rough & finish machining fir tree groove profile form 14-2 of Steam Turbine Rotor on CNC Horizontal Borer as per details given below.

1. The vendor to offer Conical cutter, Full form Profile rough cutter & Full form Profile finish cutter for fir tree groove profile form 14-2 (Groove Sketch No.1) for rough and finish machining of fir tree grooves on Steam Turbine Rotor achieving required surface finish and accuracy as per drawing & other technical requirement mentioned below.
 - 1.1 The Vendor to offer all the above mentioned tools & the offer should be complete in all respect with compliance to all technical details as per Sl. no. 4.1, 4.2 & 4.3 (Annexure-A, B & C) with item wise price for all three cutters. The offer will be considered for processing only if offer covers all three tools as per Sl. No. 4.1 to 4.3. **Partial or incomplete offer shall be ignored.**
 - 1.2 All three cutters to be procured from one source for compatibility consideration.
 - 1.3 Evaluation of offers for L1 status shall be done on cost of all three offered items combined together.
 - 1.4 In order to provide best possible solution, the offer submitted by the vendor can have tools manufactured by different original tool manufacturers (OEM) provided the vendor is authorized by those OEMs. Authorization letter of the OEM is to be submitted by participating vendor with the offer in such cases.
 - 1.5 In case, vendor requires clarification, they may discuss with BHEL prior to submission of their offer to avoid any gaps at later stage. (Drawings/Sketch supplied by BHEL must not be used directly or indirectly in any way detrimental to the interest of BHEL).
2. The Material specifications of Sample Test piece / L.P Rotor (forging material Grade: 26NiCrMoV14-5 / 26NiCrMoV11-5) on which fir tree groove is to be machined is as below :

Chemical Properties :

Elements	C	Si	Mn	P	S	Cr	Mo
Wt. (%)	≤0.28	≤0.07	≤0.40	≤0.007	≤0.007	1.50-1.80	0.30-0.45
	Ni	V	Al total	Sn	Sb	As	Cu
	3.40-3.70	0.07-0.15	≤0.010	≤0.015	≤0.0015	≤0.020	≤0.15

Carbon- 0.30%max

Mechanical Properties :-

0.2% Proof of strength(N/mm ²)	Tensile strength (N/mm ²)	Elongation after fracture,(%)	Reduction of area,(%)	Absorbed impact energy(Kv ₂)(J)
700-800	≤ 980	≥15	≥ 45	≥ 100

Ambar
27.1.21
SE/TE

SE/NCT
27/1/21

19.1/5

3. Machine Details :

Machining shall be carried out using CNC programs provided by BHEL on a CNC Horizontal Borer having major specifications as below:

- Spindle dia 160mm, Spindle power 60KW, max spindle speed 3000 RPM, spindle taper BT50, Internal coolant system & having indexing facility.

4. Technical details : The vendor is required to offer toolings meeting the technical requirements as mentioned below (Sl. Nos. 4.1 to 4.3) :

- 4.1** Material Code : TLMW62811282 (Conical Cutter) – for technical details refer **Annexure-A.**
- 4.2** Material Code : TLMW62811258 (Rough full form profile cutter) – for technical details refer **Annexure-B.**
- 4.3** Material Code : TLMW62811266 (Finish full form profile cutter) – for technical details refer **Annexure-C.**

5. Tool Quantity : To be offered as mentioned below

Sl. No.	Item	Material code	Quantity	
			Lot-1	Lot-2
1	Conical Cutter (as per Sl. No. 4.1)	TLMW62811282	03	07
2	Rough full form Profile cutter (as per Sl. No. 4.2)	TLMW62811258	04	05
3	Finish full form Profile cutter (as per Sl. No. 4.3)	TLMW62811266	04	09

6. Technical acceptance of offers in following steps :

Step-1 Scrutiny of offers for qualification against compliance to Pre-Qualifying condition.

Step-2 Technical scrutiny of those offers of vendors who have been qualified in compliance to Pre-Qualifying Conditions

Step-3 After technical scrutiny of offers as per Step-2, preliminary considered vendors shall be required to bring one no. each of Rough full form profile cutter and of Finish full form profile cutter meeting technical requirement as mentioned at Sl. no. 4 (Annexure-B & C) at their own cost for trial machining (without any financial implication on BHEL). Vendor shall be suitably intimated to bring the tools for trial. The trial machining shall be carried out at BHEL Haridwar works for roughing and finishing of two nos. of fir tree grooves on sample Test pieces of similar material grade as of LP Rotor (mentioned at Sl. no.2). The conical cutter & bottom end mill along with their adaptor for initial roughing of fir tree groove prior to running of Rough full form profile cutter shall be provided by BHEL during trial machining. Trial shall be considered successful if it meets criteria mentioned below at point no. 7. No payment shall be made by BHEL to vendors for trial machining. The vendors may carry back their cutter after trial machining. The programming support shall be provided by BHEL.

Step-4 Only those vendors who shall be successful in trial machining for both cutters (Rough full form profile cutter and Finish full form profile cutter) with

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acceptance by BHEL shall be considered as technically acceptable for further processing i.e. price bid opening & ordering on L1 basis. Failure of any of the two cutter or both in meeting the acceptance criteria will result in the offer being not considered for further processing and hence, considered as technically not acceptable.

7. Trial machining criteria for Technical Acceptance of offers:

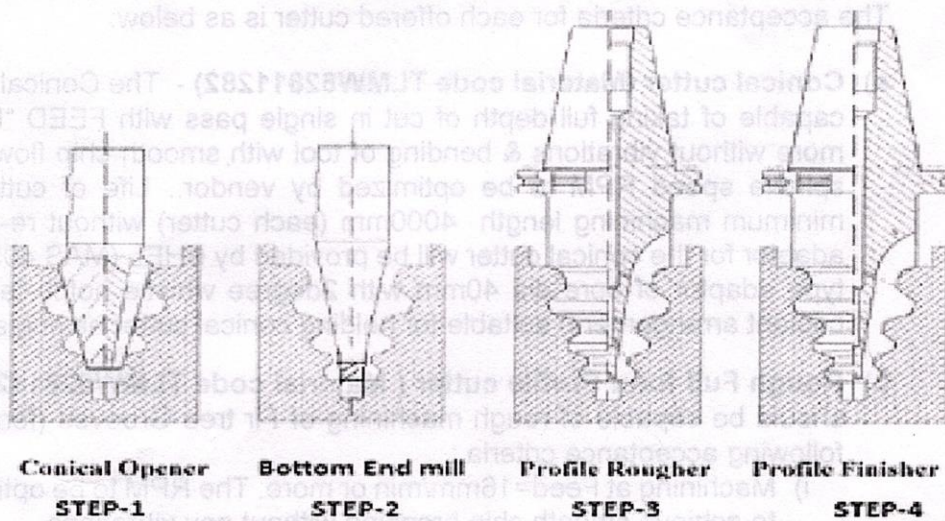
- a) The trial machining shall be carried out on sample test piece achieving cutting parameters/finish as mentioned below :
 - Rough Full form Profile cutter : Feed=16mm/min or more, RPM to be optimized by vendor to achieve smooth chip breaking without any vibrations.
 - Finish Full form profile cutter : Feed=16mm/min or more and achievement of surface finish Ra 2.5 with no line/chatter marks. The RPM to be optimized by vendor.
- b) The two nos. of finished fir tree groove made by the cutters shall be checked as per following for it's acceptance :
 - No line/chatter mark on the profile
 - Achievement of surface finish Ra 2.5
 - To be cleared by Go/No Go gauge provided by BHEL.

8. Ordering of Tools :

Only technically accepted vendors after trial machining shall be considered for price bid opening & further ordering on L1 basis as per purchase policy.

9. Acceptance of Lot-1 supplied tools after PO placement:

The acceptance machining for Lot-1 shall be carried out for roughing and finishing of fir tree grooves in the sequence as shown below, first on sample Test pieces of similar material grade as of LP Rotor (mentioned at Sl. no.2) and then on actual LP Rotor meeting the acceptance criteria as mentioned at Sl. No. 9.1 & 9.2.



SKETCH SHOWING SEQUENCE OF OPERATION FOR FIR TREE GROOVE MACHINING

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9.1 Checking on Sample Test piece

The machining shall be carried out for roughing and finishing of 2 nos. of fir tree grooves on sample Test pieces of similar material grade as of LP Rotor (mentioned at Sl. no.2). The tool for bottom end milling at Step-2 in the above sketch shall be provided by BHEL and its evaluation is not in the scope of this acceptance. The acceptance criteria for each offered cutter is as below:

- a) **Conical cutter (Material code TLMW62811282)** - The Conical cutter should be capable of taking full depth of cut in single pass with FEED "F"=24mm/min or more without vibrations & bending of tool with smooth chip flow / breaking. The spindle speed RPM to be optimized by vendor. The adaptor for the conical cutter will be provided by BHEL (MAS 403 BT-50 Weldon type adaptor of bore dia 40mm with 2degree whistle notch taper and through coolant arrangement) suitable for holding conical cutter having shank dia 40mm.
- b) **Rough Full form Profile cutter (Material code TLMW62811258)** - The cutter should be capable of machining at Feed=16mm/min or more. The RPM to be optimized by vendor to achieve smooth chip breaking without any vibrations.
- c) **Finish Full form profile cutter (Material code TLMW62811266)** - The cutter should be capable of machining at Feed=16mm/min or more and achievement of surface finish Ra 2.5 with no line/chatter marks. The RPM to be optimized by vendor. The two nos. of finished fir tree groove made by the cutters should be cleared by Go/No Go gauge provided by BHEL.

9.2 Checking on LP Rotor

The acceptance criteria for each offered cutter is as below:

- a) **Conical cutter (Material code TLMW62811282)** - The Conical cutter should be capable of taking full depth of cut in single pass with FEED "F"=24mm/min or more without vibrations & bending of tool with smooth chip flow / breaking. The spindle speed RPM to be optimized by vendor.. Life of cutter should be of minimum machining length 4000mm (each cutter) without re-sharpening. The adaptor for the conical cutter will be provided by BHEL (MAS 403 BT-50 Weldon type adaptor of bore dia 40mm with 2degree whistle notch taper and through coolant arrangement) suitable for holding conical cutter having shank dia 40mm.
- b) **Rough Full form Profile cutter (Material code TLMW62811258)** – The cutter should be capable of rough machining of Fir tree Grooves (form 14-2) meeting following acceptance criteria :
 - i) Machining at Feed=16mm/min or more. The RPM to be optimized by vendor to achieve smooth chip breaking without any vibrations
 - ii) Machining minimum length 2500 mm (each cutter) without re-sharpening.
- c) **Finish Full form profile cutter (Material code TLMW62811266)** - The cutter should be capable of finish machining of Fir tree Grooves (form 14-2) meeting following acceptance criteria :
 - i) Machining at Feed=16mm/min or more. The RPM to be optimized by vendor.
 - ii) Achievement of surface finish Ra 2.5 with no line/chatter marks.
 - iii) Machining minimum length 2200 mm (each cutter) without re-sharpening.

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- iv) Achieving clearance by Go/No Go gauge provided by BHEL in the finish machined firtree grooves.
- v) Achieving required parameter of blade frequency after assembly of blade in the finished machined grooves.

10. Acceptance & Payment of Lot-2 supplied tools:

- After successful trial of tools supplied in Lot-1 & its acceptance by BHEL, the vendor will be accordingly intimated by BHEL for supply of Lot-2.
- The payment for tools in Lot-2 shall be made after receipt & SRV acceptance of tools at BHEL Haridwar.

11. Other conditions:

- 11.1 During trial, if the process or tools could not be successfully established by vendor in one go, the vendor will be given one more chance for successful establishment or to improve any performance/cutting parameters through change of tool without any additional financial implications to BHEL. In case of failure even in additional chance, the particular tool supplied in LOT-1 shall be declared as rejected. There shall not be any Lot-2 supply for that tool.
- 11.2 In case of damage to any tool during successful establishment of required machining for reasons attributable to vendor, the same shall be replaced by the vendor without any financial implications to BHEL.
- 11.3 Cutter name and Form no. should be engraved on all supplied cutter for identification.
- 11.4 CNC Programs shall be provided by BHEL.

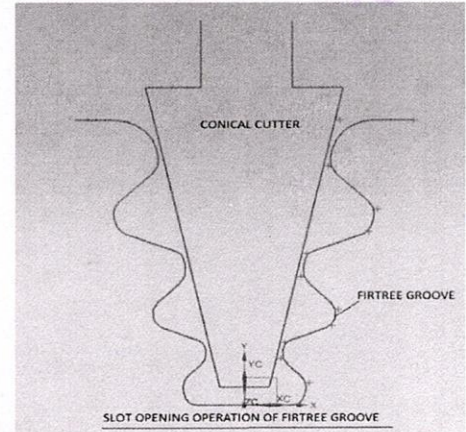
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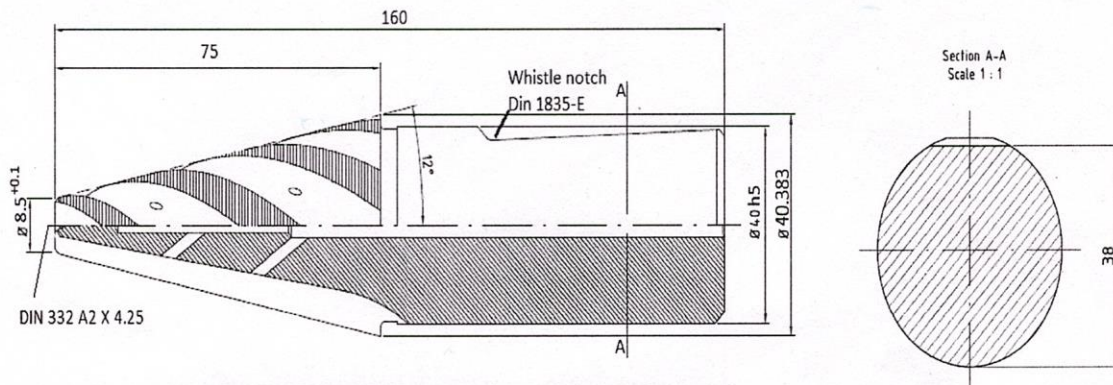
ANNEXURE-A

MATERIAL CODE: TLMW62811282

1. Conical cutters for Siemens Firtree groove FORM14-2 are required for machining firtree groove along the curved path on L.P Rotor .



2. Conical cutters are to be supplied with parallel shank Dia 40h5 mm with a whistle notch taper as per DIN1835-E for clamping in side lock adaptors and other dimensions as per SKETCH -G below.



SKETCH-G (DRAWING OF CONICAL CUTTER FORM14-2)

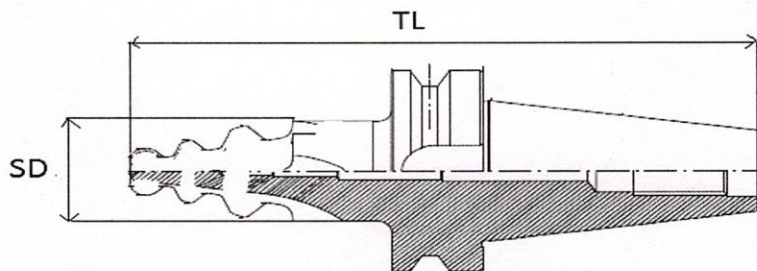
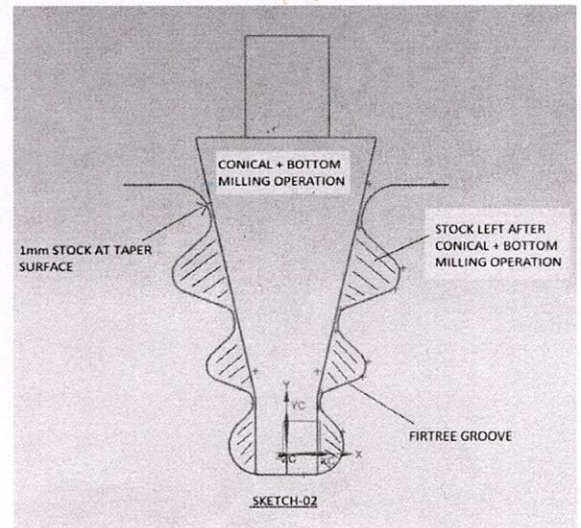
3. The cutter should have through spindle coolant arrangement.
4. Material of cutters : HSS PM{PM30/S390/HSS-CO PM(EMP6)} with TiAlN coating/ suitable coating.
5. Conical cutters should have RH cutting, RH Helical flutes, Z=3 or 4, NRF /Roughing thread on profile , chip breaker & ground relieved.
6. In case of ordering, vendor must submit drawing of cutter along with complete details like major dia, minor dia, cone angle; flute length, total length, helix angle, rake angle etc. along with the supply of cutter for re-sharpening.

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ANNEXURE-B**MATERIAL CODE:TLMW62811258**

1. Rough full form profile cutters for form 14-2 are required for machining firtree groove on LP Rotor .
2. The cutter should have BT50 integral shank, RH cutting, RH helix , Helical flute with suitable rake, Z=4, Ground relieved ,roughing profile NRF/roughing thread, chip breaker, with TIALN coating /suitable coating , with internal coolant holes.
3. Cutter material – HSS PM {PM 30/S390/HSS-CO PM (EMP6)}.
4. Stock to be removed by this cutter after material removal by conical & bottom milling shall be as per SKETCH NO-02 .
5. The Rough full form profile cutter should leave maximum 0.3 TO 0.5mm allowance along the complete profile for finishing.
6. The shank dia "SD" of cutter as shown in figure below should be equal or less than 50mm for clearance between firtree groove neck and cutter.



7. In case of ordering, vendor must submit drawing of cutter with complete details along with the supply of cutter for re-sharpening .

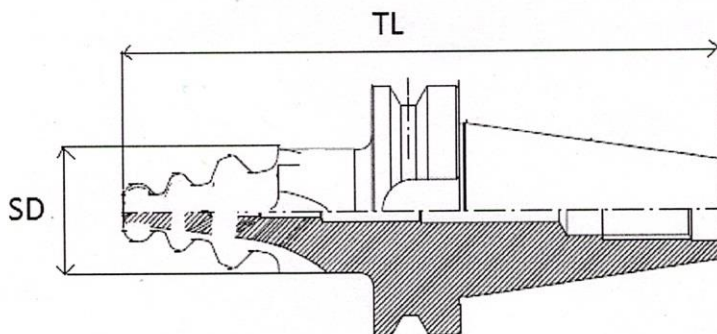
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ANNEXURE-C

MATERIAL CODE: TLMW62811266

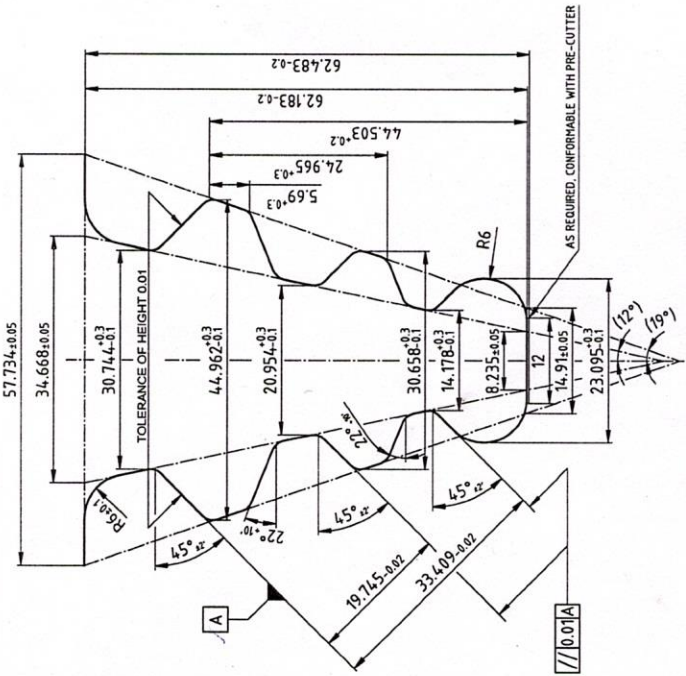
1. Finish Full form profile cutter for form 14-2 are required for machining firtree groove on LP Rotor .
2. The cutter should have BT50 integral shank, RH cutting, RH helix, Z=4, Helical flutes with suitable rake, ground relieved, with TIALN coating/suitable coating, with internal coolant holes .
3. Cutter material- HSS PM {PM30/S390/HSS-CO PM (EMP6) }.
4. Stock to be removed by this cutter shall be as per Sl no.5 of Annexure-B .
5. The shank dia "SD" of cutter as shown in figure below should be equal or less than 50mm , for clearance between firtree groove neck and cutter.



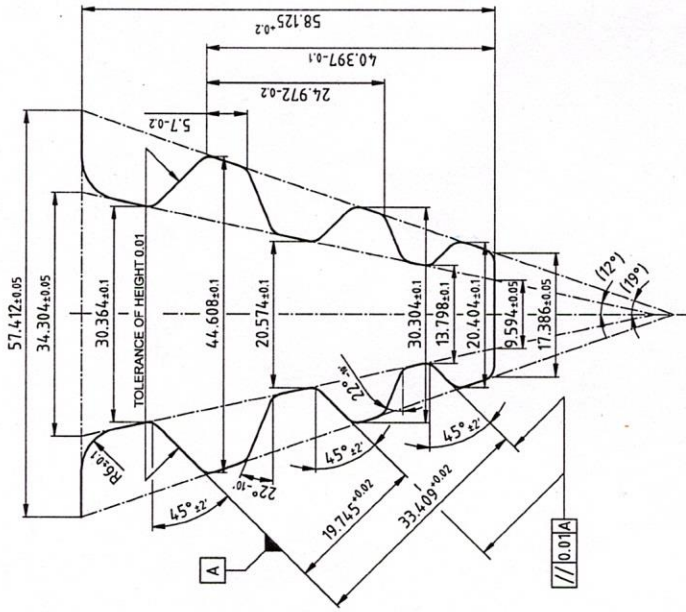
6. In case of ordering, vendor must submit following along with supplied cutter:
 - a) Drawing of cutter with complete details for re-sharpening.
 - b) Dimensional test reports of each cutter.

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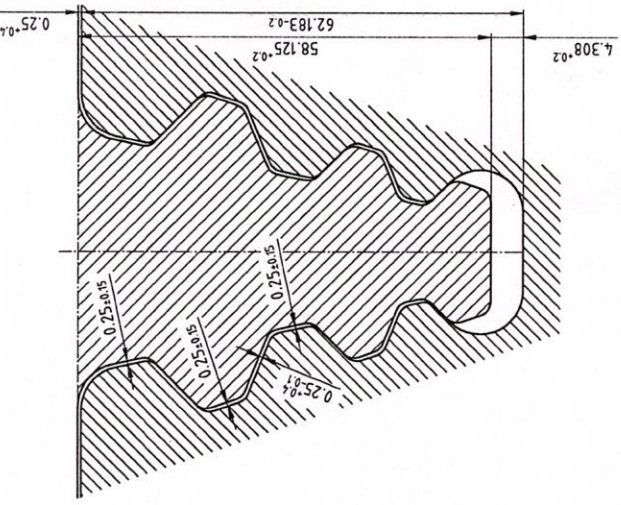
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ROTOR GROOVE



BLADE ROOT



ASSEMBLY

NETWORK COORDINATES

REFERENCE DIMENSIONS FOR THE DESIGN		
POINTS	ROTOR GROOVE	Y
1	4.116	-4.058
2	5.548	1.942
3	10.671	5.298
4	6.907	9.068
5	7.715	12.867
6	14.183	15.480
7	15.627	19.673
8	10.295	25.006
9	11.572	31.016
10	20.819	34.752
11	22.779	40.445
12	15.190	48.035
13	17.334	58.125
14	28.867	58.125

NETWORK COORDINATES

REFERENCE DIMENSIONS FOR THE DESIGN		
POINTS	BLADE ROOT	Y
1	4.797	0
2	8.693	0
3	10.500	5.250
4	6.717	9.033
5	7.518	12.806
6	14.004	15.425
7	15.450	19.625
8	10.105	24.971
9	11.377	30.955
10	20.639	34.697
11	22.602	40.397
12	15.000	48.000
13	17.152	58.125
14	28.706	58.125

TECHNICAL REQUIREMENTS:

1. ALL UNDIMENSIONED RADII ARE TO BE R2 ±0.01
2. TOLERANCE FOR NETWORK COORDINATES ±0.1
3. ROTOR GROOVE FORM 14-2
4. BLADE ROOT FORM 14

Sketch no.1
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Approved (As per ed with HCT)
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Annexure-2

Supply and successful establishment of Full form Profile rough cutter, Full form Profile finish cutter & Conical cutter for rough & finish machining fir tree groove profile form 17-2 of Steam Turbine Rotor on CNC Horizontal Borer as per details given below.

1. The vendor to offer Conical cutter, Full form Profile rough cutter & Full form Profile finish cutter for fir tree groove profile form 17-2 (Groove Sketch No.2) for rough and finish machining of fir tree grooves on Steam Turbine Rotor achieving required surface finish and accuracy as per drawing & other technical requirement mentioned below.
 - 1.1 The Vendor to offer all the above mentioned tools & the offer should be complete in all respect with compliance to all technical details as per Sl. no. 4.1, 4.2 & 4.3 (Annexure-D, E & F) with item wise price for all three cutters. The offer will be considered for processing only if offer covers all three tools as per Sl. No. 4.1 to 4.3. **Partial or incomplete offer shall be ignored.**
 - 1.2 All three cutters to be procured from one source for compatibility consideration.
 - 1.3 Evaluation of offers for L1 status shall be done on cost of all three offered items combined together.
 - 1.4 In order to provide best possible solution, the offer submitted by the vendor can have tools manufactured by different original tool manufacturers (OEM) provided the vendor is authorized by those OEMs. Authorization letter of the OEM is to be submitted by participating vendor with the offer in such cases.
 - 1.5 In case, vendor requires clarification, they may discuss with BHEL prior to submission of their offer to avoid any gaps at later stage. (Drawings/Sketch supplied by BHEL must not be used directly or indirectly in any way detrimental to the interest of BHEL).
2. The Material specifications of Sample Test piece / L.P Rotor (forging material Grade: 26NiCrMoV14-5 / 26NiCrMoV11-5) on which fir tree groove is to be machined is as below :

Chemical Properties :

Elements	C	Si	Mn	P	S	Cr	Mo
Wt. (%)	≤0.28	≤0.07	≤0.40	≤0.007	≤0.007	1.50-1.80	0.30-0.45
	Ni	V	Al total	Sn	Sb	As	Cu
	3.40-3.70	0.07-0.15	≤0.010	≤0.015	≤0.0015	≤0.020	≤0.15

Carbon- 0.30%max

Mechanical Properties :-

0.2% Proof of strength(N/mm ²)	Tensile strength (N/mm ²)	Elongation after fracture,(%)	Reduction of area,(%)	Absorbed impact energy(Kv ₂)(J)
700-800	≤ 980	≥15	≥ 45	≥ 100

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Annexure-2

3. Machine Details :

Machining shall be carried out using CNC programs provided by BHEL on a CNC Horizontal Borer having major specifications as below:

- Spindle dia 160mm, Spindle power 60KW, max spindle speed 3000 RPM, spindle taper BT50, Internal coolant system & having indexing facility.

4. Technical details : The vendor is required to offer toolings meeting the technical requirements as mentioned below (Sl. Nos. 4.1 to 4.3) :

- 4.1** Material Code : TLMW62809016 (Conical Cutter) – for technical details refer **Annexure-D**.
- 4.2** Material Code : TLMW62811304 (Rough full form profile cutter) – for technical details refer **Annexure-E**.
- 4.3** Material Code : TLMW62811312 (Finish full form profile cutter) – for technical details refer **Annexure-F**.

5. Tool Quantity : To be offered as mentioned below

Sl. No.	Item	Material code	Quantity	
			Lot-1	Lot-2
1	Conical Cutter (as per Sl. No. 4.1)	TLMW62809016	03	07
2	Rough full form Profile cutter (as per Sl. No. 4.2)	TLMW62811304	04	04
3	Finish full form Profile cutter (as per Sl. No. 4.3)	TLMW62811312	04	09

6. Technical acceptance of offers in following steps :

Step-1 Scrutiny of offers for qualification against compliance to Pre-Qualifying condition.

Step-2 Technical scrutiny of those offers of vendors who have been qualified in compliance to Pre-Qualifying Conditions

Step-3 After technical scrutiny of offers as per Step-2, preliminary considered vendors shall be required to bring one no. each of Rough full form profile cutter and of Finish full form profile cutter meeting technical requirement as mentioned at Sl. no. 4 (Annexure-E & F) at their own cost for trial machining (without any financial implication on BHEL). Vendor shall be suitably intimated to bring the tools for trial. The trial machining shall be carried out at BHEL Haridwar works for roughing and finishing of two nos. of fir tree grooves on sample Test pieces of similar material grade as of LP Rotor (mentioned at Sl. no.2). The conical cutter & bottom end mill along with their adaptor for initial roughing of fir tree groove prior to running of Rough full form profile cutter shall be provided by BHEL during trial machining. Trial shall be considered successful if it meets criteria mentioned below at point no. 7. No payment shall be made by BHEL to vendors for trial machining. The vendors may carry back their cutter after trial machining. The programming support shall be provided by BHEL.

Step-4 Only those vendors who shall be successful in trial machining for both cutters (Rough full form profile cutter and Finish full form profile cutter) with

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acceptance by BHEL shall be considered as technically acceptable for further processing i.e. price bid opening & ordering on L1 basis. Failure of any of the two cutter or both in meeting the acceptance criteria will result in the offer being not considered for further processing and hence, considered as technically not acceptable.

7. Trial machining criteria for Technical Acceptance of offers:

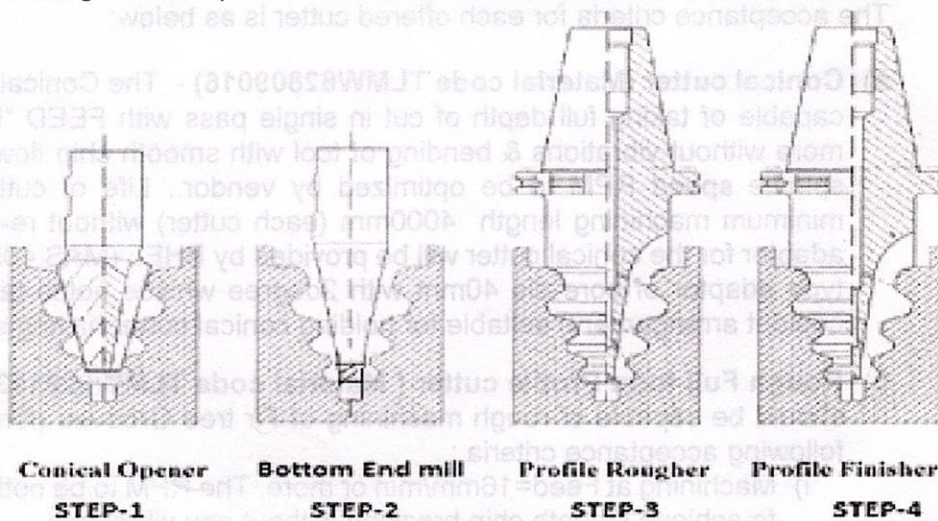
- The trial machining shall be carried out on sample test piece achieving cutting parameters/finish as mentioned below :
 - Rough Full form Profile cutter : Feed=16mm/min or more, RPM to be optimized by vendor to achieve smooth chip breaking without any vibrations.
 - Finish Full form profile cutter : Feed=16mm/min or more and achievement of surface finish Ra 2.5 with no line/chatter marks. The RPM to be optimized by vendor.
- The two nos. of finished fir tree groove made by the cutters shall be checked as per following for it's acceptance :
 - No line/chatter mark on the profile
 - Achievement of surface finish Ra 2.5
 - To be cleared by Go/No Go gauge provided by BHEL.

8. Ordering of Tools :

Only technically accepted vendors after trial machining shall be considered for price bid opening & further ordering on L1 basis as per purchase policy.

9. Acceptance of Lot-1 supplied tools after PO placement:

The acceptance machining for Lot-1 shall be carried out for roughing and finishing of fir tree grooves in the sequence as shown below, first on sample Test pieces of similar material grade as of LP Rotor (mentioned at Sl. no.2) and then on actual LP Rotor meeting the acceptance criteria as mentioned at Sl. No. 9.1 & 9.2.



SKETCH SHOWING SEQUENCE OF OPERATION FOR FIR TREE GROOVE MACHINING

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9.1 Checking on Sample Test piece

The machining shall be carried out for roughing and finishing of 2 nos. of fir tree grooves on sample Test pieces of similar material grade as of LP Rotor (mentioned at Sl. no.2). The tool for bottom end milling at Step-2 in the above sketch shall be provided by BHEL and it's evaluation is not in the scope of this acceptance. The acceptance criteria for each offered cutter is as below:

- a) **Conical cutter (Material code TLMW62809016)** - The Conical cutter should be capable of taking full depth of cut in single pass with FEED "F"=24mm/min or more without vibrations & bending of tool with smooth chip flow / breaking. The spindle speed RPM to be optimized by vendor. The adaptor for the conical cutter will be provided by BHEL (MAS 403 BT-50 Weldon type adaptor of bore dia 40mm with 2degree whistle notch taper and through coolant arrangement) suitable for holding conical cutter having shank dia 40mm.
- b) **Rough Full form Profile cutter (Material code TLMW62811304)** - The cutter should be capable of machining at Feed=16mm/min or more. The RPM to be optimized by vendor to achieve smooth chip breaking without any vibrations.
- c) **Finish Full form profile cutter (Material code TLMW62811312)** - The cutter should be capable of machining at Feed=16mm/min or more and achievement of surface finish Ra 2.5 with no line/chatter marks. The RPM to be optimized by vendor. The two nos. of finished fir tree groove made by the cutters should be cleared by Go/No Go gauge provided by BHEL.

9.2 Checking on LP Rotor

The acceptance criteria for each offered cutter is as below:

- a) **Conical cutter (Material code TLMW62809016)** - The Conical cutter should be capable of taking full depth of cut in single pass with FEED "F"=24mm/min or more without vibrations & bending of tool with smooth chip flow / breaking. The spindle speed RPM to be optimized by vendor.. Life of cutter should be of minimum machining length 4000mm (each cutter) without re-sharpening. The adaptor for the conical cutter will be provided by BHEL (MAS 403 BT-50 Weldon type adaptor of bore dia 40mm with 2degree whistle notch taper and through coolant arrangement) suitable for holding conical cutter having shank dia 40mm.
- b) **Rough Full form Profile cutter (Material code TLMW62811304)** – The cutter should be capable of rough machining of Fir tree Grooves (form 17-2) meeting following acceptance criteria :
 - i) Machining at Feed=16mm/min or more. The RPM to be optimized by vendor to achieve smooth chip breaking without any vibrations
 - ii) Machining minimum length 2500 mm (each cutter) without re-sharpening.
- c) **Finish Full form profile cutter (Material code TLMW62811312)** - The cutter should be capable of finish machining of Fir tree Grooves (form 17-2) meeting following acceptance criteria :
 - i) Machining at Feed=16mm/min or more. The RPM to be optimized by vendor.
 - ii) Achievement of surface finish Ra 2.5 with no line/chatter marks.
 - iii) Machining minimum length 2200 mm (each cutter) without re-sharpening.

Annexure-2

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- iv) Achieving clearance by Go/No Go gauge provided by BHEL in the finish machined firtree grooves.
- v) Achieving required parameter of blade frequency after assembly of blade in the finished machined grooves.

10. Acceptance & Payment of Lot-2 supplied tools:

- After successful trial of tools supplied in Lot-1 & its acceptance by BHEL, the vendor will be accordingly intimated by BHEL for supply of Lot-2.
- The payment for tools in Lot-2 shall be made after receipt & SRV acceptance of tools at BHEL Haridwar.

11. Other conditions:

- 11.1 During trial, if the process or tools could not be successfully established by vendor in one go, the vendor will be given one more chance for successful establishment or to improve any performance/cutting parameters through change of tool without any additional financial implications to BHEL. In case of failure even in additional chance, the particular tool supplied in LOT-1 shall be declared as rejected. There shall not be any Lot-2 supply for that tool.
- 11.2 In case of damage to any tool during successful establishment of required machining for reasons attributable to vendor, the same shall be replaced by the vendor without any financial implications to BHEL.
- 11.3 Cutter name and Form no. should be engraved on all supplied cutter for identification.
- 11.4 CNC Programs shall be provided by BHEL.

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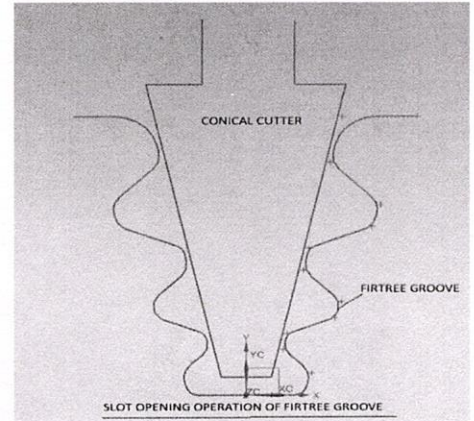
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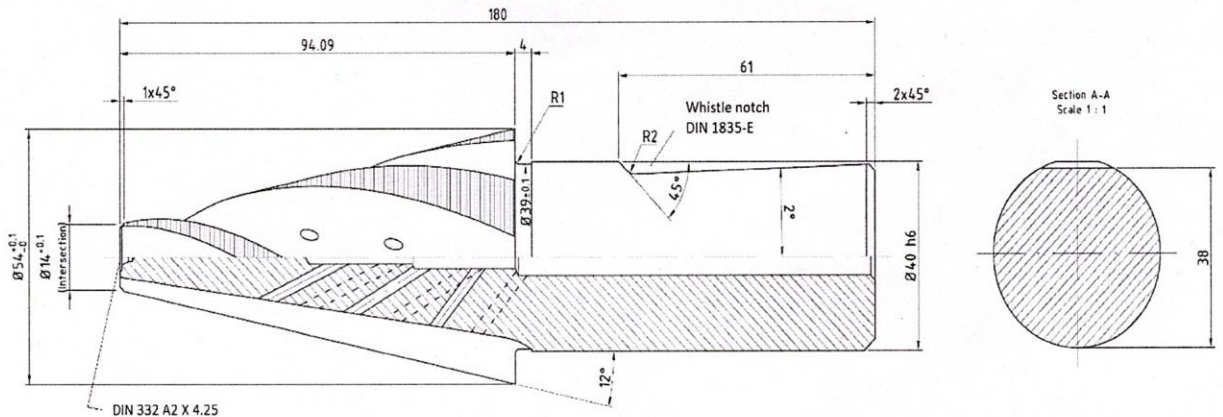
ANNEXURE-D

MATERIAL CODE:TLMW62809016

1. Conical cutters for Siemens Firtree groove FORM 17 are required for machining firtree groove along the curved path on L.P Rotor.



2. Conical cutters are to be supplied with parallel shank Dia 40h6 mm with a whistle notch taper as per DIN1835-E for clamping in side lock adaptors and other dimensions as per SKETCH -C below.



SKETCH -C (Drawing of Conical cutter FORM 17)

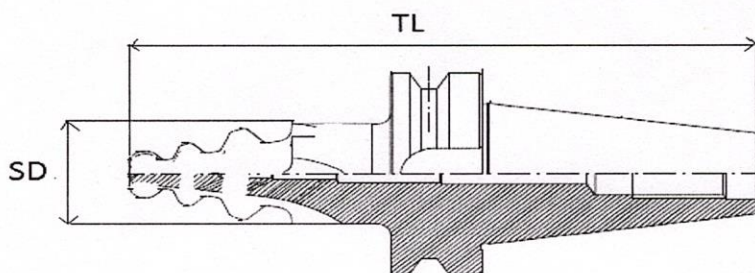
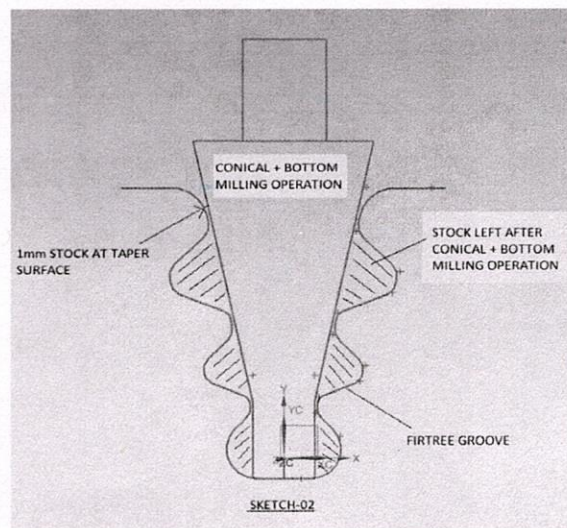
- All the cutters should have through spindle coolant arrangement.
- Material of cutters : HSS PM{PM30/S390/HSS-CO PM(EMP6) } with TiAlN coating/ suitable coating.
- Conical cutters should have RH cutting, RH Helical flutes, Z=4, NRF /Roughing thread on profile, chip breaker & ground relieved.
- In case of ordering, vendor must submit drawing of cutter along with complete details like major dia, minor dia, cone angle, flute length, total length, helix angle, rake angle etc. along with the supply of cutter for re-sharpening.

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ANNEXURE-E**MATERIAL CODE: TLMW62811304**

1. Rough full form profile cutters for form 17-2 are required for machining firtree groove on LP Rotor .
2. The cutter should have BT50 integral shank, RH cutting, RH helix , Helical flute with suitable rake, $Z=4$, Ground relieved ,roughing profile NRF/roughing thread, chip breaker, with TiAlN coating /suitable coating , with internal coolant holes.
3. Cutter material – HSS PM {PM 30/S390/HSS-CO PM (EMP6)}.
4. Stock to be removed by this cutter after material removal by conical & bottom milling shall be as per SKETCH NO-02 .
5. The Rough full form profile cutter should leave maximum 0.3 TO 0.5mm allowance along the complete profile for finishing.
6. The shank dia "SD" of cutter as shown in figure below should be equal or less than 65mm for clearance between firtree groove neck and cutter.



7. In case of ordering, vendor must submit drawing of cutter with complete details along with the supply of cutter for re-sharpening .

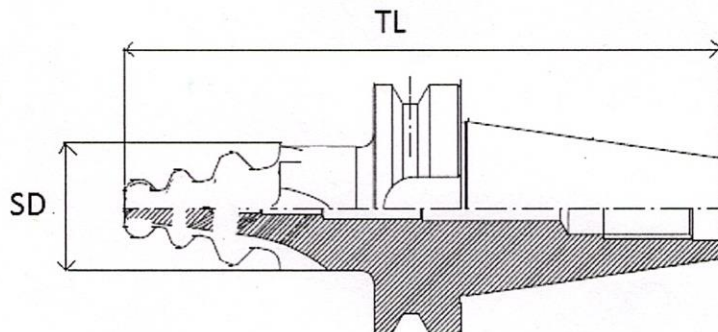
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ANNEXURE-F

MATERIAL CODE:TLMW62811312

1. Finish Full form profile cutter for form 17-2 are required for machining firtree groove on LP Rotor .
2. The cutter should have BT50 integral shank, RH cutting, RH helix, Z=4, Helical flutes with suitable rake, ground relieved, with TIALN coating/suitable coating, with internal coolant holes .
3. Cutter material- HSS PM {PM30/S390/HSS-CO PM (EMP6) }.
4. Stock to be removed by this cutter shall be as per Sl no.5 of Annexure-E .
5. The shank dia "SD" of cutter as shown in figure below should be equal or less than 65mm , for clearance between firtree groove neck and cutter.



6. In case of ordering, vendor must submit following along with supplied cutter:
 - a) Drawing of cutter with complete details for re-sharpening.
 - b) Dimensional test reports of each cutter.

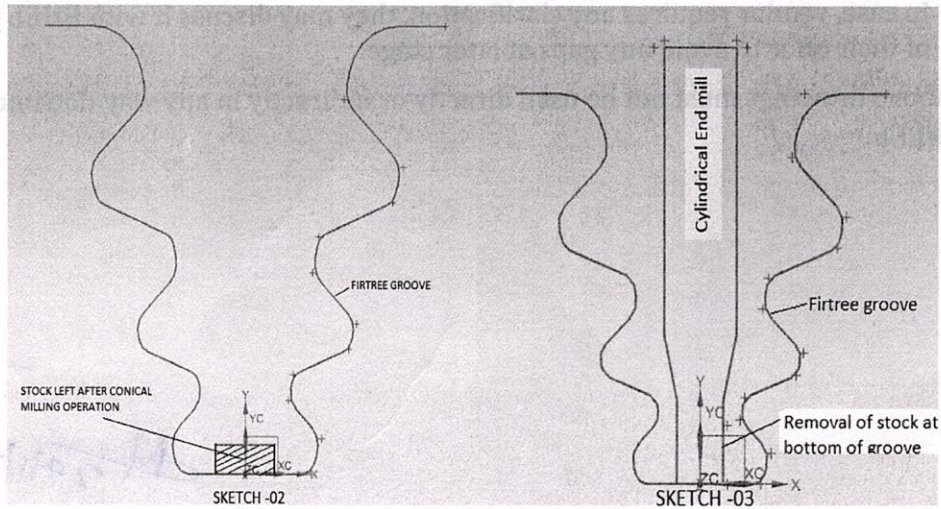
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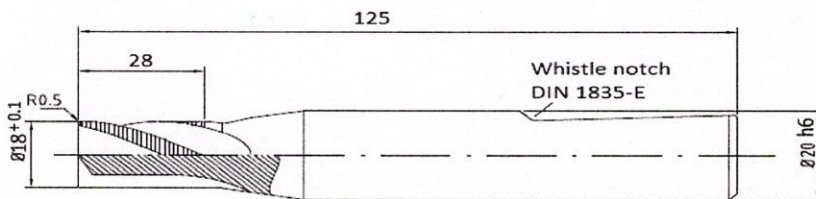
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ANNEXURE-G
(TLMW62811339)

1. End mill of dia 18mm, flute length 28mm, total length 125mm is required for machining of stock as shown in sketch-02 & sketch-03 at the bottom of Fir tree groove Form17-2 on LP rotor.



2. End mill to be supplied as per drawing provided below having parallel shank dia 20h6 mm with whistle notch taper as per DIN1835-E for clamping in Side lock adaptors.



3. Material of End mill: SOLID CARBIDE with TiAlN or suitable coating.
4. End mill should have RH cutting, RH Helical flutes, Z=4, Ground relieved, roughing thread profile for chip breaking, Corner radius 0.5mm
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed-3000rpm, max power-60kw with indexing facility.
6. Forging material of LP rotor -26NiCrMoV14-5/26NiCrMoV11-5 carbon-0.30%MAX.
7. **Acceptance criteria:** Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor :
 - a) End mill should be capable of taking full stock (depth of cut of 11mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - b) Feed of machining should be minimum 70mm/min or more. The RPM shall be optimized by vendor.
 - c) The supplied cutters should be capable of achieving a life of cutting minimum machining length 5000mm or more without resharping during trial machining on LP Rotor .

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8. In case of ordering, vendor to submit drawing of cutter along with complete details required for re-sharpening.
9. In case, vendor requires any clarification, they may discuss it with BHEL prior to submission of their offer to avoid any gaps at later stage.

(Above drawings must not be used directly or indirectly in any way detrimental to the interest of BHEL)

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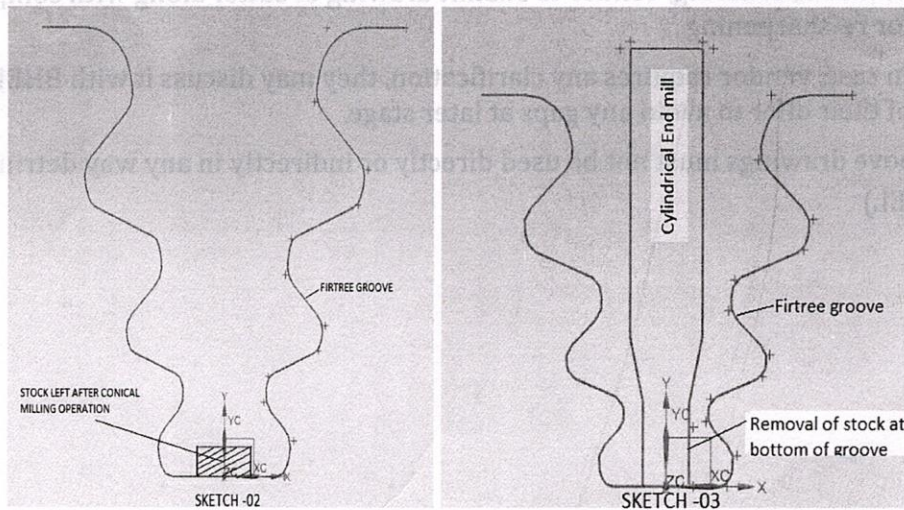
3. Material of End mill: SOLID CARBIDE with TiAlN or suitable coating.
4. End mill should have RH cutting, RH Helical Flutes, 2-4, Ground relieved, roughing thread profile for chip breaking. Corner radius 0.5mm.
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed 3000rpm, max power 60kw with indexing facility.
6. Forging material of LP rotor: 25MnCrMoV14-8 (SEMICrMoV11-5 carbon 0.30%MAX).
7. Acceptance criteria: Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor:
 - a) End mill should be capable of taking full stock (depth of cut of 1.5mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - b) Feed of machining should be minimum 70mm/min or more. The RPM shall be optimized by vendor.
 - c) The supplied cutters should be capable of achieving a life of cutting-minimum machining length 5000mm or more without resharpening during trial machining on LP Rotor.

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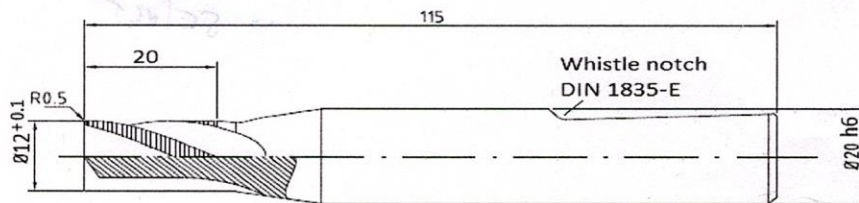
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ANNEXURE-H
(TLMW62811290)

1. End mill of dia 12mm, flute length 20mm, total length 115mm is required for machining of stock as shown in sketch-02 & sketch-03 at the bottom of Fir tree groove Form14-2 on LP rotor.



2. End mill to be supplied as per drawing provided below having parallel shank dia 20h6 mm with whistle notch taper as per DIN1835-E for clamping in Side lock adaptors .



3. Material of End mill: SOLID CARBIDE with TIALN or suitable coating.
4. End mill should have RH cutting, RH Helical flutes, Z=3 or 4, Ground relieved, roughing thread profile for chip breaking, Corner radius 0.5mm.
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed-3000rpm, max power-60kw, with indexing facility.
6. Forging material of LP rotor -26NiCrMoV14-5/26NiCrMoV11-5 carbon-0.30%MAX.
7. **Acceptance criteria:** Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor :
- End mill should be capable of taking full stock (depth of cut of 5mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - Feed of machining should be minimum 70mm/min or more. The RPM shall be optimized by vendor.
 - The supplied cutters should be capable of achieving a life of cutting minimum machining length 5000mm or more without resharping during trial machining on LP Rotor .

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Annexure-H

ANNEXURE-H
(TLMW62811230)

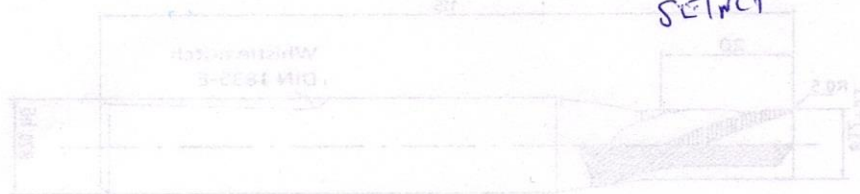
8. In case of ordering, vendor to submit drawing of cutter along with complete details required for re-sharpening.
9. In case, vendor requires any clarification, they may discuss it with BHEL prior to submission of their offer to avoid any gaps at later stage.

(Above drawings must not be used directly or indirectly in any way detrimental to the interest of BHEL)

2. End mill to be supplied as per drawing provided below having parallel shank dia 20.6 mm with with per DIN1835-E for clamping in side lock adaptors

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3. Material of End mill: SOLID CARBIDE with TiAlN or suitable coating
4. End mill should have R1 cutting, RH Helical flutes, Z=3 or 4 Ground relieved, roughing thread profile for chip breaking, Corner radius 0.5mm.
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed-3000rpm, max power-60kW, with indexing facility.
6. Forging material of LP rotor-26NiCrMoV14-5/26NiCrMoV11-5 carbon-0.30%MAX.
7. Acceptance criteria: Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor:
 - a) End mill should be capable of taking full stock (depth of cut of 2mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - b) Feed of machining should be minimum 70mm/min or more. The RPM shall be optimized by vendor.
 - c) The supplied cutters should be capable of achieving a life of cutting minimum machining length 5000mm or more without resharpening during trial machining on LP Rotor.

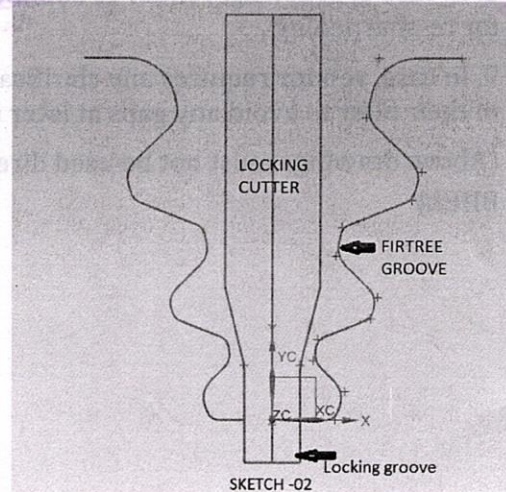
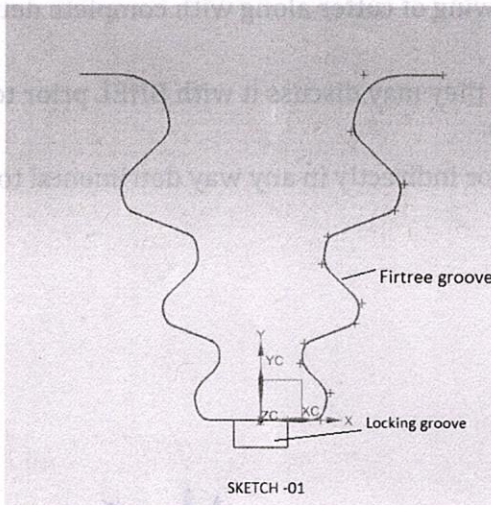
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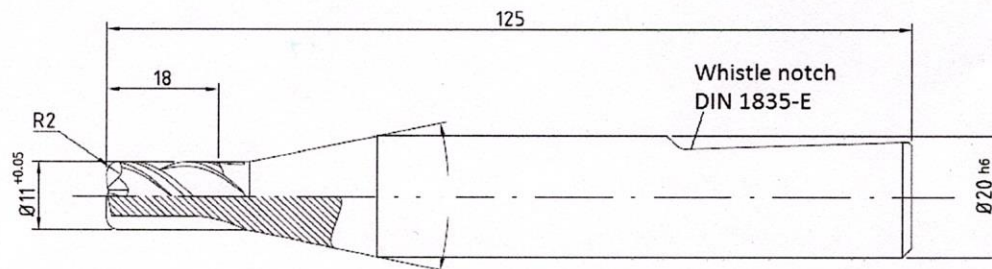
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ANNEXURE-I
(TLMW62809466)

1. End mill of dia 11mm , flute length 18mm , total length 125mm is required for machining of locking groove of Fir tree groove Form 11 as shown in sketch 01 & sketch 02 below on LP Rotor.



2. End mill is to be supplied as per drawing provided below having parallel shank dia 20h6mm with whistle notch taper as per DIN1835-E for clamping in side lock adaptors.



3. Material of End mill: SOLID CARBIDE with TIALN or suitable coating.
4. End mill should have RH cutting, RH Helical flutes, Z=3, Ground relieved, Corner radius 2mm.
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed-3000rpm, max power-60kw, with indexing facility.
6. Forging material of LP rotor -26NiCrMoV14-5/26NiCrMoV11-5 carbon-0.30%MAX.
7. **Acceptance criteria:** Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor :
 - a) End mill should be capable of taking full stock (depth of cut of 5mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - b) Achievement of surface finish Ra 2.5 with no line/chatter marks.
 - c) Feed of machining should be minimum 80mm/min or more. The RPM shall be optimized by vendor.
 - d) The supplied cutters should be capable of achieving a life of cutting minimum machining length 3000mm or more without resharpener during trial machining on LP Rotor .

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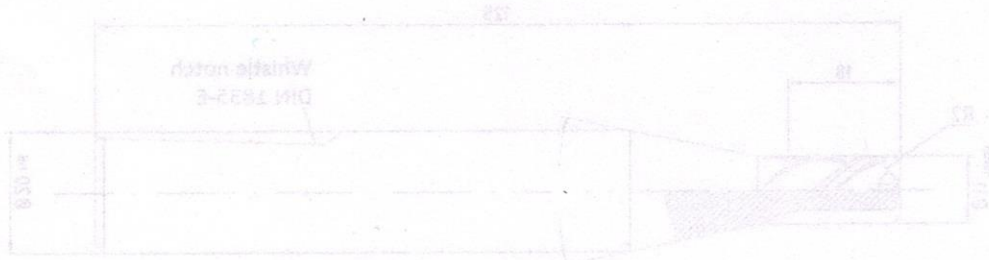
Annexure - I

8. In case of ordering, vendor to submit drawing of cutter along with complete details required for re-sharpening .

9. In case, vendor requires any clarification, they may discuss it with BHEL prior to submission of their offer to avoid any gaps at later stage.

(Above drawings must not be used directly or indirectly in any way detrimental to the interest of BHEL)

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3. Material of End mill: SOLID CARBIDE with TiAlN or suitable coating.
4. End mill should have RH cutting, RH Helical flutes, 2-3, Ground relieved, Corner radius 2mm.
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed 3000rpm, max power 60kw, with indexing facility.
6. Forging material of LP rotor - 36NiCrMoV14-2/36NiCrMoV11-2 carbon 0.30%MAX.
7. Acceptance criteria: Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor :
 - a) End mill should be capable of taking full stock (depth of cut of 5mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - b) Achievement of surface finish Ra 2.5 with no line/chatter marks.
 - c) Feed of machining should be minimum 80mm/min or more. The RPM shall be optimized by vendor.
 - d) The supplied cutters should be capable of achieving a life of cutting minimum machining length 3000mm or more without resharpening during trial machining on LP Rotor.

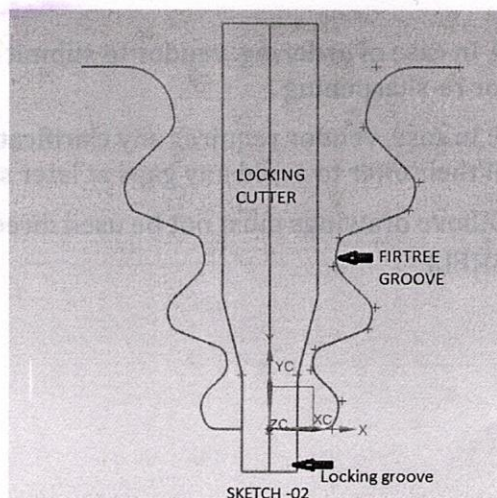
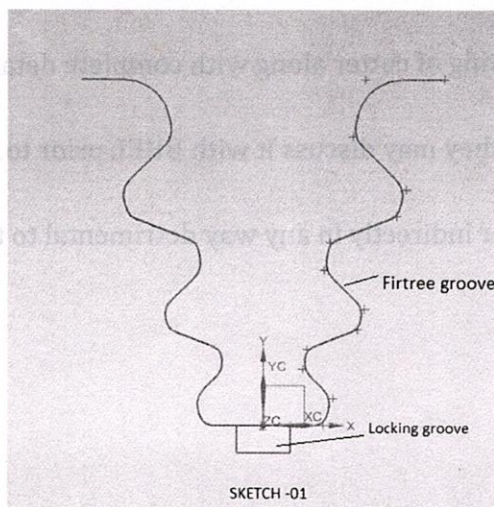
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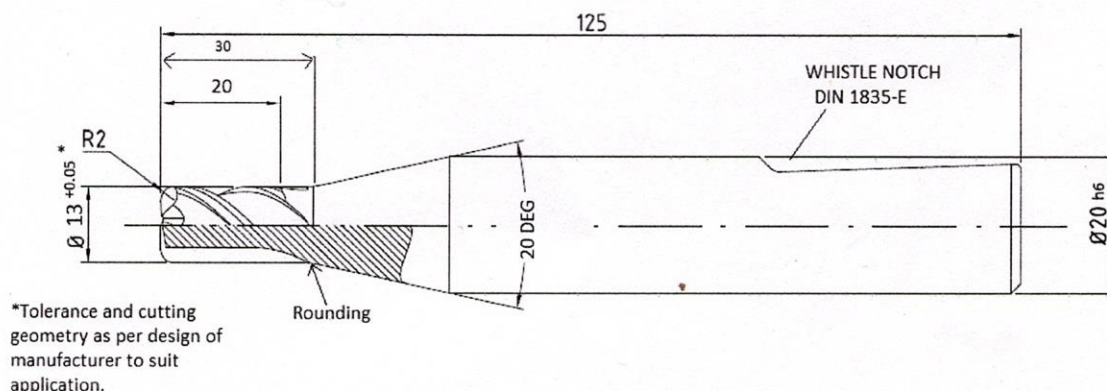
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ANNEXURE-J
(TLMW62743635)

1. End mill of dia 13mm, flute length 20mm, total length 125mm is required for machining of Locking groove of Fir tree groove form 17 as shown in sketch 01 & sketch 02 below on LP Rotor



2. End mill is to be supplied as per drawing provided below having parallel shank dia 20h6mm with whistle notch taper as per DIN1835-E for clamping in Side lock adaptors.



3. Material of End mill: SOLID CARBIDE with TIALN or suitable coating.
4. End mill should have RH cutting, RH Helical flutes, Z=3, Ground relieved, Corner radius 2mm.
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed-3000rpm, max power-60kw with indexing facility.
6. Forging material of LP rotor - 26NiCrMoV14-5/26NiCrMoV11-5 carbon-0.30%MAX.
7. **Acceptance criteria:** Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor :
 - a) End mill should be capable of taking full stock (depth of cut of 5mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - b) Achievement of surface finish Ra 2.5 with no line/chatter marks.
 - c) Feed of machining should be minimum 80mm/min or more. The RPM shall be optimized by vendor.
 - d) The supplied cutters should be capable of achieving a life of cutting minimum machining length 3000mm or more without resharping during trial machining on LP Rotor .

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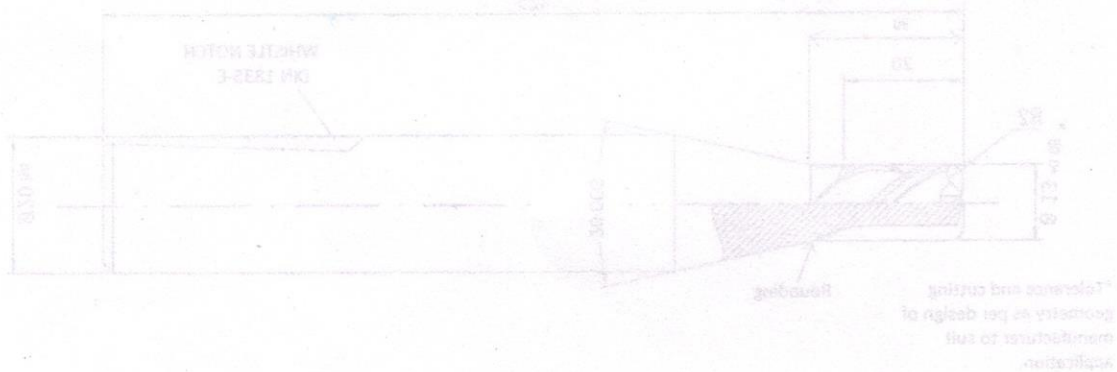
Annexure - J

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8. In case of ordering, vendor to submit drawing of cutter along with complete details required for re-sharpening .

9. In case, vendor requires any clarification, they may discuss it with BHEL prior to submission of their offer to avoid any gaps at later stage.

(Above drawings must not be used directly or indirectly in any way detrimental to the interest of BHEL)



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3. Material of End mill: SOLID CARBIDE with TiAlN or suitable coating.
4. End mill should have RH cutting RH helical flutes, Z=3, Ground relieved Corner radius 2mm.
5. Machining shall be carried out on LP rotor on CNC Horizontal Borer having spindle dia 160mm, max spindle speed-3000rpm, max power-60kw with indexing facility.
6. Forging material of LP rotor - 26NiCrMoV1-5/26NiCrMoV1-5 carbon 0.36%MAX.
7. Acceptance criteria: Final acceptance shall be made after achieving below mentioned acceptance criteria during trial machining on LP Rotor:
 - a) End mill should be capable of taking full stock (depth in cut of 2mm or more) in single pass without vibrations & bending of tool with smooth chip breaking.
 - b) Achievement of surface finish Ra 2.5 with no line/chatter marks.
 - c) Feed of machining should be minimum 80mm/min or more. The RPM shall be optimized by vendor.
 - d) The supplied cutters should be capable of achieving a life of cutting minimum machining length 3000mm or more without resharpening during trial machining on LP Rotor.

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Self-certification

As per Government Public procurement order no. P-45021/2/2017-BE-II dt.15.06.2017 & P-45021/2/2017-PP(BE-II) dated 28.05.2018,29.5.2019 & 04.6.2020, it is hereby certifying that we

.....

(supplier name) are(Class-I/Class-II) local supplier and will meet the requirement of minimum local content of (50%/20%) as defined in public procurement order dated 04.6.2020 for material against Enquiry no.

.....

Details of location at which local value addition will be made is as follows: -

.....

.....

We also understand, false declarations will be in breach of the code of integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the general financial rules along with such other actions as may be permissible under law.

Seal & Signature of Supplier

ON COMPANY LETTER HEAD

Date -

CERTIFICATE REQUIRED AS PER RULE 144(XI) OF GENERAL FINANCIAL RULES (GFRS) 2017

To,
M/s Bharat Heavy Electricals Ltd.
Heavy Electrical Equipment Plant
Haridwar – 249403

Ref:

Tender No. –

I have read the clauses regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that bidder (.....) is not from such a country or, if from such a country, has been registered with the competent authority. I hereby certify that bidder (.....) fulfils all requirements in this regard and is eligible to be considered. (Where applicable, evidence of valid registration by the competent authority shall be attached).

Authorized Signatory
(Name of signatory with company seal)