



Bharat Heavy Electricals Limited

Sub-Contracting (Turbine)

HEEP, BHEL, Ranipur, Haridwar-249403 (Uttarakhand)

Ph. No.: 01334-285166, E-mail: sbhushan@bhel.in, subhra@bhel.in

Ref. No. AIX-T/6600/EOI/22-23/1

Date: 19.11.2022

Notice for Expression of Interest for empanelment of New Vendors

The Heavy Electrical Equipment Plant (HEEP), located in Haridwar, is one of the major manufacturing plants of BHEL. The core business of HEEP includes design and manufacture of large steam turbines, generators, condenser and so on.

We are looking for vendors who are capable of carrying out job work as mentioned in below table and as per Annexure-A.

Salient Details of Notice for Expression of Interest for empanelment of New Vendors EOI No. AIX-T/6600/EOI/22-23/1		
Sl. No.	Issue	Description
1	Description of Job work	Controlled shot peening on the root of free standing LP turbine blades having material grade X5CrNiCuNb16-4 (DIN 1.4542)
2	Issue of EOI 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 and time of offer submission	Date: 12-12-2022 Time: 13:45 Hrs https://eprocurebhel.co.in/nicgep/app <i>Offer to be submitted online only through e-procurement Portal.</i> (Bidders are requested to visit website to view corrigendum/ addenda/ amendments/ extension/ modification etc. before submitting offer).
4	Opening of EOI (Technical offer)	Date: 12-12-2022 Time: 14.00 Hrs Note: <i>This EOI 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 EOI 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

Special Instructions:

1. Technical offers and inputs are required from vendors for establishment of controlled shot peening on the root of free standing LP turbine blades having material grade X5CrNiCuNb16-4 (DIN 1.4542). Vendor to clearly describe their capabilities, deviations from specifications and should also suggest possible solutions.
2. Approximate annual requirement of shot peening on root is 368 Blades per year.

3. This Expression of Interest (EOI) is for identification of prospective vendors and finalization of tender specifications only and not for procurement. There is no commercial aspects associated to this EOI.
4. BHEL reserves the right to evaluate the responses, based on technical merits, in the process of short-listing and identification of the prospective vendors for further discussions.
5. Performance of trial shot peening/ testing/ development etc. as mentioned in clauses of tender specifications are for indicative purpose only as these will be required during future tendering process for actual procurements only.
6. However, documents regarding PQR & technical conditions are to be submitted against EOI.
7. Vendors are advised to conduct a pre-bid meeting for any technical clarifications and site visit if required. In case any clarification is needed or site visit is required, bidders may contact as per following details:
 - a. Sh. Sanjiv Kumar, Email: sanjivk@bhel.in, Mobile: +91 9410395965
 - b. Sh. Anil Kumar, Email: kanil@bhel.in, Mobile: +91 8171218048
 - c. Sh. Sandip Chakraborty, Email: csandip@bhel.in , Mobile: +91 9411501631

The offers received will be technically evaluated by BHEL & successful short listed vendors will be considered for our future requirements. The offers that do not meet our Technical requirements/PQR are liable to be ignored.

Following documents/information are to be necessarily filled and submitted along with the Technical offer:

1. Duly filled, signed & stamped Annexure-A (Technical Requirements/ PQR).
2. Company Profile.
3. Financial report of the company.
4. Vendor to inform estimated delivery time for carrying out complete operation.

Only Technical BID along with the documents mentioned above should be submitted against Tender No. **AIX-T/6600/EOI/22-23/1**, Due Date-12.12.2022.

General Remarks:

1. This notification shall be published on www.bhel.com, www.eprocurebhel.co.in and www.hwr.bhel.com. The bidders will have to submit signed offer / bid through BHEL NIC portal only. Each page of quotation should be signed and stamped by authorized representative of vendor, else the offer is liable to be rejected. Unsigned bids are liable to be ignored.
2. Last date for downloading tender documents shall be 12.12.2022 till 13:45 Hrs. (IST). Tenders will be received up to 13:45 Hrs. (IST) on 12.12.2022 will be considered and opened on the same day at 14:00 Hrs. (IST).
3. No EMD & Tender fee are to be submitted.
4. The Quotation should be from the Principal / Original Manufacturer, failing which the quotation may likely to be ignored.
5. Late offers will not be considered in any case. BHEL will not be responsible for any type of delay.
6. Amendments / Corrigendum, if any, will be hosted on above websites only.

7. For any further details please log on to www.bhel.com, www.eprocurebhel.co.in or www.hwr.bhel.com.

Registration process for items required by BHEL is always open at <https://supplier.bhel.in>. Prospective suppliers (including MSEs & owned by SCs/STs) may visit this site and apply for registration in the respective unit.

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>

Digital Signature

Bidders against tender will necessarily have to obtain class – III DSCs. Procedure for application is available on www.bhel.com. 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.

B) 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.


The Tenderers must submit their Tenders, as detailed below:

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 incomplete documents.

For & ON BEHALF OF BHEL, HARDWAR

Shashi Bhushan Kumar

Manager (AIX-T)

BHARAT HEAVY ELECTRICALS LIMITED					
 UNIT'S ADDRESS: HEEP, RANIPUR, HARIDWAR - 249403 UTTARANCHAL, INDIA					
EXPRESSION OF INTEREST (EOI) FOR SHOT PEENING PROCESS ON ROOT OF FREE STANDING TURBINE BLADES					
SCOPE: ESTABLISHMENT OF SHOT PEENING PROCESS ON ROOT OF FREE STANDING TURBINE BLADES.					
NOTE : VENDOR SHOULD FILL THE "OFFERED" COLUMN IN COMPLIANCE TO SPECIFIED REQUIREMENTS AND ALSO "DEVIATIONS" COLUMN, WHERE THERE IS DEVIATION FROM THE REQUIREMENT. DULY FILLED SPECIFICATION CUM COMPLIANCE CERTIFICATE SHOULD BE SUBMITTED ALONG WITH THE OFFER. INADEQUATE, INCOMPLETE, AMBIGUOUS OR UNSUSTAINABLE INFO AGAINST ANY OF THE CLAUSES OF THE SPECIFICATIONS / REQUIREMENTS SHALL BE TREATED AS NON-COMPLIANCE. ANY CHANGES MADE TO THE CLAUSES OF THE SPECIFICATION COMPLIANCE CERTIFICATE WILL BE TREATED AS NON-COMPLIANCE AND MAY LEAD TO REJECTION OF THE OFFER.					
Clause No:	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	RE
1.0	PURPOSE & WORKPIECE MATERIAL				
1.1	Controlled shot peening at blade root is required for free standing LP turbine blades with fir tree roots and twisted aerofoil sections having material grade X5CrNiCuNb16-4 (DIN 1.4542) (tensile strength up to 1130 N/mm ² and hardness up to 335 HBW). The root of the blades are manufactured by milling of forged raw materials. The shot peening process is required for the generation of compressive stress in the blade root as per defined depth after shot peening process.	Vendor to comply.			
1.2	Controlled shot peening is required to be carried out with motion actuation of shot peening nozzle by robotic arm having minimum 6 axes and 1 rotary axis for turn table for blade movement/ rotation. Vendor to provide details of available facilities.	Vendor to comply and provide details of their available resources.			
2.0	BLADE DETAILS				
2.1	Blade drawings: Sketch 1, Sketch 2 are attached.	Vendor to accept.			
2.2	Blade material: X5CrNiCuNb16-4 (DIN 1.4542)	Vendor to accept.			
3.0	SHOT PEENING REQUIREMENTS & PARAMETERS				
3.1	Area of shot peening: Complete blade root is required to be shot peened as per attachment 1. The profile of the blade should be properly masked to shield it from shots.	Vendor to comply and provide details.			
3.2	Steel shots Size: Cast shot per AMS-2431/1 (45-52 HRC) or AMS-2431/2 (55-62 HRC) Alternatively: Conditioned Carbon steel cut wire shot globulated as per AMS 2431/3 (45-52 HRC) or AMS-2431/8 (55-62 HRC); condition in accordance with AMS-2431ff. Shot size: S 550 Vendor to provide details of checking quality of steel shots. Vendor to provide name and details of shot supplier and provide test certificate of steel shots.	Vendor to comply and provide details of their available resources.			

3.3	<p>Almen Intensity : The first 2 passes with an intensity of 0.45 - 0.48 mmA, coverage: 175 - 200%, followed by 1 pass for smoothing with an intensity of 0.25 mmA, coverage: 100 - 150 %</p> <p>Position of almen strips are as per attachment 2. Vendor to provide details of their available methods for coverage & intensity checking. Vendor to manufacture fixture replica of original blade root geometry for fixing and positioning of almen strips and blocks on the root geometry. The profile co-ordinates of blades will be provided after signing of Non Disclosure Agreement by vendor with BHEL.</p>	Vendor to comply and provide details of their available resources.			
3.4	<p>Position of shot peening nozzle: Position of shot peening Nozzle should be perpendicular to blade root geometry at each area of shot peening as per attachment 1</p>	Vendor to comply and provide details of their available resources (shot peening machine)			
3.5	<p>Surface Finish: To be achieved as per table 1 of attachment 3 after shot peening.</p>	Vendor to comply and provide details.			
4.0	<p>TRIAL AND DEVELOPMENT OF SHOT PEENING CAPABILITY AT VENDOR'S WORKS</p>				
4.1	Vendor to prove out their process in their works in 2 number of each blade types as mentioned in clause 2.1.	Vendor to accept.			
4.2	Blades will be handed over to vendor against bank guarantee as per BHEL norms.	Vendor to accept.			
4.3	Vendor will be responsible for transportation to and fro vendor's and BHEL works.	Vendor to accept.			
5.0	<p>ACCEPTANCE CRITERIA FOR ESTABLISHMENT OF SHOT PEENING PROCESS</p>				
5.1	<p>Vendor will carry out shot peening on the blade root as required in drawing as per clause 3.0 on 1 number of each type of blades provided to them by BHEL. Upon shot peening, vendor will arrange to test the blades as below for acceptance (as per clause 5.1.1 & 5.1.2) and share the reports to BHEL. Upon successful establishment and acceptance of test results, representatives of BHEL will visit vendor's works for verification purpose when vendor will again perform the shot peening on the remaining blades to prove repeatability of their process and capability in presence of BHEL representatives.</p> <p>Vendor to submit details of parameters and achieved values for shot peening operations performed and submit the same to BHEL for verification as below: Air pressure, shot flow rate, shot size, nozzle diameter, nozzle distance from blade surface, peening time, almen strip details, average intensity, coverage, number of passes.</p> <p>All required tests will be performed and arranged by the vendor for all activities.</p>	Vendor to accept.			
5.1.1	<p>Residual stress will be checked with XRD method as below:</p>				
5.1.1.1	Positions of the compressive stress measurements in the radius of the upper bearing flank measurements shall be carried out on both sides (suction and pressure side) per figure 5 & table 2 of attachment 4. Total 30 numbers of points to be measured as per table 2.	Vendor to accept and provide details.			
5.1.1.2	Vendor should have in house RSM checking facility with them. In case of out sourcing of testing, vendor to provide details of testing laboratories / facilities for checking of residual stress measurement.	Vendor to accept and provide details.			
5.1.2	<p>Metallographic inspections should be performed as below:</p>				
5.1.2.1	Peened surface should be homogeneous, free from material irregularities e.g. micro cracks, material overlapping etc. Vendor to provide details of their testing procedure.	Vendor to accept and provide details.			

5.1.2.2	No bulging should occur. Vendor to provide details of their testing procedure.	Vendor to accept and provide details.			
5.1.2.3	Coverage of peening should be as per clause 3.2. Vendor to provide details of their testing procedure e.g. optical & SEM investigation etc.	Vendor to accept and provide details.			
5.1.2.4	Suitable magnification (500X to 1000 X) of metallographic cross section of peened area should be investigated via optical microscope for investigation of details of peened surfaces. Vendor to provide details of their testing procedure. vendor to provide details of testing laboratories / facilities for checking of residual stress measurement.	Vendor to accept and provide details.			
6.0	PRE QUALIFICATION REQUIREMENTS				
6.1	Vendor must be a reputed OEM/ Organization/ institute which provides controlled robotic shot peening solutions, performs shot peening on blade of free standing turbine blades of reputed OEMs of turbine blades, with steel shots of size S 110 or higher. Vendor must be having experience of minimum 5 years for performing shot peening as mentioned above and supplying the blades to the Blade OEMs.	Vendor to comply and provide details.			
6.2	Vendor to provide at least 1 purchase order copy from blade manufacturer(s). Price may be concealed in suitable manner. This is for establishment of vendor's credentials as per clause 6.1.	Vendor to comply and provide details.			
6.3	Vendor to provide name, postal address, email IDs and phone number of the customer(s) as per clause 6.1, 6.2.	Vendor to comply and provide details.			
6.4	Vendor to provide performance certificate/ copy of MOM/ acceptance certificate from the referred customer at clause number 6.2 regarding satisfactory performance of their shot peening services.	Vendor to comply and provide details.			
6.5	BHEL may verify feedback of referred customer.	Vendor to accept.			
6.6	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected and legal action may be taken as per BHEL policies.	Vendor to accept.			

Annexure -1

Attachment: 1

SHOT PEENING POSITION AT BLADE ROOT

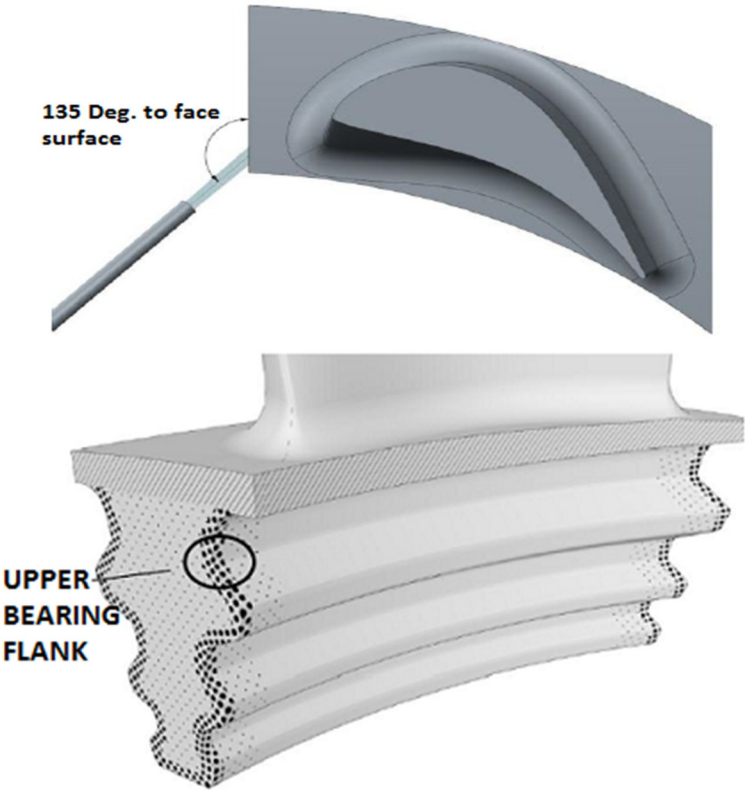
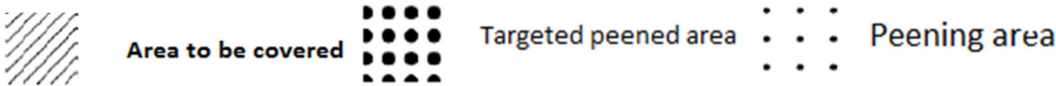


Figure 1: Peening of the transition to face area



Figure 2: Peening of bearing land radii (suction and pressure side)



Attachment: 2

POSITION OF THE ALMEN BLOCK OR ALMEN STRIP AT THE BLADE ROOT

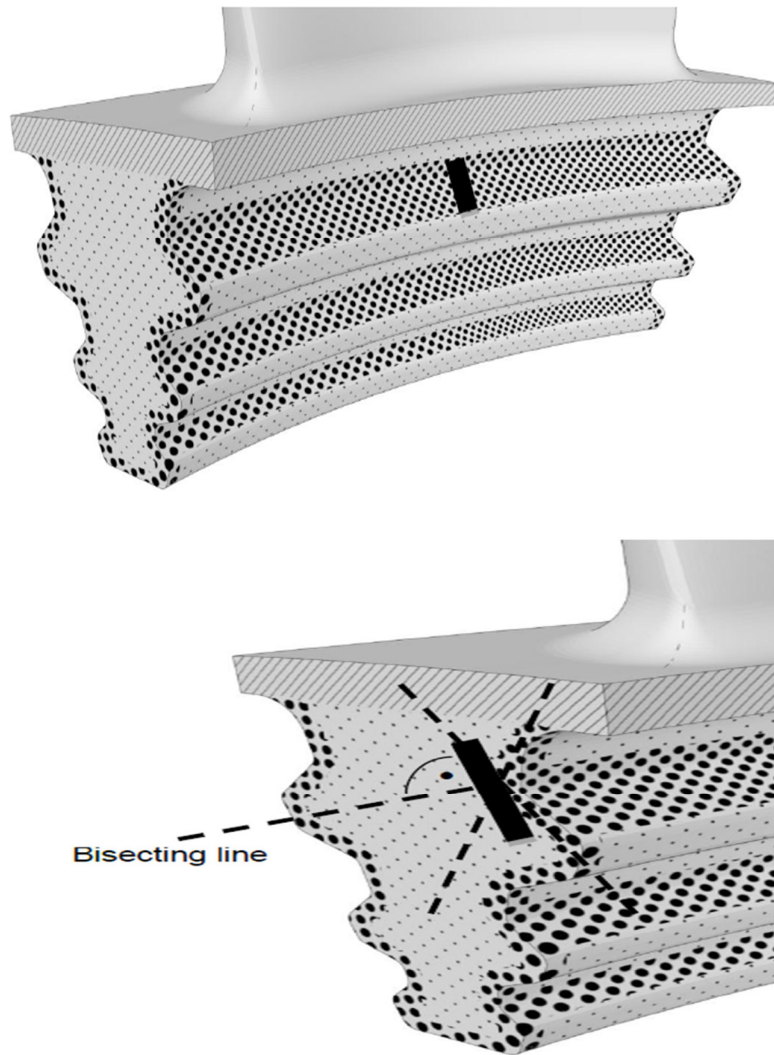


Figure 3: Shot peening areas and position of the Almen block or Almen strip at the blade root.



POSITIONS OF THE SURFACE ROUGHNESS MEASUREMENTS AT THE BEARING FLANKS



Figure 4: Positions of surface roughness measurements at the bearing flanks. Measurement shall be carried out on both sides (suction side and pressure side).

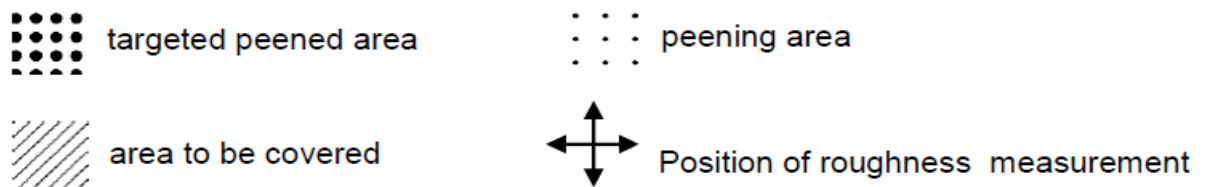


TABLE 1

SURFACE TEXTURE PARAMETERS AT SHOT PEENED AREA OF THE ROOT USING PEENING MEDIA S550

Parameter	Maximum	Average 18 Measurements
Rz	< 20 μm	< 16 μm
Wt	< 30 μm	< 20 μm

Attachment: 4

**POSITIONS OF THE RESIDUAL COMPRESSIVE STRESS MEASUREMENTS IN
THE RADIUS OF THE UPPER BEARING FLANK**

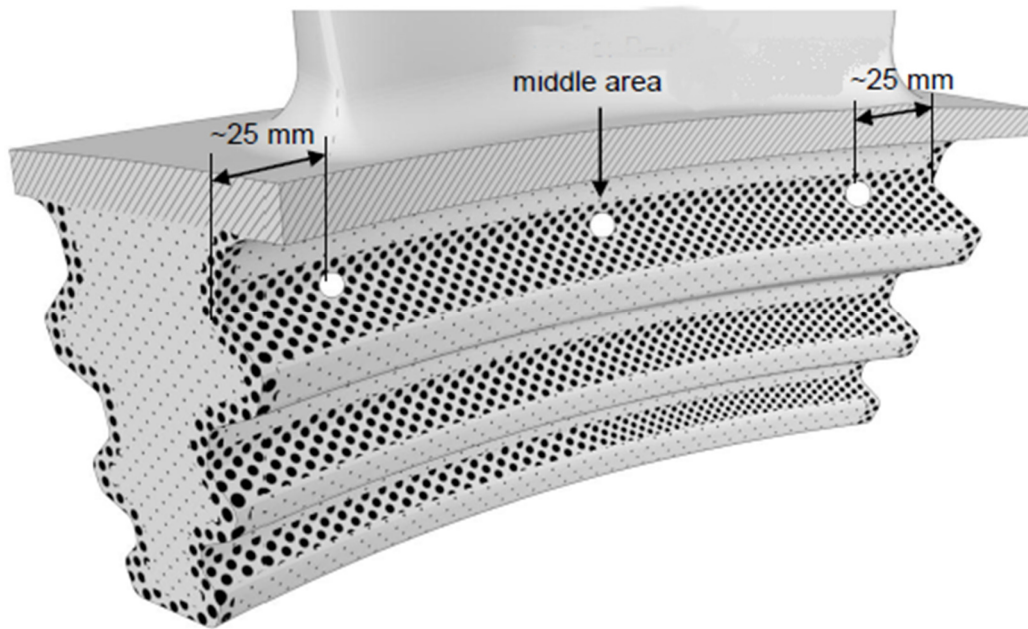


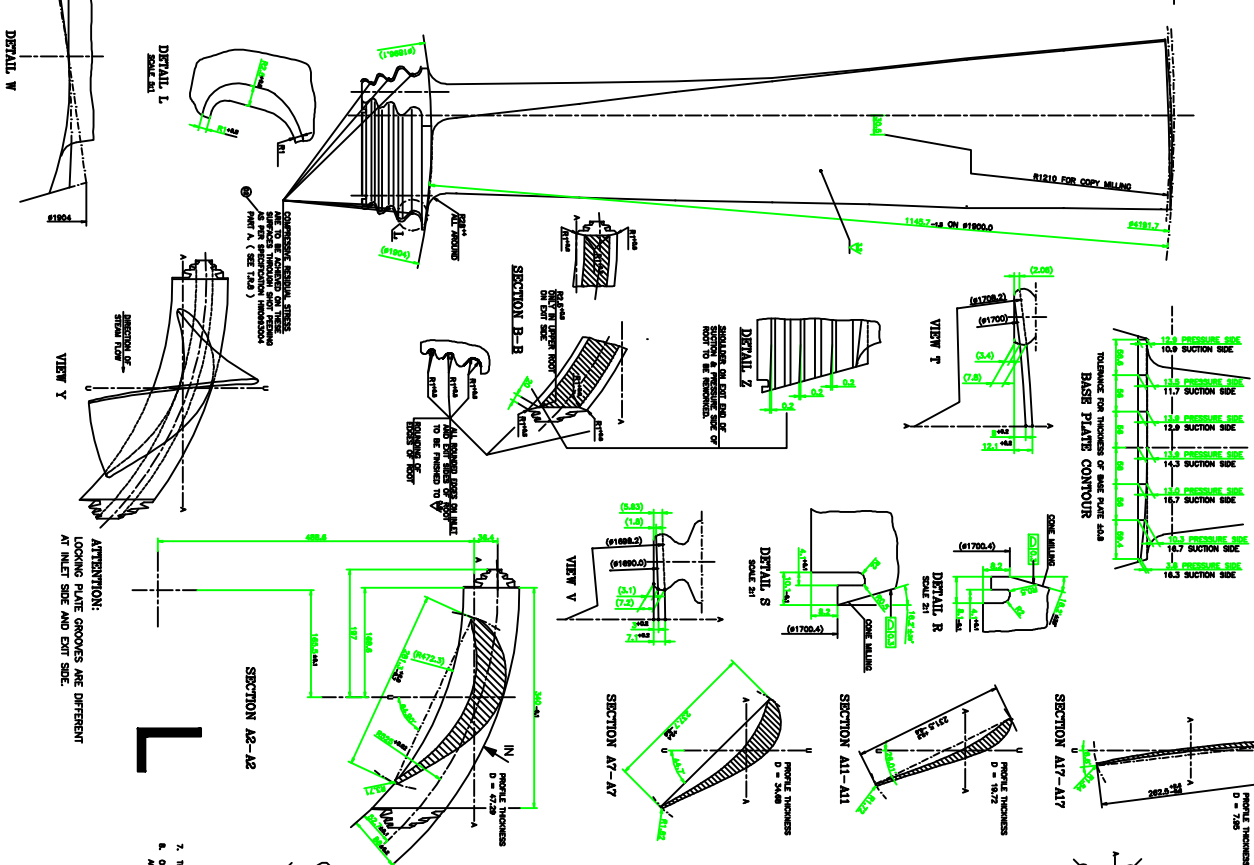
Figure 5: Positions of the compressive stress measurements in the radius of the upper bearing flank measurements shall be carried out on both sides (suction and pressure side)



TABLE 2:

COMPRESSIVE STRESSES USING PEENING MEDIA S 550

DEPTH	COMPRESSIVE STRESSES
Upper surface	> 500 MPa
50 μm	> 500 MPa
100 μm	> 500 MPa
200 μm	> 450 MPa
400 μm	> 10 MPa



TOLERANCIAL REQUIREMENTS :

1. TOLERANCE VALUES FOR PROFILE :

-ALLOTTED ORIENTATION OF PROFILE WITH RESPECT TO ROOT BE CHOSED AS FOLLOWS

MEASURED POINT	CO-ORDINATES	ANGLE	TOLERANCE						
	A	U	V	GHANA	UPPER	LOWER			
1	SECTION A-E	h=37.5			1.9	-4.3			
2	-86.35	0.82	390.5		1.9	-1.8			
3	-105.03	30.32	136.1		1.9	-1.8			
4	2.48	-7.27	264.0		1.9	-1.8			
5	22.68	31.27	50.0		1.9	-1.8			
6	115.53	-66.82	213.8		1.9	-4.3			
7	116.41	-66.79	252		1.9	-1.8			
8	112.12	-66.79	210.5		1.9	-4.3			
9	112.12	-66.79	210.5		1.9	-4.3			
10	112.12	-66.79	210.5		1.9	-4.3			
11	112.12	-66.79	210.5		1.9	-4.3			
12	112.12	-66.79	210.5		1.9	-4.3			
13	112.12	-66.79	210.5		1.9	-4.3			
14	112.12	-66.79	210.5		1.9	-4.3			
15	112.12	-66.79	210.5		1.9	-4.3			
16	112.12	-66.79	210.5		1.9	-4.3			
17	112.12	-66.79	210.5		1.9	-4.3			
18	112.12	-66.79	210.5		1.9	-4.3			
19	112.12	-66.79	210.5		1.9	-4.3			
20	112.12	-66.79	210.5		1.9	-4.3			
21	112.12	-66.79	210.5		1.9	-4.3			
22	112.12	-66.79	210.5		1.9	-4.3			
23	112.12	-66.79	210.5		1.9	-4.3			
24	112.12	-66.79	210.5		1.9	-4.3			
25	112.12	-66.79	210.5		1.9	-4.3			
26	112.12	-66.79	210.5		1.9	-4.3			
27	112.12	-66.79	210.5		1.9	-4.3			
28	112.12	-66.79	210.5		1.9	-4.3			
29	112.12	-66.79	210.5		1.9	-4.3			
30	112.12	-66.79	210.5		1.9	-4.3			
31	112.12	-66.79	210.5		1.9	-4.3			
32	112.12	-66.79	210.5		1.9	-4.3			
33	112.12	-66.79	210.5		1.9	-4.3			
34	112.12	-66.79	210.5		1.9	-4.3			
35	112.12	-66.79	210.5		1.9	-4.3			
36	112.12	-66.79	210.5		1.9	-4.3			
37	112.12	-66.79	210.5		1.9	-4.3			
38	112.12	-66.79	210.5		1.9	-4.3			
39	112.12	-66.79	210.5		1.9	-4.3			
40	112.12	-66.79	210.5		1.9	-4.3			
41	112.12	-66.79	210.5		1.9	-4.3			
42	112.12	-66.79	210.5		1.9	-4.3			
43	112.12	-66.79	210.5		1.9	-4.3			
44	112.12	-66.79	210.5		1.9	-4.3			
45	112.12	-66.79	210.5		1.9	-4.3			
46	112.12	-66.79	210.5		1.9	-4.3			
47	112.12	-66.79	210.5		1.9	-4.3			
48	112.12	-66.79	210.5		1.9	-4.3			
49	112.12	-66.79	210.5		1.9	-4.3			
50	112.12	-66.79	210.5		1.9	-4.3			
51	112.12	-66.79	210.5		1.9	-4.3			
52	112.12	-66.79	210.5		1.9	-4.3			
53	112.12	-66.79	210.5		1.9	-4.3			
54	112.12	-66.79	210.5		1.9	-4.3			
55	112.12	-66.79	210.5		1.9	-4.3			
56	112.12	-66.79	210.5		1.9	-4.3			
57	112.12	-66.79	210.5		1.9	-4.3			
58	112.12	-66.79	210.5		1.9	-4.3			
59	112.12	-66.79	210.5		1.9	-4.3			
60	112.12	-66.79	210.5		1.9	-4.3			
61	112.12	-66.79	210.5		1.9	-4.3			
62	112.12	-66.79	210.5		1.9	-4.3			
63	112.12	-66.79	210.5		1.9	-4.3			
64	112.12	-66.79	210.5		1.9	-4.3			
65	112.12	-66.79	210.5		1.9	-4.3			
66	112.12	-66.79	210.5		1.9	-4.3			
67	112.12	-66.79	210.5		1.9	-4.3			
68	112.12	-66.79	210.5		1.9	-4.3			
69	112.12	-66.79	210.5		1.9	-4.3			
70	112.12	-66.79	210.5		1.9	-4.3			
71	112.12	-66.79	210.5		1.9	-4.3			
72	112.12	-66.79	210.5		1.9	-4.3			
73	112.12	-66.79	210.5		1.9	-4.3			
74	112.12	-66.79	210.5		1.9	-4.3			
75	112.12	-66.79	210.5		1.9	-4.3			
76	112.12	-66.79	210.5		1.9	-4.3			
77	112.12	-66.79	210.5		1.9	-4.3			
78	112.12	-66.79	210.5		1.9	-4.3			
79	112.12	-66.79	210.5		1.9	-4.3			
80	112.12	-66.79	210.5		1.9	-4.3			
81	112.12	-66.79	210.5		1.9	-4.3			
82	112.12	-66.79	210.5		1.9	-4.3			
83	112.12	-66.79	210.5		1.9	-4.3			
84	112.12	-66.79	210.5		1.9	-4.3			
85	112.12	-66.79	210.5		1.9	-4.3			
86	112.12	-66.79	210.5		1.9	-4.3			
87	112.12	-66.79	210.5		1.9	-4.3			
88	112.12	-66.79	210.5		1.9	-4.3			
89	112.12	-66.79	210.5		1.9	-4.3			
90	112.12	-66.79	210.5		1.9	-4.3			
91	112.12	-66.79	210.5		1.9	-4.3			
92	112.12	-66.79	210.5		1.9	-4.3			
93	112.12	-66.79	210.5		1.9	-4.3			
94	112.12	-66.79	210.5		1.9	-4.3			
95	112.12	-66.79	210.5		1.9	-4.3			
96	112.12	-66.79	210.5		1.9	-4.3			
97	112.12	-66.79	210.5		1.9	-4.3			
98	112.12	-66.79	210.5		1.9	-4.3			
99	112.12	-66.79	210.5		1.9	-4.3			
100	112.12	-66.79	210.5		1.9	-4.3			

SKETCH 1

7. THE INLET EDGE IS TO BE LASER HANDDED AS PER TECHNOLOGICAL PROCESS NO. HW0903005.
ON ALL PLANS OF PRE-FIRE NO. COMPRESSIVE STRESSES TO BE INTRODUCED BY SHOT PEENING
ACC. TO HW0903004 PART A.

LOOKING PLATE GROOVES ARE DIFFERENT AT INLET SIDE AND EXIT SIDE.

