



INDIAN INSTITUTE OF TECHNOLOGY PATNA
BIHTA PATNA-801106
RESEARCH & DEVELOPMENT UNIT

ADVERTISEMENT NO: R&D/508/SERB/189

DATED: 17/02/2021

Project No: **R&D/SP/ME/DST/2020-21/508**

Applications are invited in the prescribed format only for the following assignment in a purely time bound research project undertaken in this institute.

1. (a) Name of the temporary assignment : JRF with provision to register in PhD
(b) Number of Post : One (01)
(c) Duration of the Post : Initially for three month extendable up to three years or completion of project subject to satisfactory performance
2. Name of the temporary research project : Influence of hydrogen on fatigue and fracture performance of ferritic-martensitic steel (P91) both at room and elevated temperature
3. Name of the sponsoring Agency : Science and Engineering Research Board (SERB)
4. Consolidated Fellowship/Salary : Rs. 31,000/- plus HRA as per GoI rule for first two years followed by Rs. 35,000/- plus HRA as per GoI rule subject to satisfactory performance.
5. Qualifications & Experience :
 - a) For candidates with M.Tech./ME/MS as qualifying degree in Mechanical/Machine Design/Applied mechanics/Solid mechanics/Mechanics/Manufacturing/Production with first class (minimum 65% marks or 7.0 CPI) in M.Tech./ME/MS with GATE/NET qualifications and first class (minimum 60% marks or 6.5 CPI) in B.Tech./BE, 12th and 10th class. Thesis with mechanical testing or material characterization will be preferred.
 - b) For candidates with B. Tech./BE in Mechanical/Production/Aerospace/Automobile as qualifying degree, 75% marks or 8.0 CPI in B.Tech/BE from institutes other than IITs/IISc and 7.0 CPI in B.Tech. from IITS and IISc with valid GATE score and first class (minimum 60% marks or 6.5 CPI) in 12th and 10th class.
 - c) The age should not exceed 28 years for a candidate with BE/B.Tech/M.Sc. degree as the highest qualification and 32 years for a candidate with ME/M.Tech/MS degree as the highest qualification.
 - d) Relaxations for SC/ST/OBC/women/PD will be given as per the GoI rules.

Application procedure:

1. Candidates interested in this position and satisfying the qualification criteria should write an email to the project investigator Dr. Akhilendra Singh, Department of Mechanical Engineering, IIT Patna (Email IDs: akhil@iitp.ac.in and akhilendra.singh@gmail.com).
2. The subject of the email should read as “PhD Position DST/508”. The last date for receiving this email is **9th March 2021**.



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3. The email **MUST** include the scanned/pdf copy of duly filled application form (see attached word document) with applicant's signature.
4. The email **MUST** include self-attested scanned pdf copy of all supporting documents (degree certificates, mark-sheets, GATE scorecard, and category certificate, if applicable).
5. The application should additionally include a 250-word statement of purpose (SOP). This document should elaborate on your interest in this project and any relevant prior experience/skills which would help you in solving the assigned research problem.
6. The application should also include a brief Academic CV not exceeding two pages.

IIT Patna reserves the right to not shortlist any candidate in case the application email does not contain complete information backed up by supporting documents as listed above.

All candidates who apply via email by **9th March 2021** (deadline) and are shortlisted will be informed regarding the further details by **13th March 2021**.

Date of ONLINE Interview: **17th March 2021** (18th March has been kept as the reserve day in case of large number of applications). It is the responsibility of the applicant to ensure that they have reliable internet connectivity on the date of online interview.

About the project:

The focus of this work is to investigate the influence of hydrogen on fatigue and fracture properties of ferritic-martensitic steel (P91) at room and elevated temperature. Hydrogen embrittlement is an environmental assisted mechanism which results in premature failure of metallic material due to degradation in mechanical and fatigue-fracture properties. P91 steel find widespread applications in nuclear, fossil fired power plants and petrochemical industries. It is being used in pipelines, pressure vessels, heat exchangers, cladding of nuclear fuel, boiler tubes are exposed to hydrogen containing environment. Moreover, these components may suffer fatigue failure during service due to various unexpected events such as seismic loadings and mechanical conditions and interaction with hydrogen environment. Therefore influence of hydrogen must be investigated thoroughly to ensure the structural integrity of structural components and to meet the ever-increasing energy demand of world. A detailed investigation on the available literature suggests that many studies have been reported related to the influence of hydrogen on mechanical and fatigue properties. However, adequate study and information regarding stress controlled fatigue, strain controlled fatigue, effect of notch on monotonic and cyclic loads, crack growth using fracture mechanics approach, fracture toughness, crack growth resistance (J-R curve) behavior of hydrogen charged P 91 steel at is not available in literature. In this context, the present work aims to investigate and analyse the influence of hydrogen on wide range of fatigue and fracture behaviour of P91 steel at room and elevated temperature. A detailed investigation will be performed to evaluate and predict the fatigue life of the ferritic-martensitic steel. FEM/XFEM modelling of hydrogenated P91 will be performed to support the experimental investigation and better understanding of the physics behind the hydrogen induced cracking. Modelling of hydrogenation, prediction of fatigue life, computation of stress intensity factor will be performed.



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For any query contact Investigator(s) : **Dr. Akhilendra Singh, Dept. of Mechanical Engineering, IIT Patna, Emails: akhil@iitp.ac.in, akhilendra.singh@gmail.com Tel.: 0612-3028018.**

Deputy Registrar

Copy to:

1. Associate Dean, R&D, IIT Patna
2. Advertisement file
3. Project file



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FORMAT OF APPLICATION FOR “JRF”

Name & Address Including email id and Phone no. (for Correspondence)	Category (GEN/OBC/SC/S T/PD)	DOB dd/ mm/yy	Professional Exam. (GATE/CSIR-NET, etc) & Validity
NAME IN CAPITAL Address: Phone: Email:			

Educational Qualification			
Institute/ Board	Exam Passed	Year of Passing	% of Marks/CPI
	10 th Class		
	12 th Class		
	Bachelors (B.Sc/B.Tech/B.E./BCA) or equivalent		
	Masters (M.Sc/M.Tech/M.E/MCA/ MA) or equivalent		

Qualifying degree	Degree/ major/Specialization
(B.Sc/B.Tech/B.E./BCA)	
(M.Sc/M.Tech/M.E/MA/MCA)	
Others	

Signature of applicant

Date:
Place: