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VNC - 2020 TASU

VIDYAVARDHINI'S NATIONAL CONFERENCE ON TECHNICAL ADVANCEMENTS FOR SOCIAL UPLIFTMENT

VNC - 2020 TASU

4TH APRIL, 2020

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Vidyavardhini means a Body committed to enhancement of Knowledge. Vidyavardhini was established as a registered society in 1970 by late Padmashri H. G. alias Bhausaheb Vartak for the noble cause of education in rural areas.

Vidyavardhini's College of Engineering and Technology, Vasai is located on the sprawling campus of Vidyavardhini, spread over an area of 12.27 acres. It is a short, two minutes walk from Vasai Road (W) Railway Station. The college is also accessible by road from Mumbai.

Vidyavardhini Society received approval from AICTE to start the new college of Engineering & Technology with effect from July, 1994. The college is affiliated to the University of Mumbai for the four year degree program leading to the degree of Bachelor of Engineering in six branches.

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Technology has always been potential tool for simplifying the way we do things. Present time demands directing the technological advancements towards addressing societal challenges such as improving health care, education environment, sanitation, agriculture, smart city, etc., VNC 2020 TASU aims to provide an opportunity to researchers, academicians, Industrialist and students to interact and share their ideologies and contributions made for social upliftment with the aid of technological advancements.

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1. Selected Papers will be published in International Journal of Information Technology, Published by Springer Nature, ISSN: 2511-2104 (Print Version), ISSN: 2511-2112 (Electronic Version)
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Important Dates:

Submission of full length paper
15TH Feb 2020
Paper Acceptance Notification
22ND Feb 2020
Submission of Final Version of Paper
29TH Feb 2020
Registration Deadline
5TH March 2020
PPT Submission
20TH March 2020
Conference
4TH April 2020

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Review of Fatigue crack growth and microstructure of rail.

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Abstract—**The aim of the paper is to provide the nature of Fatigue crack growth in rail steel. Study of microstructure of rail is presented. The hardness for the rail at the various cross sections is provided. Numerical as well as experimental methods are used to study the behaviour of the cracks in the rail. Study of Fractography is done to comply the fatigue crack growth and hardness test. FEA analysis for the same is presented to study the fatigue crack growth under stress field. The paris law is used for the purpose of fatigue crack growth studies. Study of FEA analysis is compared with experimental and theoretical studies.**

Keywords—Fatigue crack growth, Fracture surface, Crack, Rail, Fractography, Fracture Surface.

I. INTRODUCTION

The material used for rail is mosty steel of grade 880, 1080Cr, 1080HH, Special rail steel, Niobium, Vanadium, Corrosion resistant rail steel, Copper- Molybdenum, Alloy of Nickel Chromium Copper. The different types of rail are double Headed, Bull Headed & Flat Footed. The standard Flat Footed Section is mostly used. The rail is designated by weight per unit length. A 60 kg/m rail denotes that it's weight is 60 kg per metre. The standard sections used in Indian Railways are 60 kg, 52 kg, 90 R, 75 R, 60 R and 50 R. Indian Railways mostly use medium Manganese rails manufactured by Bhilai Steel Plant having ultimate tensile strength of 72 kg/mm². The various test are done for the acceptance of the rails such as Chemical Analysis, Tensile Test, Sulphur Print, Hardness test, Falling weight test, Hydrogen content, inclusion rating level. The study is carried out on the rail of grade 880. There are various defects in rail under operating conditions. A rail is considered to be failed if it is necessary to remove it immediately from the track on account of the defects noticed on it. Most of the failures in the rail originate from the fatigue cracks caused due to alternating stresses created in the rail section on account of the passage of moving loads. A rail section is normally designed to take a minimum GMT of traffic, but sometimes due to reasons like inherent defect in the metal,etc, there is weakness in the section at a particular point and that section gives way premature, causing failure of the rail.

The main causes for failures of rails are inherent defects in the rail, defects due to fault of the rolling stock and abnormal traffic effects, Excessive Corrosion of Rails, Badly maintained joints, Defect in Welding of joints, Improper maintenance of track, Derailments,etc. Rolling Contact defect is one of the prime concern which is affecting the service life of the rails. Rolling Contact defect is caused due to contact between wheel and rail. The cracks that are formed by rolling contact defect are divided into two categories first are the cracks that are formed on the surface and second are the cracks that are formed under the surface. The cracks formed under the surface are mainly due to vertical load and the material defects. The cracks formed in the surface are due to interaction between wheel and rail and large load transport to a small area. Contact area is elliptical and relatively small. Cracks formed due to the rolling contact fatigue and due to shear stress in the contact area of wheel and rail will grow when the stresses exceed the permissible tension of rail steel.Cracks advance towards the top of the rail and leads to failure of the rail under lower vertical load.

The detection of rail flaws is done by using visual examination or by rail flaw detection equipment. In visual examination the rail ends are cleansed by kerosene oil and visually examined in detail with the help of magnifying glass. In ultrasonic rail flaw detectors, vibrational waves above the hearing range of the normal ear, having the frequency of more than 20000 cycles per second are used. Whenever there is a change in media some of the ultrasonic energy gets reflected and the rest gets transmitted. When ultrasonic waves are fed at location on a rail, they pass through the rail metal and are normally reflected only from the foot. However the flaws near the surface sometimes remain undetected. Also the flaw should be perpendicular to wave detection if not it will not be detected. It also fails to detect the two flaws falling in the straight line. The reflecting surface should be parallel to the scanning surface otherwise there would be no back echo.Wrong

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Priti Shashikant Vairagi

of Vidyavardhini's College of Engineering and Technology

for presenting paper titled

Review of Fatigue crack growth and microstructure of rail

in the Vidyavardhini's National conference 2020 "Technical Advancements for Social upliftments" organised by Vidyavardhini's College of Engineering and Technology, Vasai held on 27th June, 2020

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