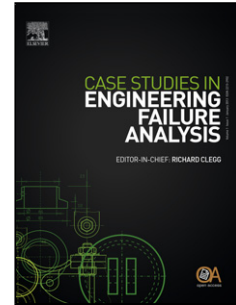


Accepted Manuscript

Title: Root Cause Failure Analysis of a Tracked Vehicle
Balance Arm

Author: Ayaz M. Khan

PII: S2213-2902(16)30033-5
DOI: <https://doi.org/10.1016/j.csefa.2017.10.001>
Reference: CSEFA 132



To appear in:

Received date: 3-2-2017
Revised date: 6-10-2017
Accepted date: 9-10-2017

Please cite this article as: Ayaz M.Khan, Root Cause Failure Analysis of a Tracked Vehicle Balance Arm (2010), <https://doi.org/10.1016/j.csefa.2017.10.001>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Root Cause Failure Analysis of a Tracked Vehicle Balance Arm

Mr Ayaz M. Khan

HITEC University

HITEC University, Taxila

Taxila 47080

Pakistan

Corresponding author: Mr Ayaz M. Khan

E-mail: engg_ayaz@hotmail.com

HIGHLIGHTS

- Failed Tracked vehicle balance arm analyzed using NDT and Fractography.
- Failure initiated with multiple cracks from spline teeth near the internal diameter.
- Fracture was of brittle nature and occurred due to Manufacturing Fault i.e. MnS inclusions.
- Loading condition, failure mode and state of stress determined.

Abstract

This paper relates to an upgraded Industrial tracked vehicle which was found with a failed Balance arm during disassembly. The failure analysis of an actual Balance Arms surface was carried out using Fractography and Non Destructive testing techniques to dig out the root cause. The analysis revealed microscopic signatures categorically pointing towards post failure surface mechanical damage. The factor causing to promote failure was improper manufacturing i.e. casting which was further attributed to MnS inclusions.

Keywords: Tracked Vehicle, Balance Arm, Failure Analysis, Non-destructive testing, Fractography.

1 Introduction

Suspension system plays a vital role in stability of a Tracked vehicle especially under dynamic loading. Suspension is a resilient damping unit to connect the hull of the tracked vehicle to the road wheels. It is used to lessen the shock of ground against the hull transmitted through the tracks and road wheels during the vehicles running's and decay the vehicle vibration and ensuring smooth running of the vehicle. To fulfil these requirements, four major parts i.e. Balance arms, torsion bars, shock absorbers, upper and lower bump stops are present. Balance arm is among the critical parts of a tracked vehicle which is subjected to bending, compression as well as torsional loads and on which weight of the whole vehicle is supported [1-3]. The Balance arm is assembled to road wheel on one side while with torsion bar on the other (See Fig. 1). As the tracked vehicle is generally subjected to severe loading conditions, thus, it is of high likelihood that its critical assemblies may fail or develop fatigue cracks. Loading conditions are, however, not the sole reason for early crack development. Systems are known to undergo mechanical failure due to defects in manufacturing, errors in design, discontinuities in casting, improper heat treatments as well [4]. If failure eventually results in fracture, fractography is usually carried out to know the root cause of failure by interpreting the fractographic features [5]. The goal of fractography is to locate the fracture origin based on the characteristics marks on the fractured sample such as beachmarks, chevrons and riverlines. These indicate direction of crack growth while

Download English Version:

<https://daneshyari.com/en/article/7153175>

Download Persian Version:

<https://daneshyari.com/article/7153175>

[Daneshyari.com](https://daneshyari.com)