

Comparison of Magnetic Particle Inspection of Dry and Wet Method to the Inspection on Aircraft Bolts

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Abstract: Most inspection companies or any companies that involve in doing this inspection were usually do not have a clear view of which method was best to use in MPI. It is sometimes unclear whether the magnetic field was sufficiently strong to give good indications. So theoretically, both can be used as an inspection tool and company will choose the best method and resolving the inspection. Dry particle inspection was best used when looking for shallow cracks near rough surface. Components with paint or rust on them can reduce the sensitivity of the test yet still allow for the desired result. Wet suspension Particles are when particles are applied while they are held within a liquid carrier, allowing for even coverage, and to highlight leakage. It provides optimum contrast with the tested surface, allowing for greater detail than dry particles. They are particularly useful for smooth surfaces as these particles will settle in rough surfaces. The objective was to perform Magnetic testing analysis on selected bolt using dry method. To perform magnetic testing analysis on selected bolt using wet method. To determine the sensitivity comparison between wet and dry method on selected bolts. To conclude wet method magnetic testing has been proven to be more sensitive to defect compare to dry method magnetic testing as evidence by Table 3 at 70% and 50% respectively.

Keywords: Magnetic Particle Inspection (MPI), Dry Method, Wet Method

I. INTRODUCTION

General Introduction

One of the utmost important aspect in aviation industry is inspection, which may be conducted in many forms and methods. Through inspections have duly proven that they not only promote continuous development in many aspects such as maintaining live aircrafts' parts [1-3], discovering new measurements and updates of the current equipment [4-8] and materials [9-10] used in the aviation industry, promoting educational research at higher learning educations [11], and generating profits for different stakeholders at many levels [12-14]; but also prevent from the losses of human lives [15-19]. One of those inspections involve magnetic testing.

Magnetic Testing uses one or more magnetic fields to locate surface and near-surface discontinuities in ferromagnetic materials.

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Magnetic testing can be conducted by using two methods which is the dry and wet method [20]. The wet method is commonly known as the Fluorescent Magnetic Particle Inspection (FMPI). On the other hand, the dry methods are dusted onto the surface of the test object as the item is magnetized. Dry particle inspection is well suited for the inspections conducted on rough surfaces [21].

Problem Statement

Most inspection companies or any companies that involve in doing this inspection are usually does not have a clear view of which method is best to use in MPI. It is sometimes unclear whether the magnetic field is sufficiently strong to give good indications. So theoretically, both can be used as an inspection tool and company will choose the best method and resolving the inspection. Dry particle inspection is best used when looking for shallow cracks near rough surface. Components with paint or rust on them can reduce the sensitivity of the test yet still allow for the desired result [22]. Wet suspension Particles are when particles are applied while they are held within a liquid carrier, allowing for even coverage, and to highlight leakage. It provides optimum contrast with the testing surface, allowing for greater detail than dry particles. They are particularly useful for smooth surfaces as these particles will settle in rough surfaces.

Research Objective

- To perform Magnetic testing analysis on selected bolt using dry method
- To perform magnetic testing analysis on selected bolt using wet method
- To determine the sensitivity comparison between wet and dry method on selected bolts

Research Goals

Main goal for intended final year project is to determine the efficiency of the wet method compare to dry method regarding flaw detection and the subsequent time consume and cost.

Scope and Limitation

The final year project scope only limited to selected aircraft standard steel bolt using Bouw and Widen equipment. Other application on other bolt might not yield the result intended.