FINAL PROJECT

VIBRATION SIGNAL ANALYSIS OF A CRACKED ROTATING SHAFT IN OVERHUNG ROTOR MODEL

Is Proposed as One of the Requirements to Finish the Undergraduate Program

By:

Riko Firma Hadi

ID.1610913013

Supervisor:

Dr.-Ing. Jhon Malta

Prof. Dr.-Ing. Mulyadi Bur

MECHANICAL ENGINEERING DEPARTMENT

FACULTY OF ENGINEERING

UNIVERSITAS ANDALAS

PADANG, 2021

ABSTRACT

A rotating shaft, in general, is known as a rotor and plays a central role in turbo-machinery. It transmits motion to a device or machine. It connects the components that cannot be connected directly due to distance. The rotor is subjected to loading and the most severe industry working condition. In operation, even though the rotor had been designed well and robust, the rotor is susceptible to failure without much earlier warning initiated by tiny cracks and propagates.

A laboratory study of the overhung rotor was carried out as part of an effort to prevent the failure. The study aimed to observe the vibration responses—the natural frequency, the amplitude of harmonic component, and the orbital—when the artificial crack in the overhung rotor was increased and rotated at a steady speed. The study compared the vibration responses rotor without crack, which assumes a healthy rotor and rotor contained crack.

Results showed the natural frequency decreased, 1x harmonic component decreased and 2x harmonic component increased as crack depth increased. In the orbital responses, the orbital form changed as crack depth increased, especially at 3 mm crack depth found double-loop response. This double-loop response was not found in the uncracked rotor. This symptom could be the main difference between rotors containing crack and without crack.

Keywords: Vibration Analysis, Shaft Crack, Overhung Rotor, Orbit Plot.