

Weerayut Sikhiwat 2010: A Failure Analysis of Oldham Ring of Scroll Pump by Finite Element Method. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Assistant Professor Phichai Kritmaitree, Ph.D. 168 pages.

This research presents design and analysis of a scroll pump. The fixed and orbiting scrolls mathematical models were used in design and construction of the scroll pump. The coordinates of the curves along the fixed and orbiting scroll wraps were calculated by the Matlab program. The scroll pump was modeled by the Solid Work program and analyzed by the ABAQUS program, which uses numerical analysis by the finite element method. The objective of this research is to use the finite element method to analyze the failure of the Oldham Ring due to impacting the orbiting scroll inside of the scroll pump. The relative motion of the orbiting scroll and Oldham Ring have impact/contact dynamics between their coupled contact surfaces. Any information and data used during the analysis were obtained from information and data used in design step. The angular velocity data taken from the design step was used in the analysis step and was calculated from the speed of the motor at 1450 rpm. After obtaining results by using the finite element method, analysis then predicted the results from the test data and compared for benefit to better design and developed the scroll pump in later models.

The results demonstrated maximum stress at each cycle of the orbiting motion. Nevertheless, the comparison between test results and analysis results are required. In conclusion, analysis results corresponded with the test results for position and area of the failure.

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Thesis Advisor's signature