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Modal Analysis for Engine Crankshaft Modal Analysis for Small Engine Crankshaft Modeling a Motorcycle Engine with SOLIDWORKS. Modeling a Motorcycle Engine with SOLIDWORKS. Finite Element Analysis of Crankshaft of an Automobile Engine *Fang Shao Matt Lombard Jian Zhong Lin Mohamad Saufi Mohamad Zainury Santhana Julias Henry Wendy Sumitra*

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crankshaft is a fundamental and a very crucial part in internal combustion engine its role as the main translational rotational converter have been used and perfected as early as 1226 by al jazari in his water pump machines this paper consists of finding the mode shape and natural frequency of a 3 cylinder 4 stroke engine crankshaft the test is done in both simulation and also experimental using a simple test rig the crankshaft is modeled using solidworks computer aided design cad software and simulation analysis is done in algor computational aided engineering cae software experimental is done by using impact hammer to excite the crankshaft and data recorded using data acquisition system das connected to sensor located on the crankshaft the post processing software used after experimental is done is me scopeves software the results for both simulation and experimental is compared the mode shapes is simulated using algor the differences in the results between simulation and experimental is discussed the final selected natural frequency for simulation is based on mesh aspect ratio of 80 simulation natural frequency in 1st mode is 688 494 hz bending 2nd mode is 707 661 hz bending 3rd mode is 1098 9 hz bending 4th mode is 1273 63 hz torsion and 5th mode is 1664 23 hz bending meanwhile the experimental natural frequency x axis in 1st mode is 668 hz 2nd mode is 722 hz 3rd mode is 1300 hz 4th mode is 1480 hz and 5th mode is 1580 hz experimental natural frequency y axis in 1st mode is 724 hz 2nd mode is 742 hz 3rd mode is 850 hz 4th mode is 1130 hz and 5th mode is 1300 hz experimental natural frequency z axis in 1st mode is 475 hz 2nd mode is 724 hz 3rd mode is 775 hz 4th mode is 1120 hz and 5th mode is 1320 hz the discrepancy errors recorded between simulation and experimental is ranging from 2 23 11

this thesis consists of finding the mode shape and natural frequency of a 4 stroke motorcycle engine crankshaft the test is done in both simulation and also experimental using a simple test rig the crankshaft is modeled using solidworks computer aided design cad software and simulation analysis is done in algor computational aided engineering cae software experimental is done by using impact hammer to excite the crankshaft and data recorded using data acquisition system das connected to sensor located on the crankshaft the results for both simulation and experimental is compared the final selected natural frequency for simulation is based on mesh aspect ratio of 60 simulation natural frequency in 1st mode is 1044 9 hz bending in face off 2nd mode is 1204 59 hz bending in face axis 3rd mode is 2104 59 hz bending out of face 4th mode is 2174 66 hz bending out of face and 5th mode is 2624 24 hz bending out of face meanwhile the

experimental natural frequency in 1st mode is 990.01 hz 2nd mode is 1244 hz 3rd mode is 2084.89 hz 4th mode is 2219.11 hz and 5th mode is 2791.18 hz the discrepancy errors recorded between simulation and experimental is ranging from 0.94 to 6.56

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### Eventually, **Stroke Engine Crankshaft**

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