

Table of Contents

Acknowledgements	3
Abstract.....	4
Table of Contents	5
List of Figures.....	7
List of Tables	11
Key to Symbols	12
Abbreviations	14
Chapter 1: Introduction	15
1.1) Introduction	15
1.2) Purpose	16
1.3) Scope	16
1.4) Assumptions	17
1.5) Hypothesis or Research Question.....	17
1.6) Significance	17
1.7) Theory	17
Chapter 2: Review of Literature	30
2.1) Analytical Stress Analysis.....	30
2.2) Numerical Stress Analysis.....	31
2.2.1) 2D Stress Analysis.....	31
2.2.2) 3D Stress Analysis.....	33
2.3) Conformal Contact Problems	34
2.4) Computational Contact Mechanics	34
Chapter 3: Methodology.....	37
3.1) Selection of polygonal profile size.....	37
3.2) Loading in P3G and P4C profiles.....	39
3.3) Pilot Finite Element Analysis.....	42
3.4) Validation of results from FEM to experimental, analytical and DIN standard.....	48
3.5) Detailed Finite Element Analysis	48
Chapter 4: Results/Discussion	49
4.1) Model Validation.....	49

4.2)	Transient Loading.....	77
4.3)	Loading capacity under torsional and torsional bending load.....	87
4.3.1)	Effect of loading on Torsional Shear stress.....	88
4.3.2)	Effect of loading on Normal stress along axial direction.....	90
4.3.3)	Effect of loading on Contact Stress.....	93
4.3.4)	Effect of loading on Contact pressure Distribution.....	97
4.3.5)	Effect of loading on maximum von Mises stress in shaft.....	103
4.3.6)	Effect of loading on maximum von Mises stress in hub.....	106
4.4)	Effect of friction.....	109
Chapter 5:	Conclusion.....	116
Appendices.....		118
Appendix A:	Dimension of the shaft and hub used in Experiment.....	119
Appendix B:	Load Calculation for FEA.....	123
Appendix C:	Experimental Stress Determination.....	128
Appendix D:	Graphical Results from FEA.....	131
Appendix E:	Permission to publish Figure 1.....	145
References.....		146