Crankshaft Fatigue Analysis by Rules and Finite Element Analysis

Thesis Background

For commercial marine installations the Classification societies requires design verification on crankshafts according to rules IACS M53. At Volvo Penta an in-house computer program is used since many years, but needs modernization and implementation in a modern computer language. Under development projects the rule based program is used together with numerical models.

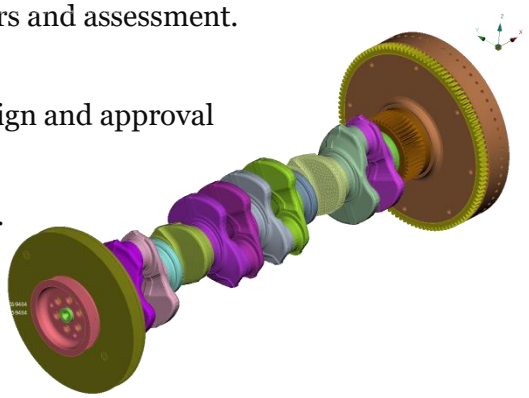
Thesis scope of work

First step
Develop and verify calculation program that fulfill classification societies rules (formula based). Write a program user manual. It is important to present results in ordered way to facilitate the communication with the societies all over the world. At Volvo Penta the CAE department supports the company with a number of these reports every year.

Second step
A staggering analysis procedure from the basic formulas to current state-of-the-art procedures should be performed.

- Calculate stresses in crank shaft three-point-bending (finite element model). Rule appendix.
- Use multi body dynamic (AVL Excite) dynamic response (available) to calculate stresses in finite element model under running conditions.
- Use fatigue program (FEMFAT TransMAX) for finite element based fatigue analysis.
- Compare rule based and finite element based fatigue safety factors and assessment.

Purpose
Understand the theory, design rules, and numerical methods for the design and approval of the crankshaft, which is an engine critical component for safety.
Discuss pros and cons with the methods.
Conclude on limitations/possible improvements for future development.



Qualifications & Required Documents

Master students Applied Mechanics (MPAME)
Knowledge of Python programming
Knowledge of finite element modeling and analysis

Please send your application including CV, Cover Letter, and Transcript of grades.

Practical information

Thesis Level: Master (30 ECTS points)
Language: English
Starting date: January 2019
Number of students: 2 students
Last application date: 1st of December 2018
Examiner proposal:

Contact

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About us

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With Volvo Penta, a world-leading supplier of engines and complete drive systems for marine and industrial applications, you will be part of a global and diverse team of highly skilled professionals who works with passion, trust each other and embraces change to stay ahead. We make our customers win.

The CAE department consists of 14 engineers performing analysis and simulations on 1D performance, CFD, MBS, and FEA, on engine and transmissions for Volvo Penta marine and industrial applications.

Entity: AB Volvo Penta
State / Province: Västra Götaland
City/Town: Göteborg
Employment/Assignment Type: Thesis
Functional Area: Technology

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