

MASTER THESIS
2012
for
stud. techn. Liaoyi Wang

**REGULARITY AND LIFE CYCLE COST EVALUATION OF OFFSHORE
DEVELOPMENT PROJECTS IN CONCEPT PHASE**
**(Regularitets- og levetidskostnadsvurdering av et offshore utviklingsprosjekt i
konseptfasen)**

RAM analyses are normally performed as part of concept studies, to evaluate the overall production availability of the installation/field development. Several tools/methods for life cycle cost (LCC) evaluations exist, but they tend to be too time-consuming and complicated to use in concept studies with a short execution schedule. Hence, a RAM/LCC model suitable for use in typical offshore engineering concept studies should be developed.

The objective of this master thesis is to develop method for regularity and life cycle cost evaluation of offshore development projects in concept phase. The thesis should conclude with a proposed method/tool suitable for use in concept selection and systems development phase (short execution time). An AkerSolutions FPSO concept (ongoing concept study) can be used as a representative test case.

As part of this project thesis the candidate shall:

1. Evaluate previous work and existing methods/tools for RAM/LCC evaluations.
2. Establish a Miriam Regina RAM model for an FPSO concept (test case).
3. Perform a RAM analysis of the system/equipment configuration chosen as base case for the FPSO concept.
4. Based on the result from the RAM analysis, propose alternative system/equipment configurations to be further evaluated (RAM/LCC).
5. Perform RAM analysis for alternative configurations.
6. Develop method for life cycle cost evaluation (CAPEX, OPEX, REGEX).
7. Perform life cycle cost evaluations for base case and alternative configurations.
8. Discuss the uncertainties related to the obtained RAM/LCC results.

9. Give recommendations for further studies.

Following agreement with the supervisors, the various points may be given different weights.

Within three weeks after the date of the task handout, a pre-study report shall be prepared. The report shall cover the following:

- An analysis of the work task's content with specific emphasis of the areas where new knowledge has to be gained.
- A description of the work packages that shall be performed. This description shall lead to a clear definition of the scope and extent of the total task to be performed.
- A time schedule for the project. The plan shall comprise a Gantt diagram with specification of the individual work packages, their scheduled start and end dates and a specification of project milestones.

The pre-study report is a part of the total task reporting. It shall be included in the final report. Progress reports made during the project period shall also be included in the final report.

The report should be edited as a research report with a summary, table of contents, conclusion, list of reference, list of literature etc. The text should be clear and concise, and include the necessary references to figures, tables, and diagrams. It is also important that exact references are given to any external source used in the text.

Equipment and software developed during the project is a part of the fulfilment of the task. Unless outside parties have exclusive property rights or the equipment is physically non-moveable, it should be handed in along with the final report. Suitable documentation for the correct use of such material is also required as part of the final report.

The student must cover travel expenses, telecommunication, and copying unless otherwise agreed.

If the candidate encounters unforeseen difficulties in the work, and if these difficulties warrant a reformation of the task, these problems should immediately be addressed to the Department.

The assignment text shall be enclosed and be placed immediately after the title page.

Deadline: June 11th 2012.

Two bound copies of the final report and one electronic (pdf-format) version are required.

Supervisor at NTNU:

Marvin Rausand

Phone: 73 59 25 42

E-mail: marvin.rausand@ntnu.no

Supervisor at Aker Solutiona:

Øystein Eriksen

Phone: +47 67527757

E-mail: Oystein.Eriksen@akersolutions.com

Bjørnar Langelo

Phone: +47 22946160

E-mail: Bjornar.Langelo@akersolutions.com**DEPARTMENT OF PRODUCTION
AND QUALITY ENGINEERING**

Per Schjølberg

Associate Professor/Head of Department

Marvin Rausand
Responsible Supervisor