

COMPUTER AIDED DESIGN AND ANALYSIS OF REMOTELY
OPERATED VEHICLE FOR SHALLOW WATER OPERATION

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COMPUTER AIDED DESIGN AND ANALYSIS OF REMOTELY
OPERATED VEHICLE FOR SHALLOW WATER OPERATION

By

Loo Wai Liam

A Thesis submitted in partial fulfillment of
the requirements for the degree of
Bachelor of Applied Science (Maritime Technology)

DEPARTMENT OF MARITIME TECHNOLOGY
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**DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verified that this research report entitled:
**COMPUTER AIDED DESIGN AND ANALYSIS OF REMOTELY OPERATED
VEHICLE FOR SHALLOW OPERATION** by **LOO WAI LIAM**, Matric No. **UK
20460** has been examined and all errors identified have been corrected. This report is
submitted to the Department of Maritime Technology as partial fulfillment towards
obtaining the Degree **APPLIED SCIENCE (MARITIME TECHNOLOGY)**,
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DECLARATION

I hereby declare that this thesis entitled Computer Aided Design and Analysis of Remotely Operated Vehicle for Shallow Water Operation is the result of my own research except as cited in the references.

Signature : 
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COMPUTER AIDED DESIGN AND ANALYSIS OF REMOTELY OPERATED VEHICLE FOR SHALLOW OPERATION

ABSTRACT

Remotely Operated Vehicle (ROVs) for underwater research have been under study and developed over the past few years. It is an important exploration tool especially for underwater research. As these researches have improved from time to time, it also increases the depth of underwater research exploration. Due to environment hazardous to human ability in which at high depth that pressurized divers and bring difficulty for the underwater tasks, ROVs are somehow important and needed to be improved to meets the required performance. Therefore, the objective of this project is to design and develop a micro-class remotely operated vehicle for shallow water operation mainly used for academic purposes. This paper discussed about the different designs of micro class ROV and its CFD analysis for shallow water operation. Five candidate designs of ROV with different specification and shapes are proposed for the design stage. All the designs of ROVs are needed to be analysed the performance in terms of its coefficient of drag and stability. Data are collected based on the drag coefficient and stability values calculated from formulas. The best design is selected after some data comparison generated from these two analyses. The selection criteria of the design are based on the lowest value on coefficient of drag and higher value of stability data. Some recommendation and suggestion were also made so that it can be applied in order to redesign a better and much more futuristic design of ROV for the underwater vehicle development.

REKA BENTUK BANTUAN KOMPUTER DAN ANALISIS BAGI “REMOTELY OPERATED VEHICLES” (ROVs) DI KAWASAN AIR CETEK

ABSTRAK

“Remotely operated underwater vehicles” (ROVs) untuk penyelidikan dalam air telah dikaji dan dibangunkan sejak beberapa tahun yang lalu. Ia merupakan salah satu alat penerokaan yang penting terutama bagi penyelidikan dalam air. Apabila penyelidikan ini telah bertambah baik dari semasa ke semasa, ia juga meningkatkan kedalaman penerokaan penyelidikan dalam air. Oleh disebabkan persekitaran yang berbahaya terhadap keupayaan manusia di mana pada kedalaman yang tinggi penyelam mengalami tekanan tinggi dan membawa kesukaran untuk menjalani tugas dalam air, pada masa inilah ROV memainkan peranan penting dan dengan sebab tersebut, ia perlu diperbaiki untuk memenuhi prestasi yang diperlukan dari semasa ke semasa. Oleh yang demikian, objektif projek ini adalah untuk merekabentuk dan membangunkan mikro-kelas ROV yang mampu beroperasi pada kawasan air cetek terutamanya digunakan untuk tujuan akademik. Kertas kerja ini membincangkan tentang reka bentuk bagi mikro-kelas ROV yang berbeza serta analisis CFD bagi setiap ROV yang beroperasi dalam air cetek. Lima bentuk calon ROV dengan spesifikasi dan bentuk yang berbeza telah dicadangkan semasa peringkat reka bentuk. Kelima-lima ROV yang telah direkabentuk perlu menjalani prestasi analisis dari segi pekali seretan dan kestabilannya. Data yang dikumpul adalah berdasarkan nilai pekali seretan dan kestabilan yang dikira dari formula. Reka bentuk ROV yang terbaik dipilih selepas beberapa perbandingan data dijalankan daripada kedua-dua analisis iaitu analisis berdasarkan pekali seretan dan kestabilan ROV. Kriteria pemilihan reka bentuk ROV yang terbaik adalah berdasarkan nilai terendah pada pekali seretan serta nilai yang lebih tinggi data kestabilan ROV tersebut. Beberapa ulasan dan cadangan juga telah dibuat supaya ia boleh digunakan untuk mereka bentuk semula ROV yang lebih baik dan lebih futuristik untuk pembangunan kenderaan dalam air pada masa akan datang.