FINAL ASSIGNMENT

DESIGN OF OFFSHORE FLOATING RUNWAY

Submitted to fulfill the requirements in completing undergraduate education on Civil Engineering Faculty of Sultan Agung Islamic University

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30.2014.03.758 **30.2014.03.779**

FAKULTAS TEKNIK JURUSAN TEKNIK SIPIL
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"DESIGN OF OFFSHORE FLOATING RUNWAY"

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Pada hari ini, tanggal 28 Maret 2018 berdasarkan Surat Keputusan Ketua Jurusan Teknik Sipil Universitas Islam Sultan Agung (UNISSULA) Semarang perihal penunjukan Dosen Pembimbing Tugas Akhir:

1. Nama : Ir. H. Gatot Rusbintardjo,M.R.Eng MSc.,Ph.D
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telah menyelesaikan bimbingan Tugas Akhir dengan Judul "*Design Of offshore Floating Runway*".

Adapun tahapan Tugas Akhir adalah sebagai berikut:

No	Tahapan	Tanggal
1	Penunjukan dosen pembimbing	28 Maret 2018
2	Pengumpulan data	30 Maret 2018
3	Penyusunan laporan	9 April 2018-15 Agustus 2018
4	Selesai laporan	15 Agustus 2018
5	Seminar Tugas Akhir	27 Agustus 2018

Demikian Berita Acara Bimbingan Tugas Akhir / Skripsi ini dibuat untuk diketahui dan dipergunakan seperlunya oleh pihak-pihak yang berkepentingan.

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The undersigned below :

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Hereby declare this our Final Assignment is entitled : **DESIGN OF OFFSHORE FLOATING RUNWAY** is a scholary work free from plagiarism. If later there is proven plagiarism from this final assignment, then I am willing to accept sanction in accordance with applicable legislation.

Semarang, 7 September 2018

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ABSTRACT

The airport is an area located both in the land or offshore that is used for aircarft landing, and take off, as well as boarding of the passengers. The location of airport should be far one another, far from high rise buildings, and should be far from the mountains. These conditions must be fulfilled for safety of the flight. The simplest airport should have at least a runway, that is a pavement that has a certain length and width that serves as a plane to take off and landing. There are several airports that have runways built offshore, one is the Kansai International Airport in Japan which all constructions are built offshore and I Gusti Ngurah Rai International Airport in Bali which a part of its runway is built above offshore. To find out how to design and calculate floating runways and get knowledge about the design of runway floating construction offshore. In this final assignment, it will be designed and calculated the offshore floating runway pavement. Kansai International Airport in Japan and I Gusti Ngurah Rai International Airport in Bali is used as study materials on this final study, because it has structure which is almost similar to floating runway. This floating runway is planned for the largest aircraft load Boeing 747-400 which have weight of 178,756 kg. The floating runway structure consists of pile foundation, pile cap, beam, slab deck, and HMA surface course. In designing some forces floating runway structure, there are many age calculated, those are wind force, sea waves, current, and earthquake. Force of sea water design and calculation of the floating runway structure are commenced with the preliminary design to determine the runway length, the runway width, thickness of runway deck slab the runway load, and the runway materials to be used. The design is continued with calculation of thickness dimension of HMA surface course, calculation of thickness of deck slab, calculation of floating runway buffer, pile cap calculation, and pile calculation. The results of calculation are the thickness of HMA surface course 10 cm, thickness of deck slab of floating runway 35 cm, dimension of beam at (60x80)cm, dimension of pile cap (120x150)cm, and the dimension of pile is 60 cm. From the calculation results, it can be concluded that the floating runway structure safely to be used for landing and takeoff of the aircarft.

ABSTRAK

Bandara adalah daerah yang terletak baik di darat atau lepas pantai yang digunakan untuk pendaratan pesawat, dan lepas landas, serta naik turun penumpang. Lokasi bandara harus jauh satu sama lain, jauh dari gedung-gedung tinggi, dan harus jauh dari pegunungan. Kondisi ini harus dipenuhi untuk keamanan penerbangan. Bandara paling sederhana harus memiliki setidaknya landasan pacu, yaitu perkerasan yang memiliki panjang dan lebar tertentu yang berfungsi sebagai pesawat untuk lepas landas dan mendarat. Ada beberapa bandara yang memiliki landasan pacu yang dibangun di lepas pantai, salah satunya adalah Bandara Internasional Kansai di Jepang yang semua konstruksinya dibangun di lepas pantai dan Bandara Internasional I Gusti Ngurah Rai di Bali yang sebagian dari landasannya dibangun di atas lepas pantai. Untuk mengetahui bagaimana merancang dan menghitung landasan pacu terapung dan mendapatkan pengetahuan tentang desain konstruksi landasan pacu terapung di lepas pantai. Pada tugas akhir ini, akan dirancang dan diperhitungkan lintasan landasan apung lepas pantai. Bandara Internasional Kansai di Jepang dan Bandara Internasional I Gusti Ngurah Rai di Bali digunakan sebagai bahan penelitian pada tugas akhir ini, karena memiliki struktur yang hampir mirip dengan landasan terapung. Landasan terapung ini direncanakan untuk muatan pesawat terbesar Boeing 747-400 yang memiliki berat 178.756 kg. Struktur landasan terapung terdiri dari pondasi tiang pancang, pile cap, beam, deck slab, dan HMA surface course. Dalam merancang beberapa kekuatan struktur landasan pacu terapung, ada banyak masa yang dihitung, yaitu gaya angin, gelombang laut, arus, dan gempa bumi. Kekuatan desain air laut dan perhitungan struktur landasan terapung dimulai dengan desain awal untuk menentukan panjang landasan, lebar landasan, ketebalan landasan deck slab beban landasan, dan material landasan yang akan digunakan. Perancangan dilanjutkan dengan perhitungan tebal dimensi permukaan HMA, perhitungan tebal deck slab, perhitungan balok landasan terapung, perhitungan pile cap, dan perhitungan pile. Hasil perhitungan adalah tebal lapis permukaan HMA 10 cm, tebal pelat dek landasan 35 cm, dimensi balok pada (60x80) cm, dimensi tiang pancang (120x150) cm, dan dimensi tiang adalah 60 cm . Dari hasil perhitungan, dapat disimpulkan bahwa struktur landasan terapung aman untuk digunakan untuk mendarat dan lepas landas dari pesawat tersebut.

MOTTO

لَكُمْ وَعَسَىٰ أَنْ تَكْرَهُوا شَيْئًا وَهُوَ خَيْرٌ لَكُمْ ۖ وَعَسَىٰ أَنْ تُحِبُّوا شَيْئًا وَهُوَ شَرٌّ

"*Boleh jadi kamu membenci sesuatu namun ia amat baik bagimu dan boleh jadi engkau mencintai sesuatu namun ia amat buruk bagimu, Allah Maha Mengetahui sedangkan kamu tidak mengetahui*."

(QS Al baqarah 216)

آمَنُوا اصْبِرُوا وَصَابِرُوا وَرَابِطُوا يَا أَيُّهَا الَّذِينَ

"*Wahai orang orang yang beriman, bersabarlah engkau dan kuatkanla kesabaranmu*."

(Qs. Al Imran 200)

Bermimpilah seakan kau akan hidup selamanya, Hiduplah seakan kau akan mati hariini. .

(Esa Putra Haris Hamam)

Kerahkan hati, pikiran dan jiwamu kedalam aksimu yang paling kecil sekalipun . inilah rahasia kesuksesan

(Fikri Khoiril Reza)

"I dedicated this final assignment to the knowledge of civil engineering in general and in airport engineering in particular as my worship to Allah SWT"

ACKNOWLEDGEMENT

Alhamdulillahirabbil'alamin, Innalhamdalillah nahmaduhu wa nasta'iynuhu. Upon Ridho and Rahmat Allah Subhana wa Ta'ala this final assignment report can be completed.

In preparing this report, I was contact with many people, researches, academicians, and practitioners. They have contributed towards my understanding and thoughts. In particular, i wish to express my sincere appreciation to my main study supervisor, Ir. H. Gatot Rusbintardjo,M.R.Eng MSc.,Ph.D., for for his encourages, guidance, criticism, and friendship. I an also very thankful to my Co – supervisor, Ir. H. Djoko Susilo Adhy, MT for his guidance, advice and motivation. Without their continued support and interest, this final assignment report would not have been the same as presented here.

My special thanks are addressed to Dean of the Engineering Faculty of UNISSULA, Bapak Ir. H. Rachmat Mudiyono, MT.,Ph.D. and Head of Department of Civil Engineering, Faculty of Engineering UNISSULA, Bapak Ari Sentani, ST., M.Sc, for permission, to take the final assignment as the requirement for reaching Bachelor Degree in Civil Engineering in Faculty of Engineering UNISSULA.

Very special thanks are given to my beloved parents, my father and my mother, their patience, prayers and understanding during this study were always a blessing. Also my sister who always give me support and pray. Of course for Fikri Khoiril Reza as partner who have worked hard and fought together to resolve this final assignment. Thanks to All of my friends in Faculty of Civil Engineering 2014 especially class A for their support. Also to all of my Acceleration friend 2014, who always fought together and give me support.

Semarang, Agustus 2018

Esa Putra Haris Hamam

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Semarang, Agustus 2018

Fikri Khoiril Reza