Budapest University of Technology and Economics
Faculty of Mechanical Engineering

Department of Fluid Mechanics

http://www.ara.bme.hu/

FINAL PROJECT ASSIGNMENT

CLASSIFIED

<table>
<tr><td rowspan="7">Identification</td><td colspan="2">Name: Padayao Jowett Millan</td><td colspan="2">ID: 73612055556</td></tr>
<tr><td colspan="2">Code of the Curriculum: 2NAMW0</td><td>Specialisation:</td><td>Document ref. number:</td></tr>
<tr><td colspan="2">Curriculum: Master Program in Mechanical Engineering Modelling</td><td>2NAMW0-FM</td><td>GEÁT:2022-2:2NAMW0:QOXO8C</td></tr>
<tr><td colspan="2">Final Project issued by:</td><td colspan="2">Final exam organised by:</td></tr>
<tr><td colspan="2">Department of Fluid Mechanics</td><td colspan="2">Department of Fluid Mechanics</td></tr>
<tr><td colspan="4">Supervisor: Dr. Kristóf Gergely János (71957915589), associate professor</td></tr>
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<table>
<tr><td rowspan="9">Project Description</td><td>Title</td><td>Model-based optimization of the intake of a side channel pump
Oldalcsatornás szivattyú beömlésének modell alapú optimalizálása</td></tr>
<tr><td rowspan="6">Details</td><td>1. Provide a literature review of side channel pump hydraulics, intake channel design, and CFD modeling of side channel pumps.</td></tr>
<tr><td>2. Based on the given sectional drawings, create the baseline geometric model of the pump fluid space neglecting the narrow gaps in Solidworks 2017. Establish 3D model parametrization to allow for scaling the model.</td></tr>
<tr><td>3. Construct a steady state CFD model of the baseline design in ANSYS Fluent system and compare the H-Q characteristic curve of the machine with the available measurement results. Calculate the hydraulic efficiency of the machine as a function of volume flow (eta-Q).</td></tr>
<tr><td>4. Based on the model results of the baseline design, determine the geometrical parameters and design variants of the intake channel.</td></tr>
<tr><td>5. Create a hydraulic model for machines with modified inlet and examine how the modifications affect the vortex in the pump and the hydraulic efficiency of the pump. Perform the optimization of the inlet channel for maximum pump efficiency, detailing the flow pattern and hydraulic characteristics of the machine with the optimized inlet.</td></tr>
<tr><td>6. Prepare your MSc thesis according to the formal requirements.</td></tr>
<tr><td>Advisor</td><td>Advisor's Affiliation:
   Flowserve Corp. Sterling Industry Consult GmbH; D-25524 Itzehoe, Lindenstraße 170.
Advisor: Rolf Martin FALCH, Manager, FPD Product Engineering - Industrial</td></tr>
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<tr><td rowspan="3">Final Exam</td><td>1st subject (group)</td><td>2nd subject (group)</td><td>3rd subject (group)</td><td>4th subject (group)</td></tr>
<tr><td>ZVEGEÁTNW02
Computational Fluid Dynamics</td><td>ZVEGEÁTNW03
Fluid Mechanics Measurements</td><td>ZVEGEÁTNW19
Vehicle Aerodynamics</td><td>ZVEGEÁTNW11
Open Source Computational Fluid Dynamics</td></tr>
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<tr><td rowspan="4">Authentication</td><td colspan="2">Handed out: 14 February 2022</td><td colspan="2">Deadline: 20 May 2022</td></tr>
<tr><td colspan="2">Compiled by:
Dr. Kristóf Gergely János (71957915589)
Supervisor</td><td>Verified by:
Dr. János Vad (signed)
Head of Department</td><td>Approved by:
Dr. Gábor Györke (signed)
Vice-Dean</td></tr>
<tr><td colspan="4">The undersigned declares that all prerequisites of the Final Project have been fully accomplished. Otherwise, the present assignment for the Final Project is to be considered invalid.

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Padayao Jowett Millan</td></tr>
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