

Test Protocol

Precisionsreglering av gaffeltruck

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Version 1.0



Reviewed	Sebastian Haglund	2019-12-03
Approved	Erik Hedberg	2019-12-04

Course name: Reglerteknisk projektkurs
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Project: Precisionsreglering av gaffeltruck

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DOCUMENT HISTORY

Version	Datum	Changes made	Sign	Review
0.1	2019-11-28	First Draft	JG	EH
0.2	2019-12-02	Second Draft	SH	JG, LR
0.3	2019-12-13	Third Draft	JB	JC, SH
1.0	2019-12-05	First Version	JG	EH

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1 INTRODUCTION

This test protocol describes the outcome the performed tests described in *Test Plan* version 1.1. The aim of this report is to confirm that all testable functionalities in the requirement specification (see *Kravspecifikation*) are met.

1.1 Test Protocol

All test protocols are filled in using the template below.

Test	Requirement	Description	Result
Test number	Tested requirements	Test description: Date: Responsible:	Test result.



2 TESTS

2.1 Tests for Modeling Module

Test	Requirement	Description	Result
1	4	Test description: Verify if the model describes the height well by using the same input signal in the model and the forklift. The height in the model is compared to the height recorded by the truck sensors. Date: 2019-12-02 Responsible: Sebastian Haglund, Linus Roos	Test passed. The model takes the height, the hydraulic pressure and the oscillations into consideration. The hydraulic flow cannot be measured on the forklift.
2	5, 6	Test description: Verify that the model describes the horizontal and vertical oscillations well by using the same input signal in the model and the forklift. The oscillations in horizontal and vertical direction in the model are compared to the ones recorded by the IMU and truck sensors. Date: 2019-12-02 Responsible: Linus Roos	Test passed.
3	7	Test description: Verify that simulated lifts with the model, with different masses and center of gravity, matches well to lifts with the forklift, with the same mass and center of gravity. Date: 2019-12-02 Responsible: Sebastian Haglund	Test passed.
4	8	Test description: Verify that a lift that pass through the transition between the free lift and the main lift, simulated by the model, matches well with data from an identical lift with the forklift. Date: 2019-12-02 Responsible: Sebastian Haglund	Test passed.



2.2 Tests for Control Module

Test	Requirement	Description	Result
5	10, 32	Test description: Verify that the control system works well with the model in Simulink. Date: 2019-11-27 Responsible: Sebastian Haglund	Test passed.
6	11	Test description: Verify that the control system can be applied on the forklift via the Speedgoat directly. Date: 2019-11-27 Responsible: Sebastian Haglund	Test passed.
7	13, 14	Test description: To test if the oscillations had been reduced to the desired level, the IMU was placed on the tip of one of the forks to measure the oscillations. The IMU data from open loop control and the designed controller were compared and evaluated to see if they met the requirements. Date: 2019-11-28 Responsible: Jonatan Gustafsson	Test passed. Reduction of oscillations met the requirements.
8	18, 33	Test description: To test the three different modes in the controller, each mode can be set as input to the forklift. The data is evaluated to see if the forklift has the desired behavior. Date: 2019-12-02 Responsible: Sebastian Haglund	Test passed. There are two modes: <i>energy efficiency</i> and <i>time efficiency</i> , which both takes the oscillations into consideration. A third mode is redundant.

2.3 Tests for IMU Module

Test	Requirement	Description	Result
9	19, 34	Test description: To see if the performance of the IMU is adequate, the output data of the IMU was tested for simple scenarios. Date: 2019-11-14 Responsible: Sebastian Haglund, Jonatan Gustafsson	Test passed. IMU is deemed sufficient.