

## I. IDENTIFICATION DATA

<b>Thesis title:</b>	<b>Control Systems and Electronics for a 2.9 kW Internal Combusting Engine and Battery Hybrid Multicopter Based on Power Tracking Method</b>
<b>Author's name:</b>	Kengo Nagashima
<b>Type of thesis :</b>	master
<b>Faculty/Institute:</b>	Faculty of Mechanical Engineering (FME)
<b>Department:</b>	Automation and Instrumentation Engineering
<b>Thesis reviewer:</b>	Prof. Ing. Jan Leuchter, Ph.D.
<b>Reviewer's department:</b>	University of Defence

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b>	<b>challenging</b>
<i>How demanding was the assigned project?</i>	
The topic of this mater thesis is Control Systems and Electronics for a 2.9 kW Internal Combusting Engine and Battery Hybrid Multicopter Based in Power Tracking Method. The assignment can be challenging or extraordinary challenging in my view for this kind of mater theses..	

<b>Fulfilment of assignment</b>	<b>fulfilled</b>
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
The work of this thesis corresponds to the title and assignment.	

<b>Methodology</b>	<b>correct</b>
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
The presented methods are correct and in my view are relevant to the assignment.	

<b>Technical level</b>	<b>A - excellent.</b>
<i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?</i>	
The mater thesis is oriented to the issue of the control systems and electronics.	

<b>Formal and language level, scope of thesis</b>	<b>A - excellent.</b>
<i>Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?</i>	
The work is transparent and well written..	

<b>Selection of sources, citation correctness</b>	<b>A - excellent.</b>
<i>Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?</i>	
It is correct for this kind of mater thesis.	

<b>Additional commentary and evaluation (optional)</b>
<i>Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.</i>
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### III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

The topic of this master thesis is Control Systems and Electronics for a 2.9 kW Internal Combusting Engine and Battery Hybrid Multicopter Based on Power Tracking Method. The work is oriented to the control and described using the power electronics of the multicopter with synchronous generator with permanent magnets. The author used power tracking method to achieve satisfactory results in view of the efficiency and safety. The goals of this master thesis are well specified and fulfilled.

The submitted master thesis has a logical structure, well arranged and organized. This master thesis includes relevant references.

The goals of this master thesis were to provide a design of power electronics processing unit and provide a simulation model of the control system verified by the experimental confirmations.

The power processing units and control methods were used correctly. The methods that was used are right and can be used in practices. The theoretical background of this master thesis was shown. The results give the overview of the right design. The methods was confirmed by the practical experiments and verifications.

The goals of this master thesis was achieved completely. The work brings the correct conclusions and technical results based on the control and power processing methods. Author shows his ability of the technical work. The student presents his results transparently, and the text of thesis is well written. The graphic parts of the master thesis are well presented. The references are correct. The submitted work run into the criteria for master thesis. I recommend this work to be defended and propose grade A- excellent.

My questions to the author are:

- 1) In the figure 29, there is the efficiency map of the DC-to-DC converter. Please, describe this figure and explain in detail.
- 2) What is difference between buck and boost converter?

Date: **4.8.2022**

Signature: prof. Jan Leuchter