

**DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF
PROPELLER TURBINE FOR LOW HEAD PICO HYDRO
POWER GENERATION SYSTEM**

JOHN KARLO G. DOMINGO

An Undergraduate Thesis Submitted to the faculty of the Department of Agricultural
and Biosystems Engineering, College of Engineering, Central Luzon State
University, Science City of Muñoz, Nueva Ecija, Philippines
in Partial Fulfillment of the Requirements
for the Degree of

**BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS
ENGINEERING**
(Agricultural Power, Energy and Machinery Engineering)

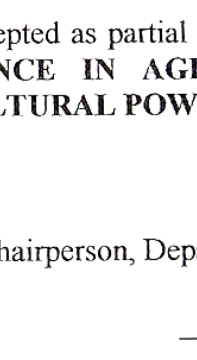
JUNE 2019

ACCEPTANCE SHEET

This undergraduate thesis entitled “**DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF PROPELLER TURBINE FOR LOW HEAD PICO HYDRO POWER GENERATION SYSTEM,**” prepared and submitted by **JOHN KARLO G. DOMINGO**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AGRICULTURAL POWER, ENERGY AND MACHINERY ENGINEERING)**, is hereby accepted:


CLAIRE MARIE M. CASTILLO, M.Sc.
Member, Advisory Committee

6 / 11 / 19
Date Signed


MARLON F. DELOS SANTOS, M.Sc.
Member, Advisory Committee

6 / 11 / 19
Date Signed



MARVIN M. CINENSE, Ph.D.
Chairperson, Advisory Committee

6 / 11 / 19
Date Signed

Accepted as partial fulfillment of the requirements for the degree **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AGRICULTURAL POWER, ENERGY AND MACHINERY ENGINEERING)**:


MARVIN M. CINENSE, Ph.D.
Chairperson, Department of Agricultural and Biosystems Engineering

6 / 11 / 19
Date Signed


VICTORINO T. TAYLAN, Ph.D.
Dean, College of Engineering

6 / 11 / 19
Date Signed

BIOGRAPHICAL SKETCH

John Karlo Gallindez Domingo was born on June 1, 1998 in Barangay Nagpandayan, Guimba, Nueva Ecija. He is the son of Mr. Ferdinand Corpuz Domingo and Mrs. Aurelia Galindez Domingo and younger brother of Kimberly Ann Galindez Domingo.

He finished his primary education in Nagpandayan Elementary School on March 2010 as first honorable mention and secondary education on March 2014 in Nagpandayan High School as salutatorian. He was one of the participants of a 2014 Metrobank-MTAP-DepEd Math Challenge (CD I & II) held at Sto. Domingo National Trade School in Sto. Domingo, Nueva Ecija on January 2014. He entered college on June 2014 in Central Luzon State University. He was a college scholar during the 1st Semester of Academic Year 2015-2016 and a former varsity player of CLSU Swimming Team in 2017. He is a proud beneficiary of CHED Tulong-Dunong Scholarship for 5 years.

ACKNOWLEDGEMENT

This study would not have been possible without the guidance and support of the important people in the author's life. The author wishes to express his deepest gratitude, sincerest thanks and heartfelt appreciation to all of them.

To Dr. Marvin M. Cinense, chairman of the advisory committee, for his guidance, full support, valuable comments, and insights from planning, fabrication up to the conduct of the study. The author is very thankful for having a great and kind adviser who is willing to share his knowledge and help not only on the contents of this manuscript but also on boosting the confidence of the author.

To Engr. Claire Marie M. Castillo and Engr. Marlon T. Delos Santos, members of the advisory committee, for their specialization as seen in their excellent suggestions, corrections and criticisms for the improvement of the study.

To Engr. Roldan Quitos, for unselfishly sharing his knowledge and resources about the study and most especially, for his words of wisdom, encouragement and valuable support throughout the conduct of the study

To Babasoro brothers, Angelo, John and James, for their patience in fabricating the PHP generation system.

To Engr. Freddie M. Toquero, Division Manager, NIA – UPRIIS Division I, for allowing to conduct the author's study at Lower Talavera Reservoir Integrated System – Lateral G located in Villa Isidra, Barangay Bantug, Science City of Muñoz, Nueva Ecija.

To Engr. Kristian Jay D. Galapon, Engr. Dianne B. Ramos, Engr. Abigail G. Calub, and Kuya Ruseller for assisting the author and providing the data of the Lower Talavera Reservoir Integrated System – Lateral G.

To the CLSU-College of Engineering Land and Water Field Laboratory Family, Sir Cris, Kuya Mario, Kuya Ruben, Kuya Mico and Kuya Neil, for the help and support during the fabrication and testing of the PHP generation system.

To Cherish Anne F. Mariano and Janeth J. Socorro, for helping the author to take note all the suggestion of the Committee.

To Menard A. Soni, for helping the author in calculations for the cost analysis and design of the PHP generation system.

To Victoria Family especially to Tita Violy and Jhovirey, for the support and help all the time and words of encouragement to finish this study.

To the author's friends and classmates, Johnny V. Reyes, Bravelly Jehu F. Fernandez, Jonathan T. Peralta, Raymart C. Mc Carke, Jowel John B. Ladignon, Renz C. Hilario, Anthony D. Diga, Christian Clark P. Rimocal, Alvin M. Laplano, Renel D. Gallardo, Mico M. Ramirez, Prime Rose M. Acapuyan, Hyleen Joy S. Agustin, Divine Cabla, Claire D. Parayno, Joana P. Marie Bernardo, Danisse Grace A. Patungan, and Danisse Anne A. Patungan for sharing their valuable time and opinions; and for assisting the author during the conduct of the study. The author is truly blessed to have a wonderful and awesome friends.

To the author's sibling, Kimberly Ann, to his cousins (Sheena, Erikha, Belinda, Osang), to his Tito Cris, Aunt Tita, Aunt Linda, Tita Perla and Tita Ludy, for their steadfast support every step of the way and for encouraging the author to do his best.

To the author's grandfather, Tatang Tura, for inspiring and teaching the author to become a fighter in facing all the challenges in life.

To the author's parents, Mr. Ferdinand C. Domingo and Aurelia G. Domingo, for

raising the author well. Also, for their support not just financially, but also spiritually and morally; for their unconditional and never-ending love that the author will always cherish for the rest of his life; for giving inspiration and reason for him to pursue all his dreams and goals in life.

Above all, to God for all the blessings and without him, this study would not have been possible.

To all of you, this work is humbly dedicated.

JOHN KARLO G. DOMINGO

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ABSTRACT

DOMINGO, JOHN KARLO G., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **JUNE 2019, DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF PROPELLER TURBINE FOR LOW HEAD PICO HYDRO POWER GENERATION SYSTEM**

Adviser: MARVIN M. CINENSE, Ph.D.

The electricity is mostly used by households for power lighting. The increasing cost and demand of it are due to the increase in population, advancement of science and technology and difficult construction of power lines particularly in rural areas. This study was conducted to design and fabricate a PHP generation system to generate electricity by utilizing irrigation water flow to supplement household power demand and contribute in household lighting. Specifically, the study aimed to evaluate the performance of the PHP generation system in terms of turbine efficiency and conduct a cost analysis in using the PHP generation system.

The design of PHP generation system was based on design considerations and calculations as suggested by literatures. The PHP generation system was fabricated considering locally available materials and manufacturing technology. It has six major components, namely: turbine, inlet basin, draft tube, generator, structural frame, and weir.

The propeller turbine efficiency of 42.37 % was produced at water depth of 0.30 m, water velocity of 27.22 m/s, water discharge of 0.118 m³/s, permanent magnet generator shaft rotational speed of 1,223.08 rpm, voltage of 9.78 volts, and power output of 15 watts.

Cost analysis of operating the PHP generation system indicated a break-even point of 2,395.03 kW/yr and consumption rate of ₱1.75/kWh. The projected time needed to recover acquisition cost was 4.52 years.

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