

BIOGRAPHICAL SKETCH

Jay Travis Howard was born in Nashville, Tennessee on January 27, 1994. He graduated from White County High School in May 2012. In the following August, he attended Tennessee Technological University and received the degree of Bachelor of Science in Mechanical Engineering in May 2016. He returned to Tennessee Technological University for graduate school in August 2016 and received a Master of Science Degree in Mechanical Engineering in May 2018.

EDUCATION

M.S., Mechanical Engineering

Tennessee Technological University, 2016-2018

B.S., Mechanical Engineering

Tennessee Technological University, 2012-2016



College of Engineering

TENNESSEE TECH

The Department of

Mechanical Engineering

Announces the Thesis Defense

of

Jay Travis Howard

In Partial Fulfillment of the Requirements

For the degree of

Master of Science in Mechanical Engineering

April 9, 2018 at 1 P.M.

Held in

Brown Hall – Room 241

115 W. 10th Street

Cookeville, TN 38505

FIELD OF STUDY

Mechanical Engineering

DISSERTATION TOPIC

Cooling Tower Optimization and Analysis Tool

EXAMINING COMMITTEE

Dr. Glenn Cunningham, Committee Chair

Associate Professor, Mechanical Engineering

Dr. Jie Cui

Associate Chair, Professor, Mechanical Engineering

Dr. Ehsan Languri

Assistant Professor, Mechanical Engineering

ABSTRACT

Open-circuit cooling towers, in the simplest sense, are specialized heat exchangers to which a fluid and air interact to transfer heat from the fluid to the air primarily via evaporation. There are multiple types of open-circuit cooling towers that are utilized by commercial and industrial facilities and their application is widespread. A number of simplifying assumptions are made within this thesis concerning tower type and operating conditions to better define the problem. Of those assumptions, the most notable are that only mechanical draft, open-circuit cooling towers are considered, and since the cooling tower may be serving a range of processes i.e. chillers, facility equipment, etc. pumping energy is excluded.

With the cost of energy and resources continually increasing, it is important to consider how they are used and if there is an opportunity to minimize the respective energy and water consumption. This thesis focuses on the development of a calculator tool to analyze the energy consumption of a cooling tower fan with and without VFD control, optimize water consumption, and proper utilization of fan sequencing in cooling tower cell operation. This thesis requires fundamental knowledge of cooling tower operation in order to manipulate and operate the calculator tool. The calculator tool is designed to perform quick, analytical calculations for operational comparisons by industrial personnel and students, alike.