

UNIVERSITI TEKNOLOGI MARA

**DEVELOPMENT OF COMPACT
DISSOLVE OXYGEN (CDO) WITH
IOT MONITORING SYSTEM**

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Dissertation submitted in partial fulfillment
of the requirements for the degree of
Master of Science
Mechanical Engineering

Faculty of Mechanical Engineering

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Clean water is an important substance to maintain the survival of the ecosystem on earth. Due to urbanization, space constraints are often significant issues that drive sewage treatment projects towards considering innovative, smaller footprint processes. The novelty of development Compact Dissolves Oxygen (CDO) comprised of a combination of two wastewater treatment processes that are attached growth and suspended solids. The development of this project encompasses a standard 40-foot ISO container (28 m² surface area) which is advantageous due to its lower footprint and saves more than 50% surface area compared to conventional biological treatment plants. This project is mainly responsible for the development of biological treatment processes from primary treatment processes (screening) and secondary processes (anaerobic, aeration, stabilization, and clarifier) which intended to serving populations 51PE up to 149 PE. Efficiency CDO system, can be achieved by integrating a real-time monitoring system through the "Internet of Things (IoT)" technology. This IoT monitoring system focus to enhance the CDO system by helping the plant operator to monitor, measure, and control the air supply (dissolve oxygen) since it is vital in the oxidation process for microorganisms that turn from organic waste into inorganic by-products. Level of dissolved oxygen measured using dissolved oxygen sensor and process through microcontroller name NodeMCu, before it transmits the information to databased via Wifi. The real-time data is stored in a cloud database using Firebase platform. Real-time levels of dissolved oxygen can be accessed and viewed through mobile applications built using MIT Inventor. The complete development of Compact DO is illustrated in the 3D model using Solidwork and the data IoT monitoring system was tuning according to the calibrated product in the market. It shows relative percentage difference is less than six percent and the regression value is 0.995.

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