

**MINIMIZATION OF START-UP TIME OF SOJITZ  
KELANITISSA COMBINED CYCLE POWER PLANT**

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Master of Engineering

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the Master  
of Engineering in Energy Technology

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## **Declaration**

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## **Abstract**

There are only three combined cycle power plants in Sri Lanka. Ceylon Electricity Board owns one power plant, and private companies own the other two. Combined cycle power plants start-ups can be divided into three categories such as hot, warm and cold. Most of the start-ups are hot start-ups due to varying demand in the Sri Lankan's grid system. During start-up, power plant run at part load, which is inefficient. Because a portion of the steam generated is directed to the atmosphere during boiler warming up, it is essential to reduce the combined cycle power plants' start-up time. This thesis focuses on optimising hot start-up time without compromising equipment reliability.

The thesis is carried out on a combined cycle power plant in Sri Lanka. Parameters during hot start-ups between 2019 and 2021 were collected in a minute interval. After analysing the start-ups in 2019 and 2020, several experiments were carried out during 2020 and 2021 hot start-ups. For this purpose, the start-up operation was divided into sub-operations, and four critical operations which have a significant impact on start-up time were identified.

Operations such as G.T. Loading, High Pressure (H.P.) start-up vent operation, High Pressure (H.P.) steam bypass valve operation and new vent system operation were analysed, and the best optimum operation pattern was identified.

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## List of Abbreviations

Abbreviation	Description
ACF	Activated Carbon Filter
APRDS	Auxiliary Pressure Reducing & De-Superheating
BHEL	Bharat Heavy Electricals Limited
BWRO	Brackish Water Reverse Osmosis
CEB	Ceylon Electricity Board
CEMS	Continuous Emission Monitoring System
CWST	Clarified Water Storage Tank
DCS	Digital Control System
DM	Demineralization
DMF	Dual Media Filter
ESV	Emergency Stop valve
FSNL	Full Speed No Load
GE	General Electric
GT	Gas Turbine
HP	High Pressure
HRSG	Heat Recovery Steam Generator
IGV	Inlet Guide Vane
LLP	Low Low Pressure
LP	Low Pressure
MOV	Motor Operated Valve
OEM	Original Equipment Manufacturer
PST	Permeate Storage Tank
RO	Reverse Osmosis
RSD	Reserved Shutdown
SH	Super Heater
SWAS	Steam Water Analysis System
SWRO	Sea Water Reverse Osmosis
ST	Steam Turbine

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