

Overview

Country or Region: UAE

Industry: Cement

Customer Profile

Gulf Cement Company (GCC) is a leading cement producer in the United Arab Emirates. Based in Ras Al Khaimah with an installed annual production capacity of 2.5 million tons cement and 1.3 million tons clinker. GCC is leading regional cement exporter in the United Arab Emirates. GCC Ras Al Khaimah (UAE) operates 2 cement kilns – the first one of 4100tpd capacity & the second one of 7500tpd capacity.

E,C&I Solutions from L&T–C&A helps GCC enhance WHRS operation



The Challenge

Electrical energy is a significant contributor to the cost of manufacture of cement. In its endeavour to remain competitive, the cement industry remains preoccupied with figuring out measures to reduce energy consumption or the cost of energy. Since the unit cost of captive generation turns out to be well below that of grid power, most cement plants prefer to set-up a captive power plant. As an additional measure, several cement plants have invested in power generation based on the recovery of heat from kiln & cooler exhaust gases, which would otherwise have been vented to the atmosphere; so called Waste Heat Recovery Systems (WHRS).

To meet its electrical energy needs and reduce demand on the grid supply or captive power, GCC decided to invest in Waste Heater Recover system which could also bring down the burning of fossil fuels. The GCC required advanced WHRS in order to quickly and efficiently reduce greenhouse gas emissions and attracts CDM benefits.

As a consequence, GCC contracted ThyssenKrupp Industries India Pvt. Ltd (TKIL) to set-up a 35.5MW Waste Heat Recovery based Power Plant utilizing waste heat from the preheaters & coolers of both kilns and exhaust gas from a gas turbine operating in open cycle. TKIL in turn entrusted L&T – Control & Automation (C&A) the responsibility for design, supply, erection supervision, testing & commissioning of the Electrical, Control & Instrumentation System for WHRS.

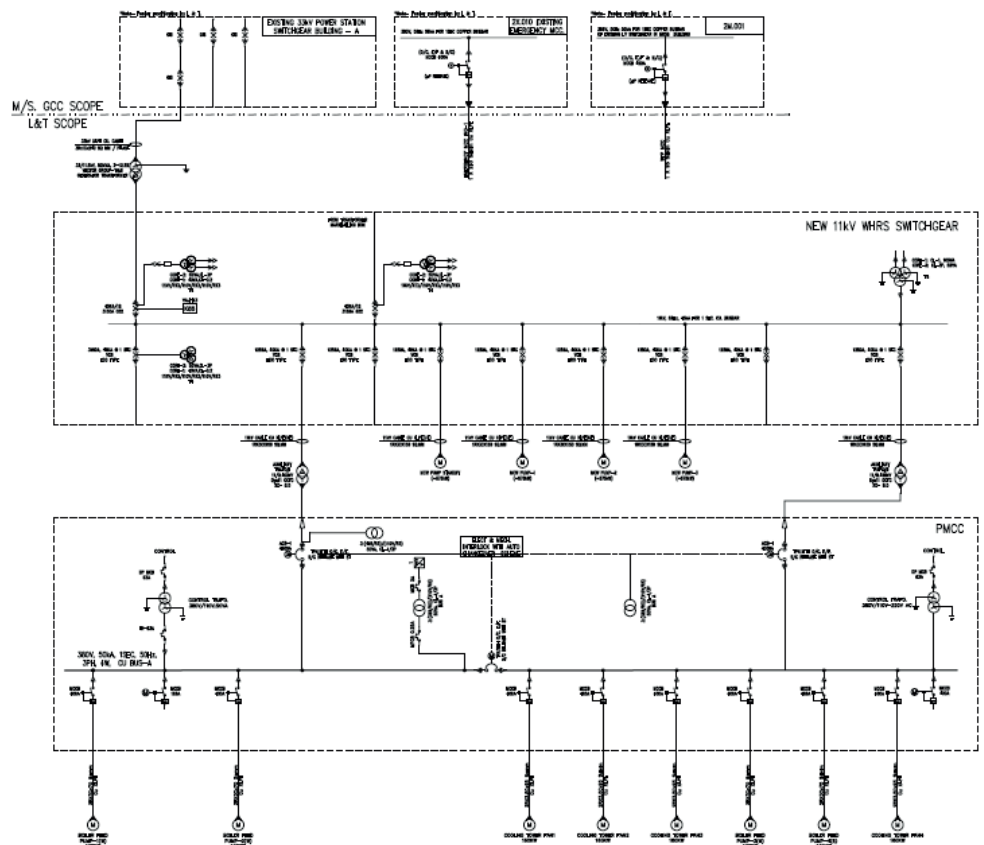
The Solution

L&T-C&A was responsible for a complete design, engineering, procurement, supply, supervision of installation and commissioning of Electrical Power Distribution System, Instrumentation & Control and DCS system for the WHRS Auxiliaries.

The scope of supply included all the electrical, control and instrumentation equipments – from the electrical balance of plant to the substation, and from the instrumentation and field devices to the

L&T-C&A The Waste Heat Recovery System encompasses :

- 2 boilers for each kiln :
 - a PH Boiler: Horizontal boiler with vertical tubes for uniform dust disposal – for heat recovery from exhaust gases from the preheater
 - an AQC Boiler: A vertical boiler with horizontal tubes – for heat recovery from cooler exhaust gases
- 1 HRSG for heat recovery from the exhaust gases from a Gas Turbine.
- 1 Steam Turbine of 35.5MW rating
- Boiler Feedwater & Deaerator System
- Steam system
- Condensate System
- Water Treatment Plant
- Cooling Water System C&A provided an integrated, E,C&I (electrical, control and instrumentation,) solution for the entire project, including medium- and low-voltage switchgear, motor control, protection system, inverters, and a state-of-the-art distributed control system.



Power distribution scheme

distributed control system, across the entire delivery chain.

This involved detail layout engineering pertaining to electrical equipments, cable trays, lighting fixtures & earthing & lightning protection system based on the existing plant layout & the GA drawings of the various plant structures, i.e. STG building, boiler structures, electrical rooms

On the electrical side, L&T-C&A designed, engineered, supplied Generator Power Transformer, MV switchboards, LV Power Switchgear and protection system to ensure reliable and uninterrupted power supply from and to the power grid.

During Design and planning stage, the space availability on site was a major challenge. The situation was challenging, due to this being a brown-field project, L&T was responsible to ensure the accommodation of equipments in existing available space. The responsibility was also to ensure modification in existing switchboards to facilitate interface with the

existing power distribution system. understand existing as well as new load, P&IDs and plant Lay out.

However L&T-C&A team adopted innovative engineering strategies to overcome these challenges, and ensured installation of equipment did not constrain in any way.

In addition to the electrical package, L&T-L&T-C&A was also responsible for complete design/sizing of a Distributed Control System (DCS), development of application software to control & monitor the entire WHRS operation.

L&T-C&A provided DCS to maximize WHRS efficiency and reliability through the automation, integration and optimization of the entire plant. The system handles some 400 I/Os for each WHRS it and 600 I/Os for the common system, including remote I/Os for cooling water, auxiliary cooling water, cooling towers and other plant components.

About Us

L&T Control & Automation (C&A) is a Strategic Business Unit of L&T Electrical & Automation. It is a part of Larsen & Toubro – the multi-billion India-based conglomerate. L&T's C&A business is market leader in delivering integrated electrical & automation solutions in India and overseas. With over three decades of experience in diverse industry segments, L&T-C&A delivers value through comprehensive solutions based on varied technology platforms and incorporates the benefits of its wide-ranging experience. L&T's state-of-the-art Electrical & Automation Campus at Navi Mumbai in India has the latest testing and manufacturing equipment. It incorporates a modular manufacturing unit, an application software laboratory and a fully networked office for engineering and project management.

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Our Integrated Electrical & Automation Solutions:

Minerals & Metals

Cement, Mining, Ferrous & Non-Ferrous

- Cement Plant E&I
- Iron & Steel making E&I
- E&I for Bulk Material Handling
- E&I for Ports

Oil & Gas

Upstream, Midstream and Downstream

- Integrated Process Control
- Pipeline SCADA
- Emergency Shutdown and Fire & Gas
- Terminal Automation & Tank Farm

Power

Generation, Transmission and Distribution

- Integrated controls for Boilers and Turbines
- Station C&I
- E, C&I for CHP, AHP, WTP
- E&I for Solar Plants
- Smart Grid

Infrastructure

Highways, Ports and Metro Railways

- Highway Traffic Management
- Metro Rail BMS & AFC
- Airport Baggage Handling
- Power Management
- Smart City & ITS

Buildings

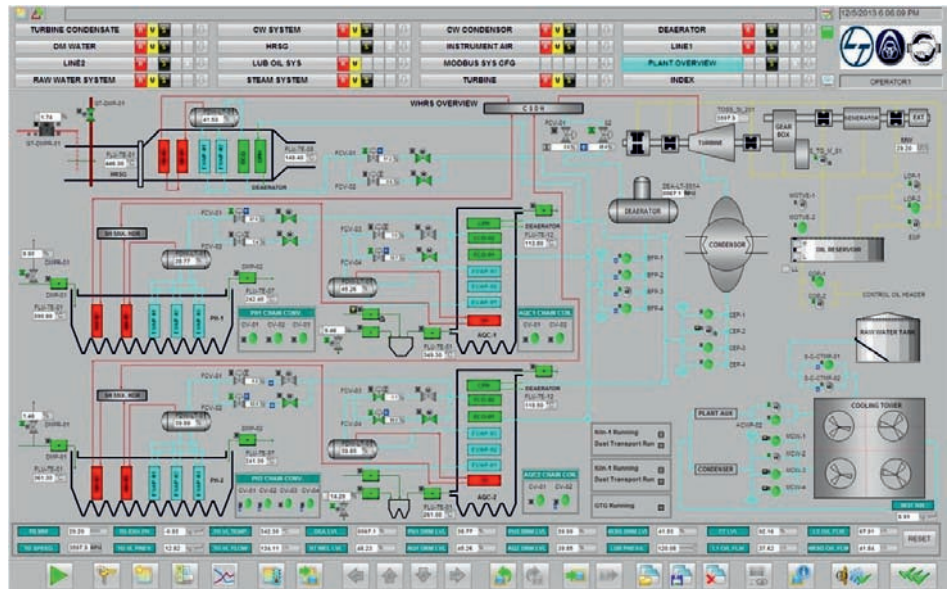
Hotels, Hospitals, Factories, Malls, Data Centres

- Substation
- MV / LV Power Distribution System
- ELV / CCTV / Fire Detection & Alarm Systems (FDAS) with suppression solution
- Access Control
- Lighting Control

In this project, L&T-C&A also implemented Steam & Water Analysis System (SWAS), covering supply of Sensors & Transmitters for measurement water of level, temperature, pressure / differential pressure along with process hook-up hardware, control valves for feed water to condensate flow to the boilers, to provide exact precise measurements of critical parameters and analysis of steam & water from 24 locations in the WHRS System

The Result

The system was commissioned & synchronized with the grid in Aug 2013 and is working satisfactorily. Apart from the monetary benefit involved, WHRS is playing vital role in energy conservation, as GCC do not need any additional fuels to generate electricity and hence directly help conserve fuels and reduce overall carbon emissions. . The WHRS at GCC is expected to lead directly to a reduction a tonne of carbon dioxide (CO₂) emissions per annum.



Overview Screen : WHRS operation