Success Story

Fully Automated Power Plant Supplies Steady Flow of Electricity to National Grid

YOKOGAWA
Co-innovating tomorrow™

EGCO

Location: Rayong, Thailand
Order date: 2000
Completion: 2002
Industry: Power

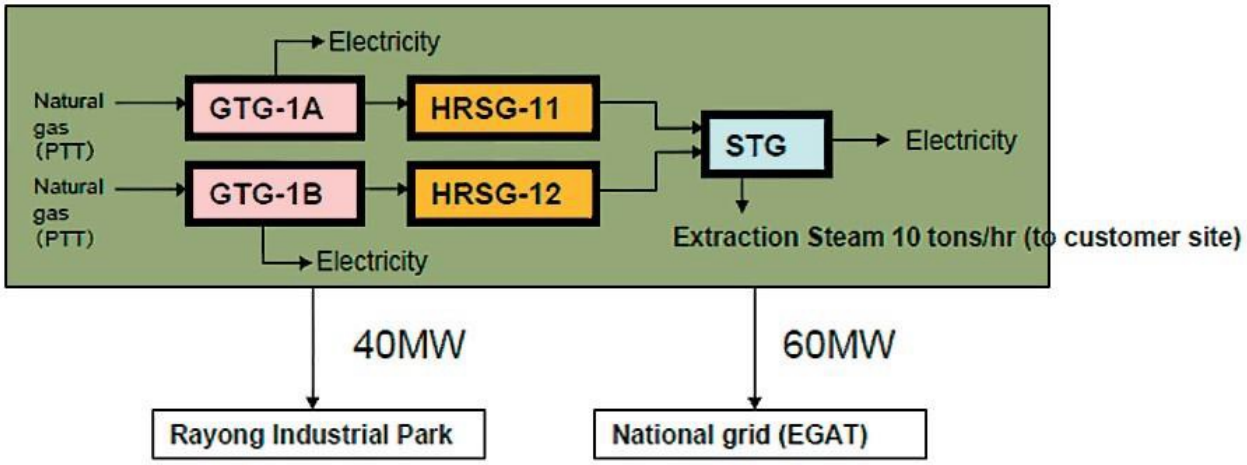
EGCO GROUP

Executive Summary

The Electricity Generating Public Company Limited (was the first independent power producer (to be established in Thailand as the result of an initiative by that country's government to allow broader private sector investment in the power sector. EGCO was incorporated on May 12, 1992 by the Electricity Generating Authority of Thailand (and over the next three years it became a public company and was listed on the Stock Exchange of Thailand (SET). Operating as a holding company, it invests in power generation and supply and provides comprehensive operation, maintenance, engineering, and construction services to the power industry and other industries in Thailand as well as other countries. Furthermore, the company searches for good growth opportunities that are related to its core energy business.

EGCO Cogeneration Co., Ltd, an EGCO Group company, operates a combined cycle power generation plant at the Rayong Industrial Park. The plant uses natural gas from PTT to power gas turbines that generate electricity. Heat recovery steam generators (use waste heat from the turbines to produce steam for a steam turbine that generates additional electricity. Sixty percent of the generated electricity goes to the national grid (EGAT) and the remaining 40% is utilized by companies at the Rayong Industrial Park.

To control these processes at the EGCO Cogen power plant, Yokogawa Thailand installed a CENTUM CS 3000 process control system in 2002. This facility has operated without any major system failures since then.



Main process overview

The Challenges and the Solutions

1. Highly efficient operation

The national grid operated by EGAT needs a steady supply of electricity at all times, and the same is true for the Rayong Industrial Park. The CENTUM CS 3000 plays a core role by controlling and enabling the monitoring of all processes at the EGCO Cogen plant. The gas and steam turbine control systems as well as the PLCs controlling the water treatment and chemical injection facilities are all integrated with the CS 3000 system through a Modbus interface. The CS 3000 system has access to both horizontally and vertically integrated data from throughout the plant, allowing EGCO Cogen to calculate the efficiency of each gas and steam turbine as well as each of the HRSGs in real time.Operators have constant access to plant performance data and a daily report showing the hourly base performance figures can be printed out. The performance data is utilized to plan maintenance and improve control strategy. Currently, the plant's overall efficiency is about 60%.

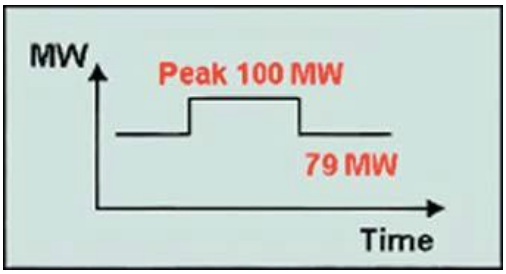
	CG1002	CG2002	CH1006	CH2006	CS0003	UC0005	1MET-TI-1	10NETLOAD
	CPV	CPV	CPV	CPV	CPV	CPV	PV	CPV
	GTG-1A HR & efficiency	GTG-1B HR & efficiency	HRSG-1A Efficiency	HRSG-1B Efficiency	STG Net heat rate	Net Unit Efficiency	AMBIENT TEMPERATURE	NET TLP LOAD
	%	%	%	%	kJ/kWh	%	DEGC	MW
00:00 - 01:00	36.77	30.11	124.4	89.7	12337.4	55.08	24.2	72.7
01:00 - 02:00	37.33	30.54	127.3	91.2	12290.8	56.26	23.9	73.4
02:00 - 03:00	37.99	30.52	131.8	91.5	12343.5	55.73	23.6	73.0
03:00 - 04:00	38.64	30.73	135.1	92.3	12392.4	57.57	23.0	71.7
04:00 - 05:00	38.93	30.77	137.0	92.6	12413.0	57.22	23.0	71.7
05:00 - 06:00	38.45	30.91	133.8	92.7	12346.4	56.57	23.3	73.4
06:00 - 07:00	38.50	30.80	134.3	92.5	12377.9	56.72	23.9	73.2
07:00 - 08:00	38.07	30.74	131.5	92.5	12374.8	57.16	23.9	73.4
08:00 - 09:00	33.61	31.87	101.9	92.7	11937.7	52.76	24.4	91.8
09:00 - 10:00	32.29	32.18	93.3	91.9	11716.0	52.73	25.0	96.7
10:00 - 11:00	32.19	31.88	92.9	91.9	11713.6	53.15	26.3	95.2
11:00 - 12:00	32.74	31.84	96.7	90.4	11872.9	52.55	26.2	93.5
12:00 - 13:00	33.15	31.70	100.3	92.8	11692.7	53.31	29.4	92.6
13:00 - 14:00	32.70	31.63	97.6	91.7	11679.4	53.11	30.5	93.2
14:00 - 15:00	32.79	31.85	97.5	92.3	11680.3	53.46	31.8	93.6
15:00 - 16:00	32.99	31.88	98.5	92.4	11687.1	53.28	29.3	93.8
16:00 - 17:00	33.55	32.20	101.1	93.9	11671.5	54.18	28.4	93.7
17:00 - 18:00	34.38	32.12	106.9	95.0	11678.9	54.46	27.2	92.1
18:00 - 19:00	33.91	32.16	103.6	94.5	11667.8	54.50	26.2	92.6
19:00 - 20:00	33.72	32.10	102.6	93.9	11663.3	54.96	25.8	92.0
20:00 - 21:00	33.72	32.10	102.7	94.0	11698.2	53.77	26.5	93.0
21:00 - 22:00	37.45	30.96	128.9	93.5	12192.4	56.63	26.0	77.4
22:00 -23:00	38.40	30.41	134.2	91.2	12511.4	57.04	25.4	70.5
23:00 - 24:00	39.29	30.82	139.6	93.0	12462.7	57.92	26.2	71.2
Average	35.48	31.37	114.7	92.5	12016.7	55.00	26.1	84.0
Median	34.1	31.7	105.2	92.5	11905.3	54.7	25.9	91.9
Total	851.58	752.81	2753.3	2220.1	288402.0	1320.12	625.3	2015.4
Maximum	39.29	32.20	139.6	95.0	12511.4	57.92	31.8	96.7
Minimum	32.19	30.11	92.9	89.7	11663.3	52.55	23.0	70.5
Time(Max)	23:43:10	19:27:10	23:43:10	01:44:10	22:35:10	23:43:10	14:06:10	10:00:10
Time(Min)	10:55:10	00:41:10	11:09:10	00:15:10	19:23:10	11:21:10	04:57:10	22:38:10

Daily report

2. Steady and safe operation

iBased on monthly requests from EGAT, EGCO COGEN supplies a steady flow of electricity to the national grid. EGCO COGEN also supplies load of 40 MW to the Rayong Industrial Park. To meet these requirements under a variety of circumstances, the CS 3000 system has the following control functions:

1. Automatic start-up and shutdown sequences
2. Automatic load sharing/plant optimization
3. Load shedding control
4. Voltage/power factor control
5. Island operationwhen disconnected from the national grid
6. Plant performance monitoring



Monthly electricity demand

Each operator workstation has function keys that allow quick access to a target process from the plant overview graphic display. With certain sequences, clear and easy to understand operation procedures are displayed. Operators thus have all the information needed to take quick and timely action whenever needed, making this a very safe plant.

Central control room

Customer Satisfaction

According to Plant Manger, “The system allows operators to clearly see the plant’s status and know what is going on. With this information, our operators can take quick action whenever there is a problem with a gas or steam turbine or with an HRSG. When there is a problem with the transmission lines or some other part of the national grid, the plant is immediately put into island mode and provides electricity only to its local customers. We are very pleased with the performance of Yokogawa’s CENTUM CS 3000 at our power plant.”

EGCO COGEN operator

Plant details
Gas turbine: GE (40MW x 2 units)
HRSG: Alstom (2 units)
Steam turbine: Alstom(40MW)

Delivered system
Distributed control system: CENTUM CS 3000
Total I/O: 1,500
Field devices: Yokogawa pH meters, conductivity meters

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