

General Specification

Power Performance Calculations Package

Exaquantum/PPC

GS GMSCD0901-01E

■ Introduction

Exaquantum/PPC is an ASME compliant power performance calculation package used in power generation and process plants to determine the efficiency of plant equipment. Coal Fired and Combined Cycle Power Plants are supported.

The performance calculations provided include the measurement & estimation of parameters for the derivation of plant efficiency and heat rate calculations of equipment found in a typical power station.

The resulting information can be used as an indicator of the plant's operational efficiency and facilitates Optimized Plant Operations.

■ Key Features

Key features include:

■ OPC DA Interface

Exaquantum/PPC collects real-time process data from a Process Control System(s) via an OPC DA interface, an open standards interface that makes the gathering of process data easy to configure and maintain.

■ Data Validation & Processing

Validation of tag (data point) names for erroneous entries and/or non-existent tags are clearly identified facilitating simple correction by the Exaquantum/PPC administrator.

The acquired data is also subjected to tag quality checks (Good/Bad/Uncertain including IOP) enabling calculations where the source value quality check has failed to be clearly highlighted.

■ Runtime Expression Builder & Curve Expert

Exaquantum/PPC includes a powerful expression equation builder to provide users with the ability to define and refine their calculations and/or constants. The expression builder syntax allows for both simple and comprehensive calculation definitions. For curves, such as ideal equipment performance curves, degradation curves, etc., 2D and 3D curves can be defined using Excel and imported into the calculation.

■ Built-in Steam Tables

Users can access steam table routines from the Expression Builder. Steam data is in accordance with IAPWS-IF97.

■ Manual Entries (User, LIMS data, etc.)

A user can manually enter process data, LIMS data, etc. for use by Exaquantum/PPC calculations.

■ User Configurable Data

Users can use Excel to add:

- Custom functions based on 2D or 3D curve data in order to represent, for instance, equipment performance curves, degradation curves, etc.
- Custom Units of Measure.

Once configured, the information is exported into Exaquantum/PPC using the supplied Excel add-in.

■ What-If and Recalculation Capability

Users can manually change input values and recalculate the derived results to simulate the effect on plant performance. This facility also allows for the correction of bad data in reports.

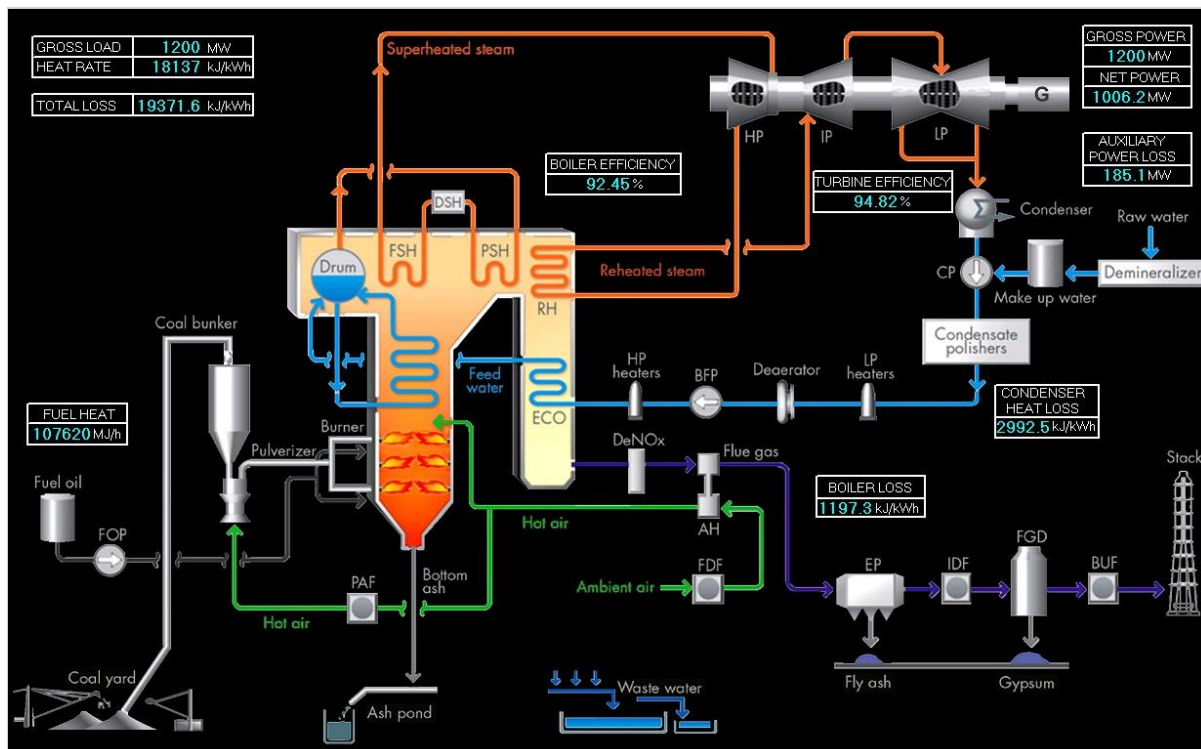


Figure 1: Example Coal Fired Power Plant Graphic displaying Exaquantum/PPC Performance Calculations

■ Business Benefits

● Integrated Cost Effective PIMS

The combination of Exaquantum/PPC embedded within an Exaquantum Plant Information Management System (PIMS) provides a powerful, integrated, cost-effective platform for collecting critical power plant information from various sources. The resulting performance information is made available across the business to users in Operations, Management and Maintenance.

● Improvement in Operational Efficiency

The calculation summary can be provided to any user with access to the Exaquantum/PPC server. If a Yokogawa DCS is present, Exaquantum/PPC can be displayed on Yokogawa HIS stations to provide operation personnel with the necessary information to take corrective actions to optimize efficiency.

● Performance Improvements

The Exaquantum/PPC 'What-If' tool will allow different input scenarios to be tested to determine the viability of cost reduction and performance improvement initiatives.

■ Calculations

Exaquantum/PPC supports Coal Fired and Combined Cycle Power Plants, and is adaptable to different power plant types by incorporating ASME compliant calculations, curves, etc. to vary with plant capacity, equipment characteristics and power plant type (thermal, combined cycle, etc.).

Templates are provided for all power performance calculations to simplify and reduce configuration time. These templates are constantly evolving and an up-to-date list can be supplied upon request.

Exaquantum/PPC uses aggregated process data to improve power calculations accuracy through all inputs being 'time coherent'.

The following calculation methods are employed.

● Efficiency Estimation by Heat Loss Method

The heating value of the fuel is estimated from the laboratory analysis allowing the losses in the steam generator to be estimated. The efficiency of the boiler is then calculated by deducting the sum of all the losses from the heating value.

● Efficiency Estimation by Input/Output Method

The heat supplied to working fluid and heat supplied to the steam generator is computed to estimate the following:

- Air heater performance
- Economizer performance
- Feed water heater performance
- Turbine performance
- Heat rate
- Condenser performance
- Steam generator performance.

■ Hardware Software Requirements

Tables: Minimum Hardware and Software Specifications

Component	Hardware Specifications
Exaquantum/PPC Server	As per Exaquantum PIMS R2.85

Component	Software Specifications
Exaquantum/PPC Server and Client	As per Exaquantum PIMS R2.85

Exaquantum/PPC can be installed with a fully operational Exaquantum PIMS (Plant Information Management System) server or installed on its own dedicated server.

Exaquantum PIMS limitations will also apply to Exaquantum/PPC.

■ Models and Suffix Codes

Table: Exaquantum/PPC Server License

		Description
Model	GMSCD09	Exaquantum/PPC Server License
Suffix Codes	-S	Basic Software License
	1	New Order (with Media)
	1	English Version
	-SA1	Exaquantum/PPC Standalone Package License
	-UP1	Exaquantum/PPC Upgrade License
	-AD1	Exaquantum/PPC Add-on License

An Exaquantum PIMS and Exaquantum Web Server License must also be provided.

Table: Exaquantum/PPC Maintenance Service

		Description
Model	GMSCD80	Exaquantum/PPC Maintenance Service
Suffix Codes	-S	Basic Maintenance Service
	1	Always 1
	1	Always 1
	-9SA1	Exaquantum/PPC Standalone Package
	-9UP1	Exaquantum/PPC Upgrade Package
	-9AD1	Exaquantum/PPC Add-on Package

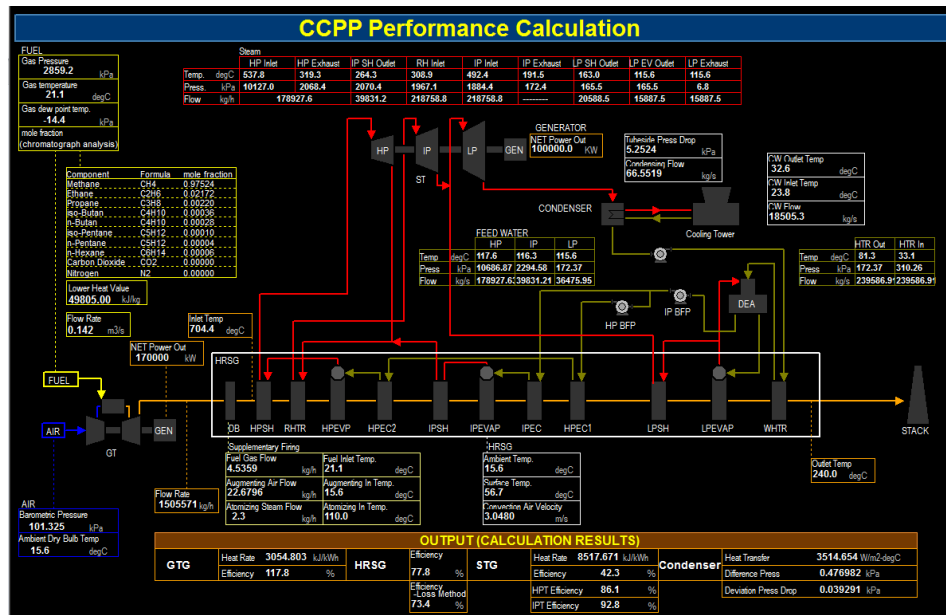


Figure 2: Example Combined Cycle Power Plant Graphic displaying Exaquantum/PPC Performance Calculations

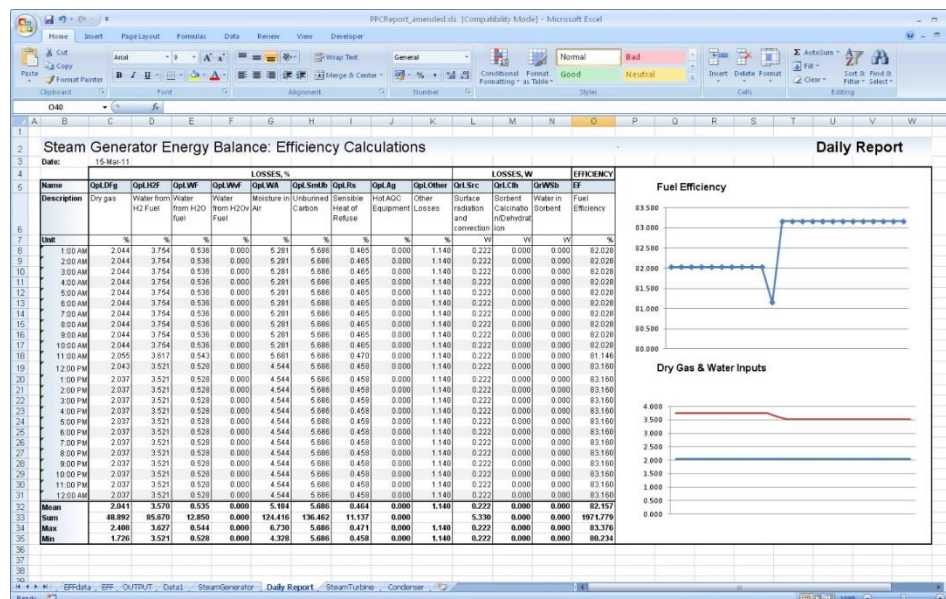


Figure 3: Example Steam Generator Report displaying Exaquantum/PPC Performance Calculations

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