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**PLANT-LEVEL MONITORING
SUPERVISORY INFORMATION
SYSTEM SOLUTION**

**Intelligence
For Excellence**

Profile

Founded in 1993, HollySys is a leading supplier of intelligence solutions with more than 4,700 employees and operates in both China and abroad. HollySys is headquartered in Beijing with R&D, production, and service bases in Beijing, Hangzhou, Xi'an, Singapore, and local branches in major cities in China, as well as offices in India, Malaysia and Indonesia, establishing a comprehensive service network across the world.

HollySys business consists of industrial intelligence, transportation intelligence, and food and pharmaceutical intelligence, covering the main industries for the national economy and the people's livelihood. With years of technological accumulation in various fields and continuous capacity building, we can provide customers with customized integrated solutions, stable and reliable products, and full lifecycle services, helping them improve market competitiveness. Over the past three decades, we have served more than 35,000 clients, successfully completed more than 45,000 projects, and gained more than 1,000 new clients each year, making HollySys a world-renowned brand in automation and intelligence filed.

The HOLLIAS industrial control platform of HollySys features a series of advanced, practical and reliable industrial automation systems and HollySys automation instrumentations products. The system products include MACS-K, MACS-S industrial control system DCS, professional control systems such as DEH, ETS and SIS, and whole-process information-based software for manufacturing enterprises. Instrumentation products include isolated safety barriers, signal isolators, surge protectors, power transmitters, pressure transmitters, electromagnetic flowmeters, metal tube float meters, magnetic level gauges, radar level gauges, throttling elements, thermal elements, and pressure gauges.

The company's products have been successfully applied to major projects and key equipment, including 1000MW ultra-supercritical thermal power units, 1.2 million tons of urea and 5 million tons of oil refining main units, earning a good reputation in the industry.

Specializing in HollySys Instrumentation and control system engineering and integration, the company can provide both new and brown field projects of enterprises with HollySys proprietary products, as well as comprehensive engineering services such as customized design and construction & commissioning.

HollySys has always pursued continuous innovation and R&D while sticking to its vision "create the most valuable intelligent company through stable and sustainable development" to provide more reliable, secure, and intelligent technology and products for our customers.

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Basic Concept



Overview

Supervisory Information System for Plant Level, is an information system for real-time production process monitoring and management for comprehensive optimization of the whole plant.

Functionality

- Establish a unified corporation data center to realize corporate data sharing
- Provide all-round digital supervision of production site at all time
- Exploit the potential of production process data and improve data asset utilization efficiency
- Instruct operating personnel to run the unit in the best condition and reduce operation costs
- Comprehensively enhance the enterprise's refined management capabilities to ensure efficient use of resources

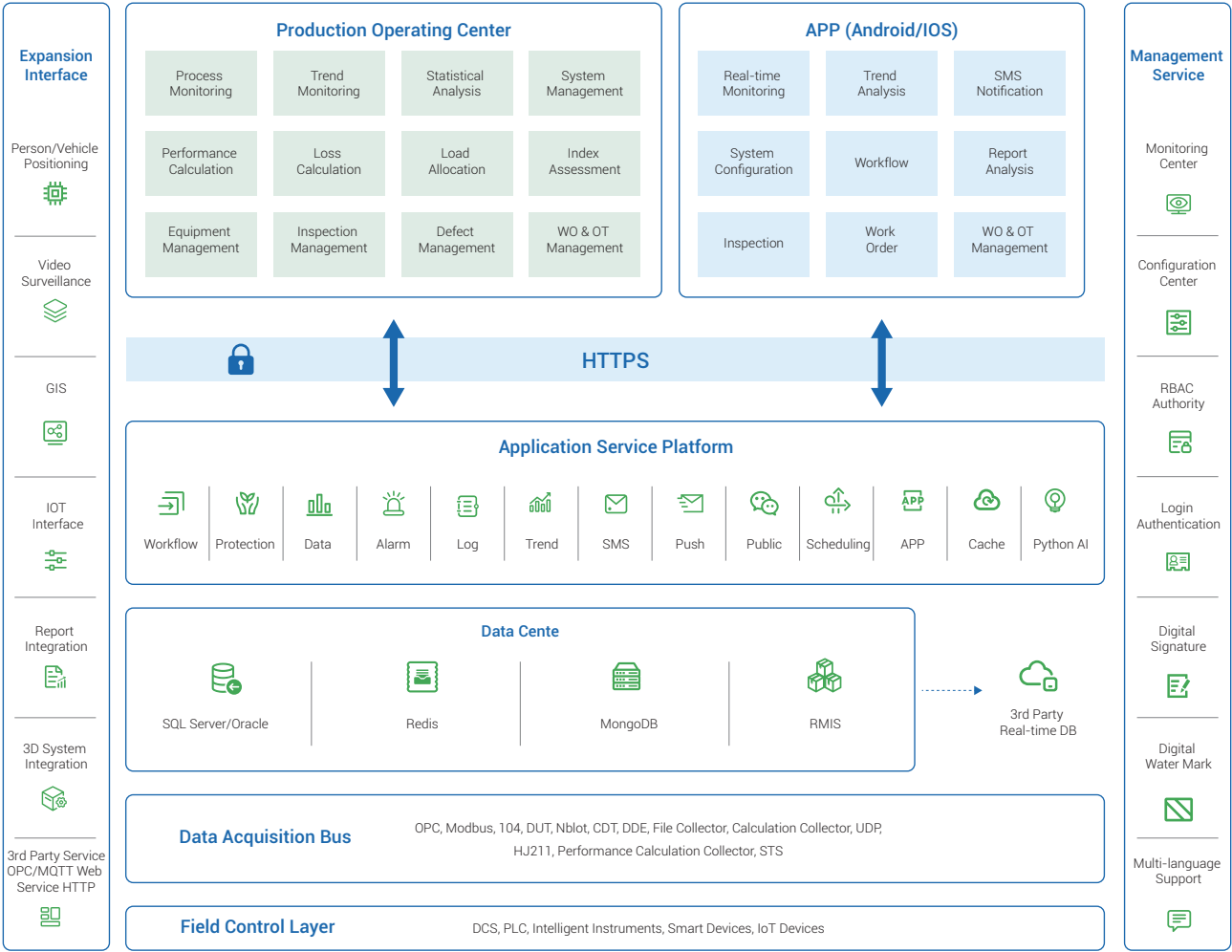


Figure1: System Architecture

Product Introduction

System Architecture

HiaPlantSIS adopts hierarchical architecture to improve the reusability and scalability of the system, and reduce the system dependence. It adopts Https technology to improve the security of system data access. It carries out unified management of system authority, configuration and authentication via the management service of real-time monitoring system operating status, so as to improve system configurability and stability. The system provides various third-party system interfaces such as personnel positioning, video surveillance, GIS, etc., to enhance the system integration.

Data Acquisition Bus

Supports industrial standard protocols such as OPC, Modbus, UDP, CDT, IEC104, etc. for field data acquisition.

Enterprise Level Data Center

Classifies, stratifies, and time-shares data to meet various storage requirements and provide data support for the platform.

Application Service Platform

Classifies and manages the data requirements of business applications, and provide data IO services, such as flowcharts, alarms, push, workflow, data access and other services.

Business Applications

Based on various browsers and mobile APPs, provides management applications including factory modeling, real-time monitoring, performance calculation, loss analysis, load dispatching and distribution, performance evaluation, statistical analysis, etc.

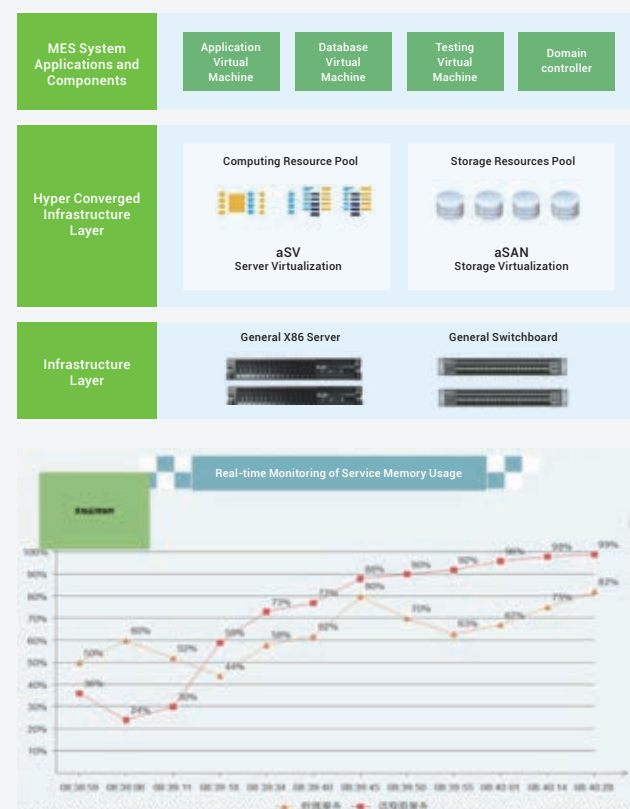
➡ System Performance

The platform adopts WebSocket communication protocol to improve the flowchart response time, compression algorithm to reduce the data storage space, asynchronous response technology to reduce the page request time, and the load balancing technology to improve the system response speed at high concurrency and ensure product performance at high IO throughput.

Index	Specification	Remark
Acquisition Frequency	0.5s	Min acquisition frequency of real-time DB is 500ms
Multi-system Data Acquisition	>100 sets	System data acquisition capacity no less than 100 sets of system
Real-time DB Year Storage Space	<1024G	Appx. 1024G disc storage space for 200,000 tags/Year
Max Online Users	10000	Max stable online users
Max Tags in Single Flowchart	10000	Max programmable tags in a flowchart
Max Tags in Single Real-time DB	500000	Max 500,000 tags supported by a real-time DB
Average Speed of Historical Data Query	10 per second	Average query speed of historical data on real-time DB

➡ Reliability

- Containerization: Private Cloud
- Deploys the system in a private cloud, remarkably improving system reliability.
- System Guard: Avoid single spot failure
- 7*24 Guard every service of the system
- System Monitoring
- Analysis to system log, operation log, and error analysis
- MTBF: 99%
- Max possible interruption time during 1 year of continuous operation is 52.6 minutes.



➡ Advantage

The system adopts a resource-oriented RESTful framework, uses front-end and back-end hierarchical architecture to achieve "one platform, multiple applications", and supports mixed data storage and multiple display methods.



Security

The system fully complies with the CIA standards (Confidentiality, Integrity, Availability of Information System).

HTTPS Technology to Ensure Link Security

- Ensures client’s data sent to correct server
- Ensures security during data transmission and prevent data from being stolen or tampered with

Prevention of XSS Cross-site Attacks and SQL Injection Attacks

- Fitter illegal user input
- Parameterized transmission using data dictionary
- Sensitive information transmitted in cipher text

Login Authentication

- Random password for initial password, and must being changed at first login
- Mandatory password complexity and regular modification
- Third-party systems are authenticated by tokens to ensure the security of system integration
- Support token expiration

Log Management

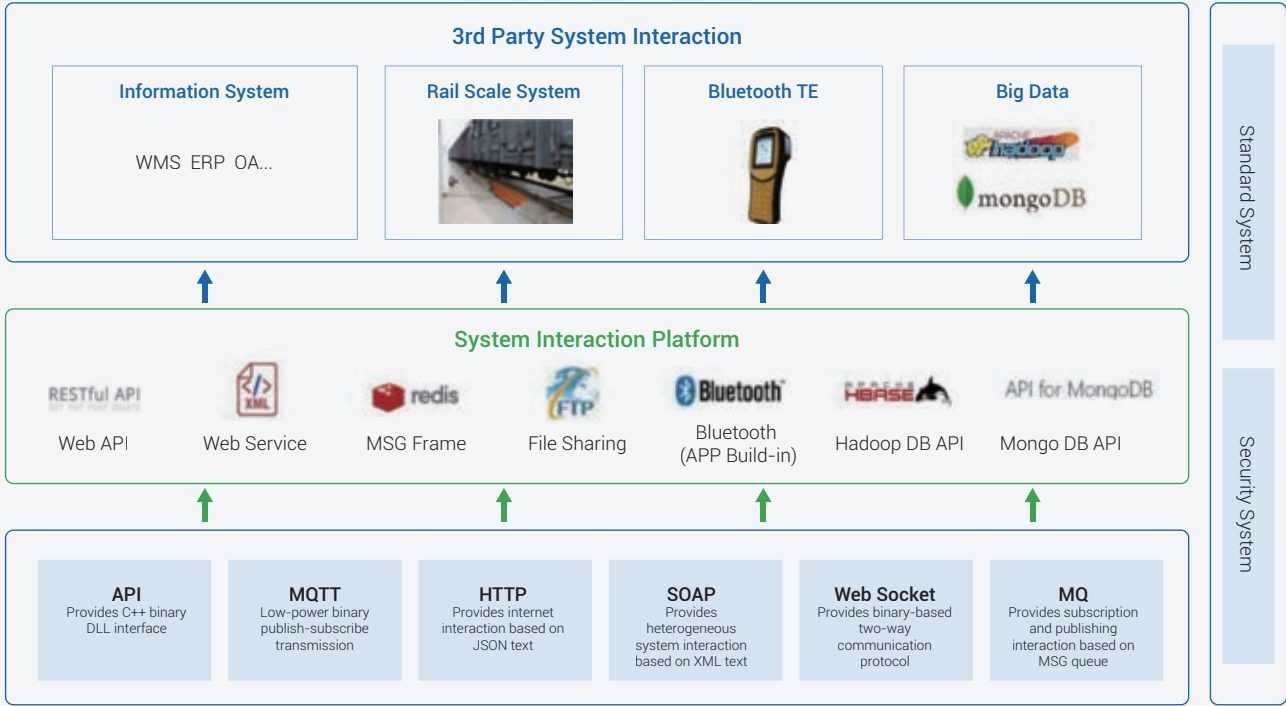
- Provides complete log information
- Provides traceable operation log information

Interaction Mobile Platform

- Supports Android, IOS, Window Table
- Adopts HTML5 technology to realize simultaneous display on APP and PC
- Supports media formats such as voice, picture, video, etc.
- Supports recognition technologies such as NFC, barcode, QR code, etc.
- Uses HTTPS, serial number binding, digital signature, digital watermark and other technologies to ensure data security

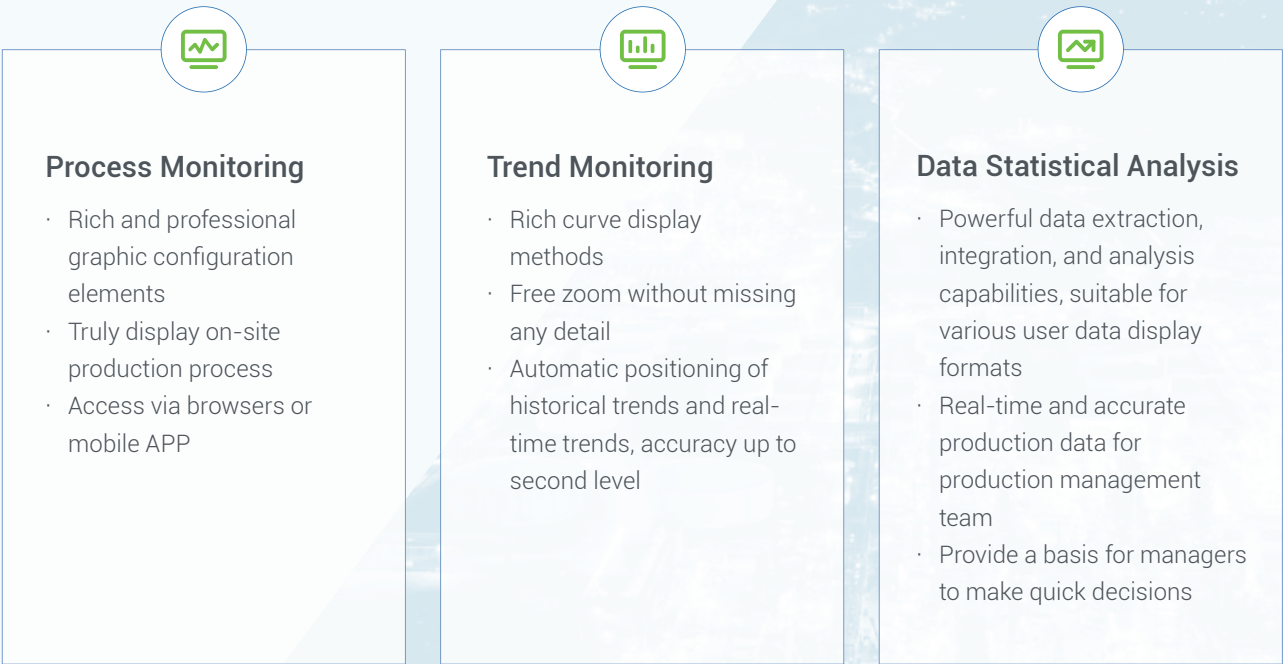


Interaction



The system uses communication protocols as API, MQTT, HTTP, XML, MQ, etc., and interactive technologies like WebAPI, WebService, messaging, FTP, Bluetooth, HadoopAPI, etc. to realize data interaction with third-party systems.

Function Overview

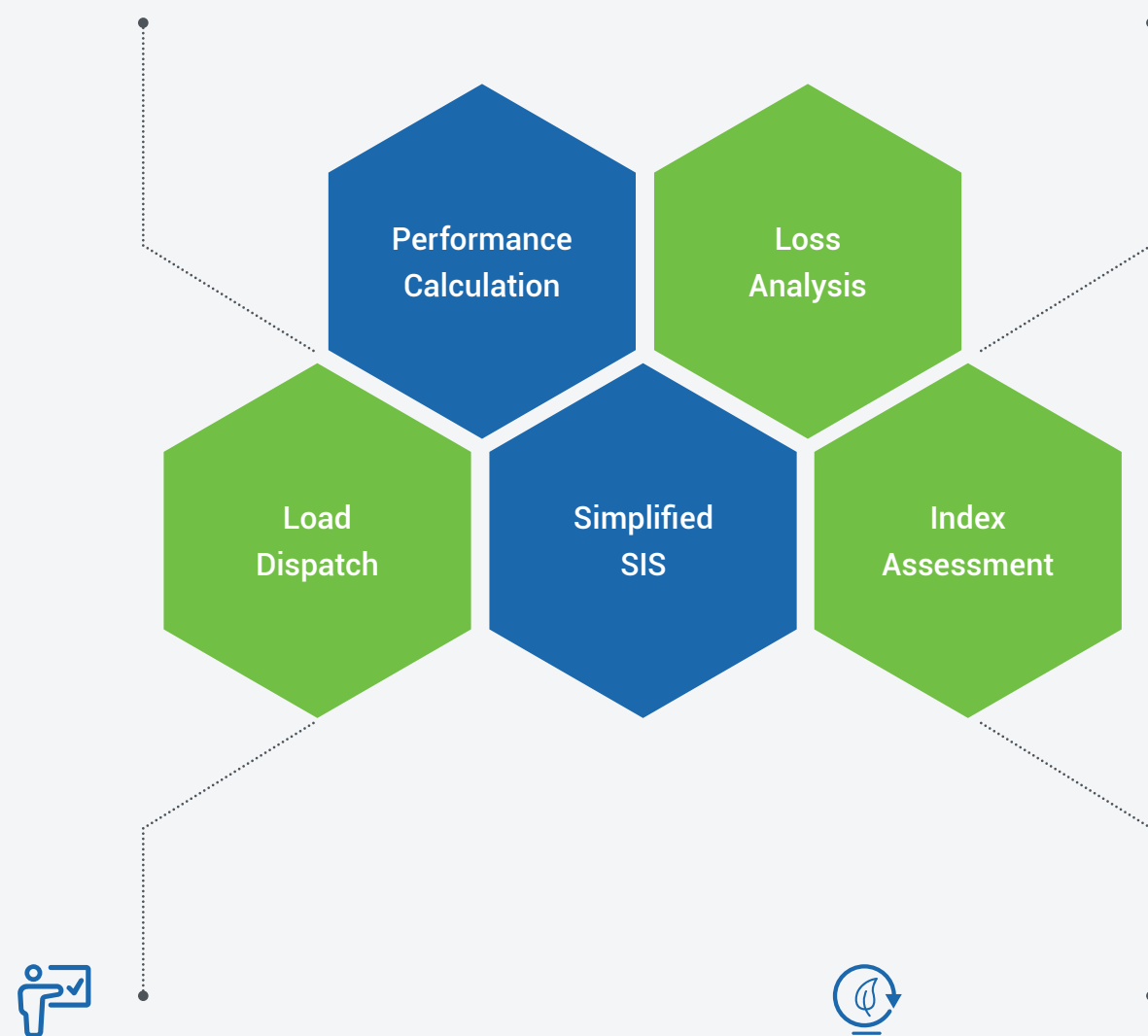




Online computing capabilities to calculate the loss (water, electricity, heat consumption, etc.) and performance parameters of boilers, turbines, and auxiliary control systems.



Diagnoses major loss sources in thermal system, provides real-time guidance on the economic and safe operation.



Provides coal consumption curves and optimized parameter list. Provides optimization guidance to ensure the unit run in the best conditions.



Calculates, counts and assesses main parameters and indexes during operation. Improve power plant economic parameters through management and assessment to indexes.

Typical Projects

➡ A Coal Gangue Power Generation Co., Ltd.

Project Overview:

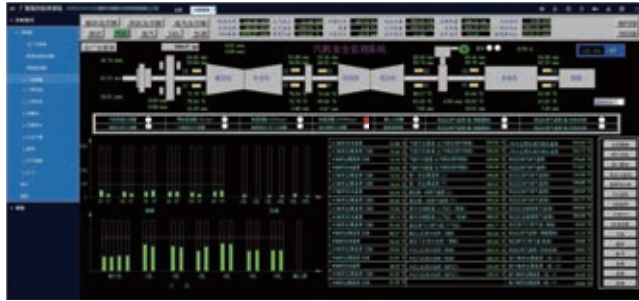
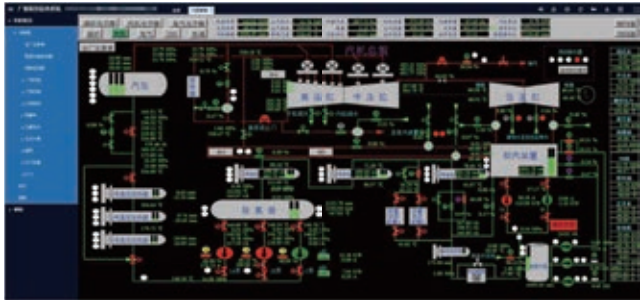
The 2*300MW units of a coal gangue power generation Co., Ltd. were put into operation in 2010. The company faces huge challenges with time goes gone due surplus power generation capacity, slow power demand growth, the continuously increasing proportion of new energy capacity, the high coal consumption, the worn out equipment, and the relative large proportion of new employees.

In 2019, the company launched a smart power plant renovation project. The project mainly included Supervisory Information System renovation, equipment predictive maintenance, unit optimization control, bidding online, and intelligent decision-making. An industrial cloud data center was established to break through the barriers of various systems in the power plant, realize intelligent transformation, and improve management efficiency.

Project Contents:

Real-time Monitoring

The system provides simple and easy-to-use graphical configuration tools, integrates a large number of graphical elements, realizes 1:1 conversion with each control system HMI, and provides real-time information of the entire plant's production systems for the production management personnel. It enables managers to understand the actual situation of the entire production site in real time through computers or mobile phones when they are in the office or on business trips.

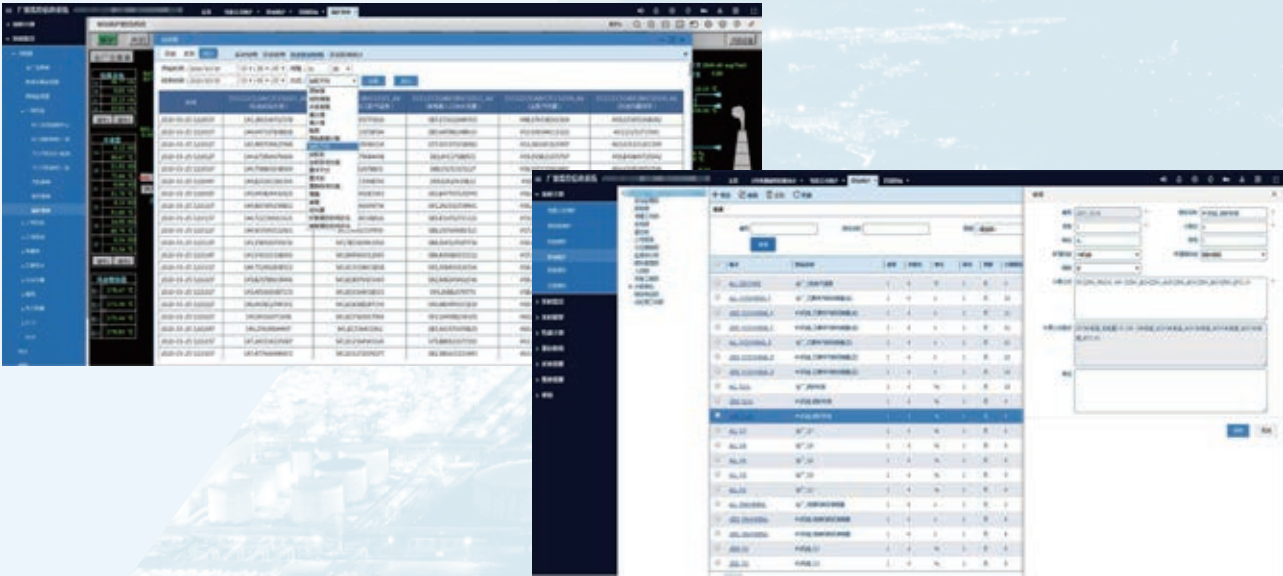
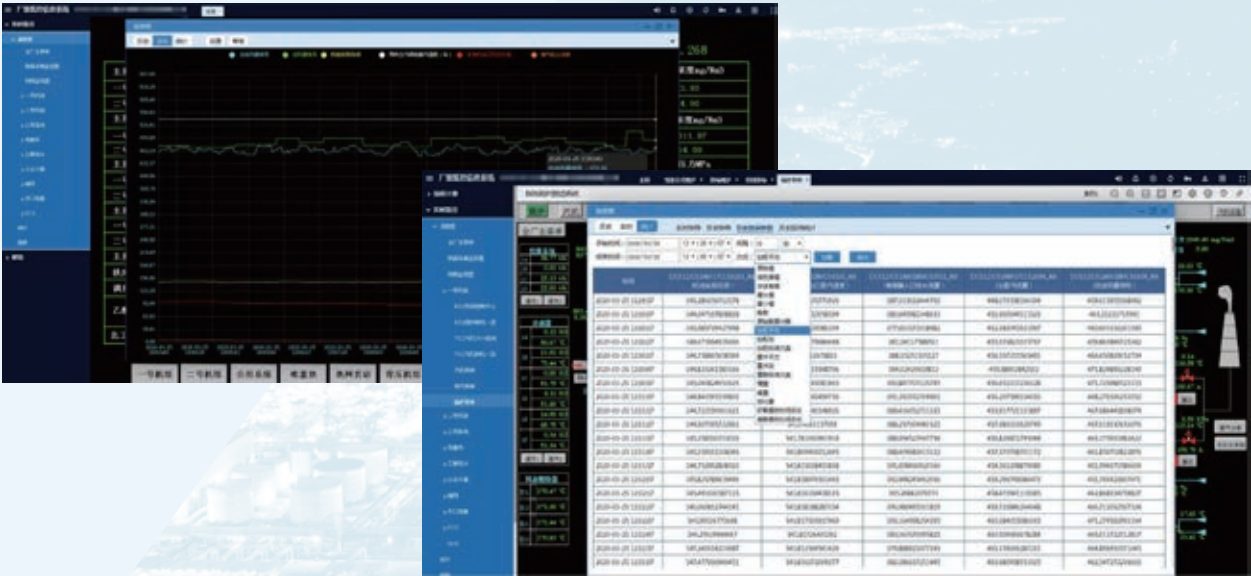


Trend Analysis

The system provides simple and convenient trend query methods, powerful and intuitive real-time/historical trend display, supports single-point and multi-point trend query, trend comparison analysis, and multiple trend sampling. It is convenient for technical and management personnel to compare and analyze key historical data, make scientific and reasonable adjustments to key technical parameters.

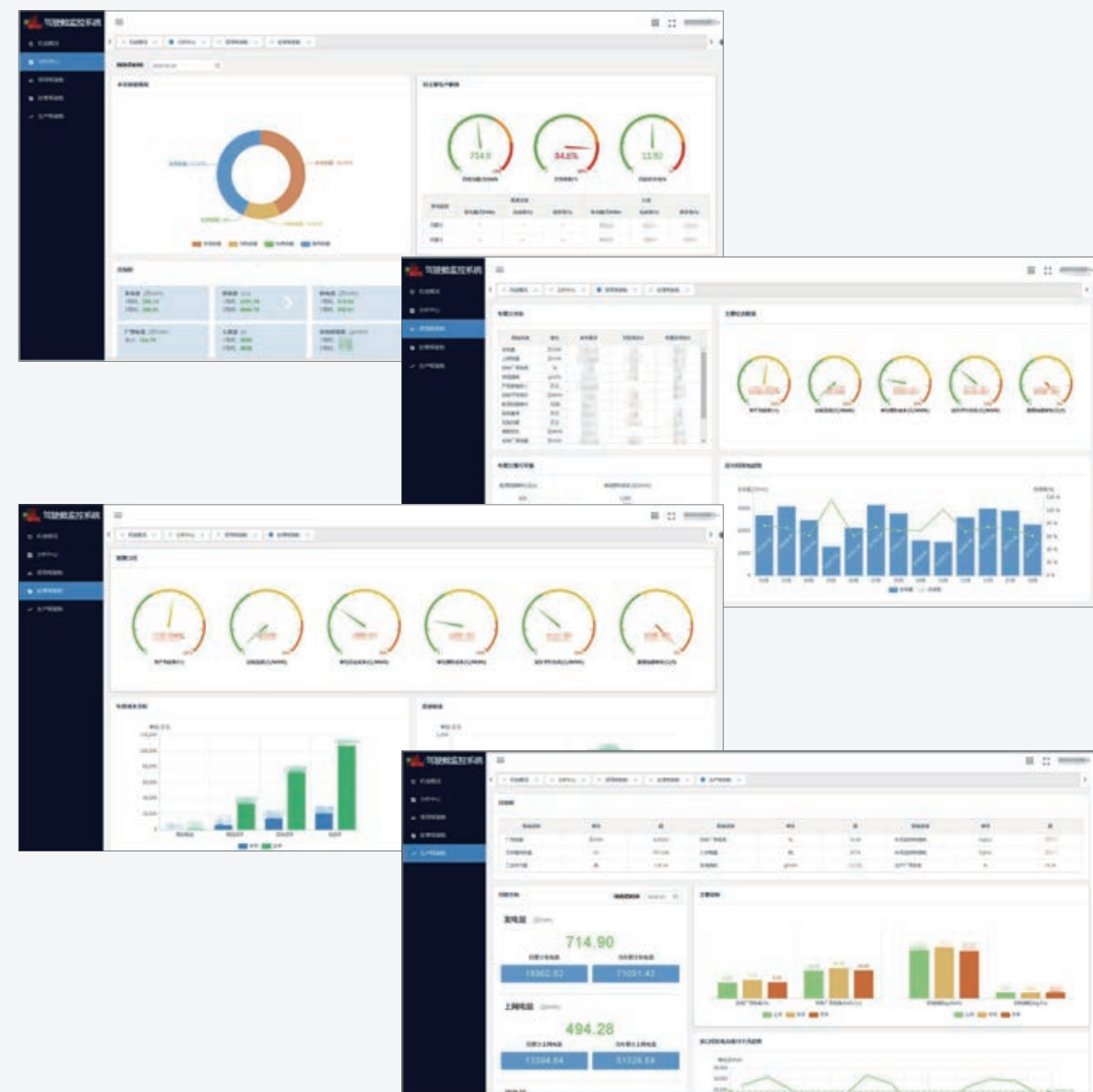
Performance Calculation

Real-time grasps the operating situation of entire plant's systems and calculates system economic indexes, accurately evaluates the operating efficiency of each equipment and economic operating conditions of entire plant, and institutively display to managers and operators.



Data Statistical Analysis

Counts and analyzes of the whole plant operation information, including: energy consumption analysis, key index analysis, etc., comprehensively evaluates the production operation level, grasps the operating economy of each system in real time, and provides data support for managers' decision-making.



Project Contents

Multi-system Integrating

The project involves more than 10 control systems from different vendors, such as DCS, PLC, ECS, sub-warehouse metering system, etc., as well as information systems such as planning and statistics systems, performance management systems, intelligent management and control platform, etc. Through this project, we eliminated data barriers between systems, realized data interconnection and information sharing.

Users can display, query, count, and analyze related performance parameters and main indexes in multiple forms from multiple dimensions and different time periods based on their needs.

A Captive Power Plant of a Chemical Company

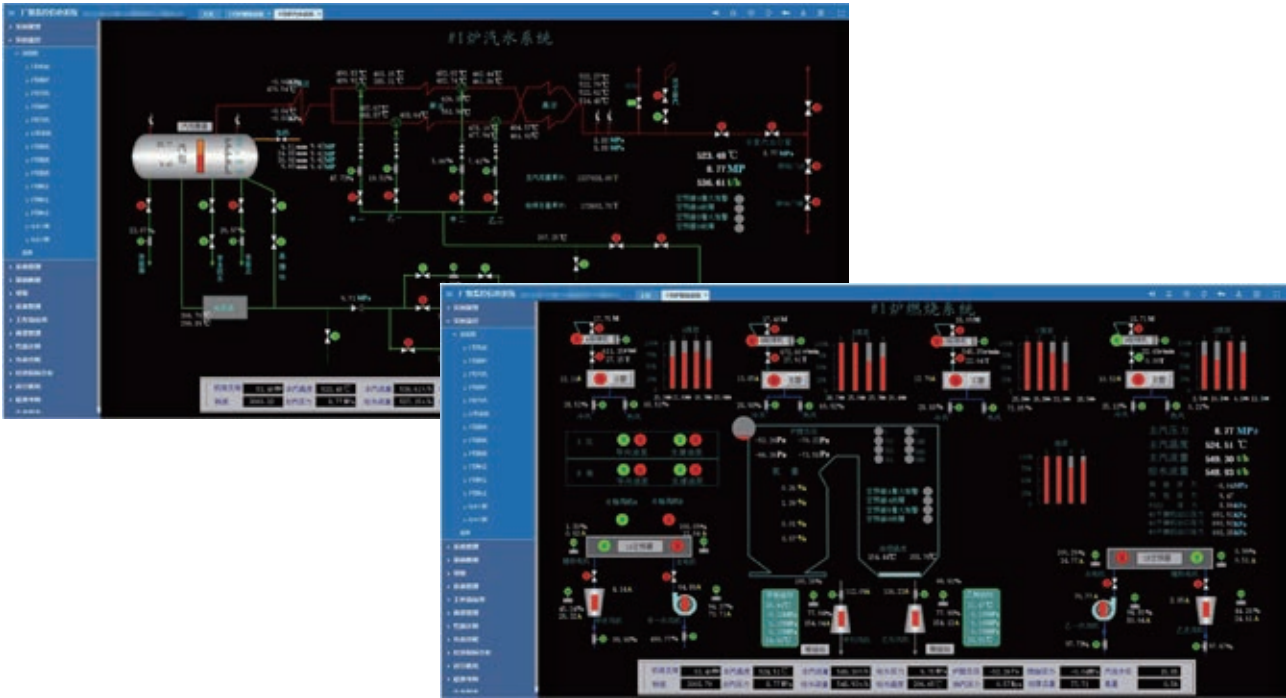
Project Overview:

The business scope of customer includes power generation, heating, alumina, lime, 0.3MT/year ion-exchange membrane caustic soda and by-products, liquid chlorine, hydrochloric acid, sulfuric acid, sodium hypochlorite, 0.4MT/year polyvinyl chloride production and sales, 0.1MT/year flame retardant production and sales, filling of pressure vessels, etc. In order to realize the intelligent transformation, the company built a plant-level monitoring information system from HollySys in 2019.

Project Contents:

The Supervisory Information System collects data from all control systems of the whole plant, and realizes the functions such as monitoring and management of real-time information, plant-level/unit-level performance calculation, loss analysis, unit online performance test, operation optimization and equipment operation guidance, operation management and performance evaluation, production reports and mobile apps, etc. Through the collection and integration of the data from various systems, the application of data analysis and decision-making algorithms becomes possible, laying the foundation for the realization of intelligent management and control.

Real-time Monitoring



Economic KPI Analysis

The system displays the influence of different index of the generator units on the economic KPI from two aspects: energy efficiency and loss analysis, providing a reference for managers' decision-making.



Multi-system Integrating

The calculation formula can be flexibly defined, the various performance Index of the whole plant can be calculated in real time, and the operation status of the whole plant's various systems can be grasped at any time.



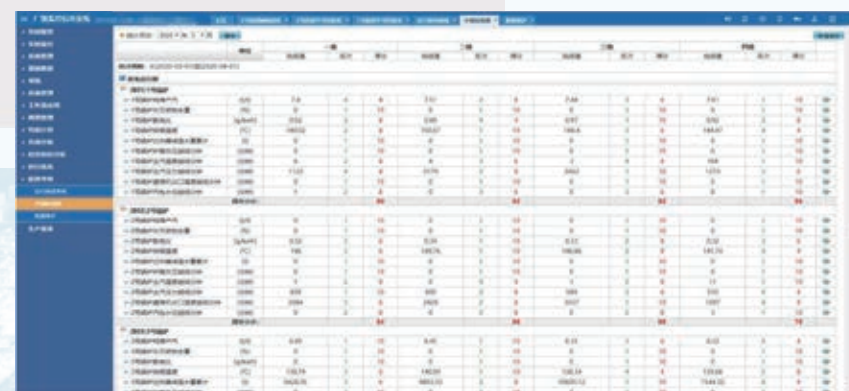
System Optimization

Based on the set parameters, the system gives corresponding optimized suggested parameters of the steam turbine, including two parts: operation guidance curve and optimization parameter list.



Index Assessment

Evaluates the operation of the operating personnel according to the evaluation rules designed by the user and realizes the running curve assessment and small index competition.



Mobile APP

The system provides mobile phone APP client access to realize mobile office and put the factory into the "pocket".

Major Functions:

- Real-time browsing, real-time/historical trend query, alarm reminder of key production data on site.
- Push of production information and news notifications.
- Report filling and viewing.
- Workflow approval.



References

