



CUSTOMER CASE STUDY

Jiangsu Nuclear expands AVEVA™ PI System™ to monitor massive plant

Jiangsu Nuclear Power Corporation (JNPC) - en.cnnc.com.cn
Industry - Power generation

Goals

- Monitor equipment in real time
- Analyze and present data in different formats for different roles
- Integrate with similar systems country-wide to benchmark performance

Challenges

- Capturing sufficient datapoints to provide meaningful analysis
- Integrating with other data platforms onsite and across China
- Site growing constantly while under construction

Solution

- AVEVA PI System
- PI ProcessBook™

Results

- PI ProcessBook presents data from multiple processes in dashboards customized for staff in different roles
- When operations data diverges from expected results, engineers can quickly analyze and diagnose issues
- The power plant can access and learn from the experience of other power plants with comparisons of similar equipment across China



At the Jiangsu Tianwan Power Plant, safety could not be any higher a priority, which is why the Jiangsu Nuclear Power Corporation adopted AVEVA PI System to build safer, more resilient operations. AVEVA PI System enables engineers to reduce the risks of radiation and extend equipment life by analyzing equipment performance parameters in real time, and by comparing their plant's performance to other plants across China.

The Tianwan Nuclear Power Plant, today, stands six towering reactors abreast at the shore of the Yellow Sea, about 500 km north of Shanghai. By 2027, Jiangsu Nuclear Power Corporation (JNPC) plans to erect two final reactors, which will see the Tianwan plant named not only the largest nuclear plant in China, but the largest in the world. Once JNPC has cut the ribbon and brought all eight reactors into full operation, the Tianwan Nuclear Power Plant will be capable of delivering a whopping 8,100 MW of electricity, and up to 60 to 70 billion kWh annually.

The plant isn't just producing massive amounts of power, though; it's producing a likewise massive amount of operations data in the process. Without a sophisticated data management strategy in place, any quantity of data that vast is likely to become a glut of information rather than actionable intelligence.

Which is why, in 2005, a year after the first reactor went online, JNPC embarked on a multi-phased approach to manage its data and achieve business intelligence using AVEVA PI System. According to Yang Qiang, Senior Engineer, JNPC began with an initial purchase of a 1,000 data point PI System, which it used to display sensor data. Since that initial deployment, JNPC has expanded from its 1,000 data point system to a 100,000 data point PI System. Now, JNPC can extract all production process data in real time with the PI System and configure it into charts or tables for analysis or cross comparisons.

“PI ProcessBook can present data from the various processes in flowcharts to our staff at different levels, making it easier for us to understand the real-time data.”

-

Yang Qiang
Senior Engineer, JNPC

In his presentation at a PI System users conference in China, Yang outlined five important ways in which AVEVA PI System has proven key to plant operations:

1. Real-time production monitoring and analysis with PI ProcessBook

PI ProcessBook assembles torrents of plant operations data into easy-to-understand flowcharts, which are accessible by staff at all different levels. From the production floor to the boardroom, decision-makers organization-wide have a clearer understanding of crucial operations data.

“Our current measurement frequency is five seconds,” Yang said, “and our staff can independently carry out trend analysis and historical data query on the platform.” AVEVA PI System allows each team to monitor requirements specific to their role while storing all the different data in one location.

2. Unit performance calculations and monitoring

Monitoring the performance of the core power generation units closely and precisely is essential to the nuclear plant’s safe and efficient operation. AVEVA PI System enables JNPC to make real-time performance calculations at the unit and equipment levels. It also enables engineers to analyze specific performance parameters, including power, efficiency, energy consumption, output, cavitation, terminal temperature

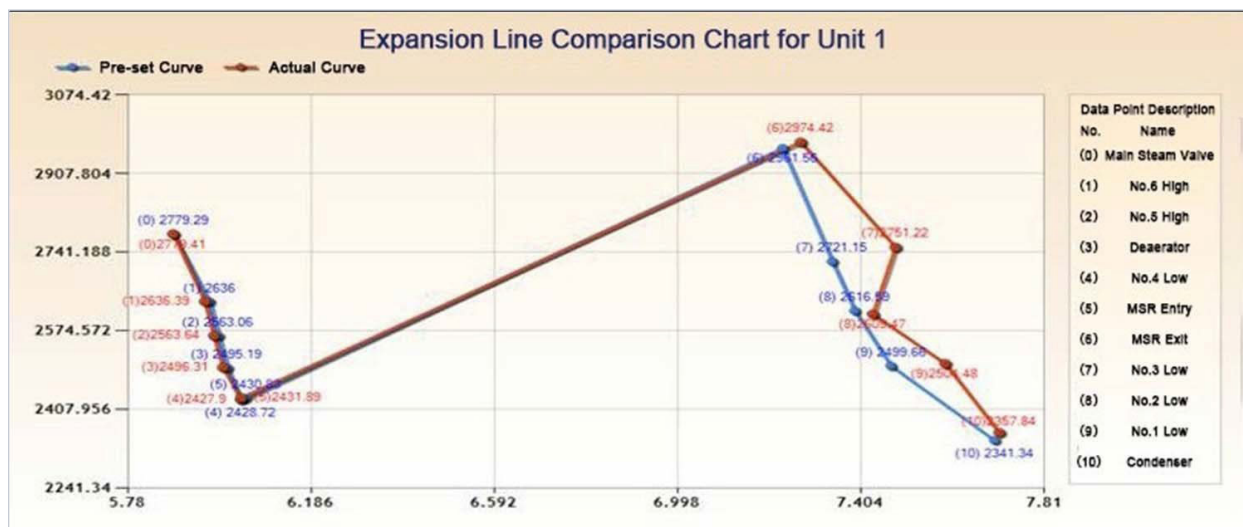
differences, temperature rise, heat transfer coefficient, and cleanliness. They can then quantify these various performance parameters for performance monitoring purposes. When operations data diverges from expected results, engineers can quickly analyze and diagnose issues.

3. Radiation risk control

JNPC uses AVEVA PI System to collect real-time radiation-risk data and provide it to staff on site who are involved in maintenance, operations, and radiation management. With this information in hand, supervisors can make data-driven decisions and take appropriate protective measures to ensure the safety of the staff as well as the units.

4. Integration with other data platforms in the data center

The information system at Jiangsu Nuclear Power Plant consists of three basic data platforms: AVEVA PI System, a SAP enterprise resource management system, and an enterprise content management system (ECM). AVEVA PI System integrates and organizes data from multiple sources so that staff members can view role-specific data in the same platform. Operators can focus on the factory floor plan while equipment engineers view 3D models; whatever the case may be, all the necessary data is available on a single platform.



The blue curve is the preset curve while the red curve represents operating data in real-time.

5. Integration with CNNC to eliminate information silos and manage equipment reliability

China National Nuclear Corporation (CNNC) launched the Equipment Reliability Database (ERDB) so that teams from different nuclear plants could learn from one another's challenges and successes. This database, which is based on AVEVA PI System, extracts and displays operations data from every unit in every nuclear power plant under the CNNC. AVEVA PI System enables the JNCP to easily integrate its data into the ERDB.

“For similar equipment, such as steam turbines and transformers in different nuclear power plants, we can perform horizontal or vertical comparisons so that one power plant can access, and learn from, the experience of other power plants and industry peers.”

-
Yang Qiang

Senior Engineer, JNPC

Looking forward

Yang expects to expand the company's PI System to manage more nuclear power production and operations functions. “We will migrate to a high availability architecture,” Yang said, “and a virtualized framework to optimize the overall information architecture of the power plant.”

JNPC is also planning to improve reliability and extend equipment lifespan with a big data platform. “The PI System, as the source of real-time data, can use the SAP HANA IoT connector module to integrate with HANA to build the big data platform,” Yang said. This integration will eventually support a closed-loop equipment reliability management system and equipment deterioration warning management system.

The Jiangsu Nuclear Power Corporation is focused on providing safe and efficient nuclear power management for millions of people, and AVEVA PI System helps support this mission with real-time information collection, customized data visualization, and integrated platforms.

To learn more, please contact your AVEVA representative
or visit us online at [aveva.com](https://www.aveva.com)