TECH OFFER

Industrial Digital Twin Solutions for Developing Low-Carbon Smart Plants

KEY INFORMATION

TECHNOLOGY CATEGORY:
Energy - Sensor, Network, Power Conversion, Power Quality & Energy Management
Infocomm - Artificial Intelligence
Manufacturing - Chemical Processes

TECHNOLOGY READINESS LEVEL (TRL): **TRL9**
COUNTRY: **CHINA**
ID NUMBER: **TO175184**

OVERVIEW

The increasing complexity of plant and factory operations, coupled with growing demands for energy and carbon management, has created an urgent need for integrated solutions. These solutions must not only manage assets and optimize production processes but also measure and reduce carbon emissions, driven by mounting government pressure to achieve smart and green manufacturing with low carbon output.

This technology is tailored for manufacturing plants and energy-intensive industries such as oil and gas, petrochemicals, chemicals, and pharmaceuticals - sectors facing significant challenges to lower operational costs, boost production efficiency, and meet carbon neutrality goals. By leveraging 3D visualization, operational simulation, real-time data collection, and big data analytics, this technology reconstructs the entire production and operational processes through a digital twin. It integrates and replicates data from system upgrades, engineering construction, production activities, and process principles.

The implementation includes the digital delivery of engineering assets, the creation of a digital twin model based on operational mechanics and historical data, and the seamless integration of operational management with energy and carbon management systems through real-time data access. This technology ultimately establishes a cloud-based digital twin platform that enables comprehensive asset management, production workflow optimization, and precise monitoring of energy consumption and carbon emissions, paving the way for developing low-carbon, smart plants.

The technology owner is seeking collaboration with industrial manufacturers, plant operators, energy management companies, engineering design firms, IoT sensor and software providers to co-develop and implement this technology in practical applications, delivering tailored solutions to meet the unique needs of diverse clients.

TECHNOLOGY FEATURES & SPECIFICATIONS

Core Technology:

- Builds on a comprehensive digital twin platform
- Integrates cutting-edge 3D visualization tools
- Features simulation engines for operational mechanism
- Utilises big data analytics
- Real-time data acquisition systems

Key Components:

- 3D visualization engine
- Digital delivery system
- Digital operations and maintenance system
- Process simulation and optimization system
- Energy and carbon management system

Primary Functions:

- Digital reconstruction of factory production and operational workflows
- Enable precise monitoring, predictive maintenance, and optimized energy and carbon management

POTENTIAL APPLICATIONS

Target Industries:

- Oil & gas, petrochemicals, chemicals, steel, pharmaceuticals, and other energy-intensive sectors
- Export-driven industries requiring carbon emission reporting

Transformative Solutions:

- Engineering digital delivery
- Factory digital operations and maintenance
- Real-time production process optimization
- Energy and carbon management platforms
- Real-time carbon accounting systems

Key Applications:

- Digital Delivery and Asset Management: End-to-end digital delivery, preservation, and management of factory assets
- Production Optimization: Enhance production efficiency, streamline processes, and reduce operational costs
- Predictive Maintenance: Anticipate equipment failures, minimize downtime, and extend machinery lifespan
- Energy and Carbon Management: Reduce energy consumption and track carbon emissions with real-time data analytics

UNIQUE VALUE PROPOSITION

This technology offers significant advancements over existing solutions through its BS architecture, which eliminates the need for software installation, enhancing both accessibility and user-friendliness. The platform supports multiple business models and software formats, enabling real-time data integration and carbon accounting in compliance with international standards.

- BS architecture that requires no software installation
- Compatible with multiple business models and software formats
- Real-time data integration and carbon accounting capabilities
- Open software environment with rapid response capabilities