K-Spice®

KONGSBERG

Maximize lifecycle value with dynamic simulation

K-Spice® dynamic simulation software empowers users to perform detailed engineering tasks, including process design verification, control and safety analysis, debottlenecking, and design optimization. Its scalable modelling approach allows for early design analysis with minimal FEED data, evolving into a high-fidelity plant representation as more data becomes available. Developed in close collaboration with clients and users, K-Spice ensures an efficient workflow for building and running high-fidelity models.

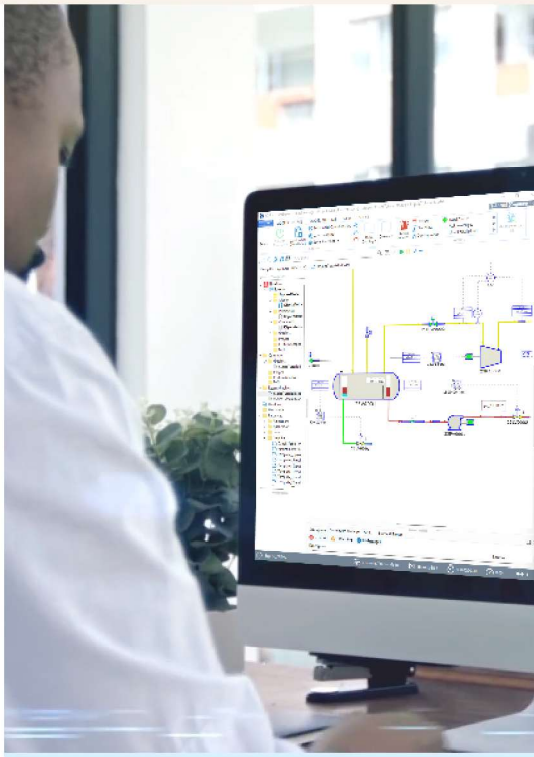
The software provides a comprehensive library of process equipment and control logic building blocks, resulting in high fidelity virtual replicas of process facilities. A key strength is the tight integration of LedaFlow®, enabling seamless incorporation of multi-phase pipelines and wells into the process model. This provides full connectivity and visibility of the subsea model through a unified graphical interface.

Providing links to more than 15 commercial ICSS systems and supporting industry standard communication protocols, K-Spice enables testing of control-logic (software in the loop) and thorough verification of operating and control strategies, accelerating the design-to-startup phase.

K-Spice combines rigorous thermodynamic packages for maximum fidelity with efficient lookup tables, ensuring reliable and meaningful results across a wide range of operating conditions. Simulations can be run in real-time and accelerated real-time speeds, enabling efficient dynamic simulation studies. The engineering interface streamlines model building with advanced tools for design data import and semi-automatic graphics generation, significantly reducing development time while maintaining the highest possible model quality.

These capabilities reduce the overall engineering, construction, and operating costs and establish a comprehensive environment for safe training and learning.

K-Spice integrates real-time data from the physical asset to provide deep insights into the plant's operating conditions.



HIGHLIGHTS

- Design studies and verification
- Equipment data validation
- Real-time flow assurance
- Production and energy optimization
- Virtual flow metering
- Power system modelling
- Operator training
- Cloud-native access with Kognitwin® Simulation

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Process equipment performance monitoring

K-Spice models and monitors all critical process equipment to give a detailed insight into how the equipment is performing against design data.

K-Spice provides continuous insights into process equipment performance by comparing simulated and actual measurements. Trending deviations over time enables advanced, performance-based maintenance optimization. Detailed equipment status information allows for optimization studies within current operating limitations.

Multiphase pipeline and process system engineering

K-Spice enables process, production, and flow assurance engineers to perform high-fidelity dynamic simulation studies that incorporate both process equipment and single or multiphase pipelines, providing a comprehensive view of integrated system behaviour.

From slug catchers and separators to pumps and compressors, K-Spice fully integrates dynamic well/pipe modules with a wide range of process equipment through its full integration with the LedaFlow dynamic multiphase flow simulator.

Real-time flow assurance

Real-time models, powered by K-Spice and LedaFlow, integrate sensor data and predictive calculations for a complete production overview. This data and dynamic model support informed decision-making, preventing problems and optimizing production and performance. Look-ahead, planning, and what-if modes further enhance predictive capabilities.

Virtual metering

K-Spice models and monitors all critical process equipment to give a detailed insight into how the equipment is performing against design data.

Power system evaluation

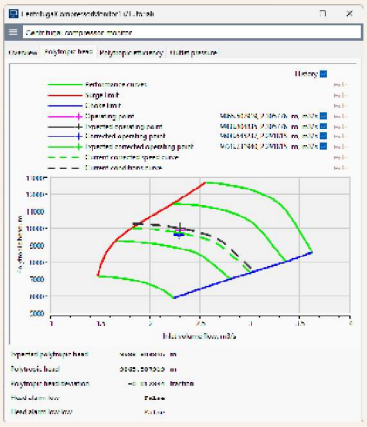
K-Spice offers a unique, fully integrated solution by directly connecting to the electrical systems powering process equipment. This enables high-fidelity electromechanical power models to drive detailed simulations of process components like pumps, compressors, and heaters. K-Spice also seamlessly integrates with NetSim, providing the most accurate gas turbine modelling available.

Operator and training simulators

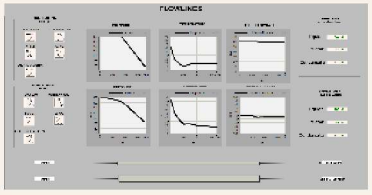
K-Spice connects its dynamic process model to a replica of the plant's actual Integrated Control and Safety System (ICSS), creating realistic operator training simulators (OTS). These OTS allow operators to safely train on all operational modes. K-Spice can also integrate with generic training simulators and includes robust assessment tools to ensure high-quality training.

Cloud-native access with Kognitwin® Simulation

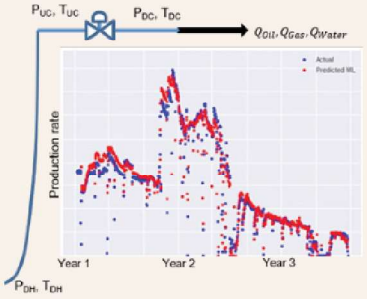
K-Spice coherently integrates with the Kognitwin Simulation platform, enabling energy operators to enhance efficiency, safety, and training outcomes. As part of the cloud-native Kognitwin solution, K-Spice provides users with real-time access to powerful simulation capabilities from anywhere, making it easier to optimise operations and improve decision-making.



Equipment monitoring



Flow assurance



Virtual metering

Training and learning
(Image courtesy of Equinor ASA)

THE INDUSTRIAL WORK SURFACE

Kognitwin transforms industrial operations by generating actionable insights from data, advancing intelligent operations, and enhancing safety and efficiency.

By leveraging digital twin technology with AI and simulation capabilities, organisations can boost uptime, improve sustainability, and create smarter, safer operations for the future.