

IDEAS

Simulation solutions for mining operations



The challenge: To reduce the risk to your people, your equipment — and your investment



The solution: Measure. Simulate. And profit.

In every industry, in every business, there is risk—to your people, your equipment, and your investment. Setting your operation free of these risks is what IDEAS is all about. IDEAS is a leading dynamic simulator

for mining operations, helping customers to save time, money, and resources.

IDEAS is more than just a cutting-edge simulation tool. It is supported by a team of development engineers and process experts who have years of hands-on experience at mining opera-

tions around the world. We bring the power of IDEAS right to your site, no matter where it is in the world. Our global, industry-specific experience means we understand your issues and can provide you with solutions efficiently.

IDEAS provides solutions for three key areas of project development.

Process design

IDEAS enables you to test and verify design concepts and process control logic—quickly, and at low cost and low risk.

Control logic (DCS) verification

IDEAS is an excellent tool for staging, testing, and validating control logic—identifying and correcting errors to help you achieve a faster and smoother start-up.

Operator training

IDEAS works much the same way as a flight simulator, providing your operators with realistic, hands-on training modules—reducing the risk to both themselves and your equipment.

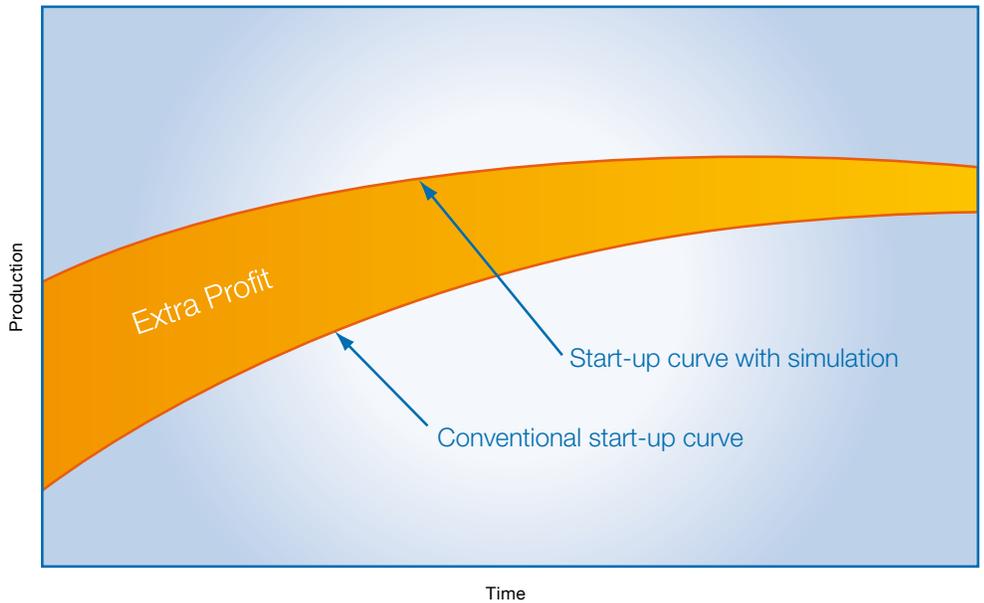
We are dedicated to working with you to help you harness the power of IDEAS. With your vision and our technology, the possibilities are limitless.

How IDEAS is implemented to help your project:

- We build process models of the facility based on P&IDs, pump curves, and other key components of the process.
- We connect these models to an offline version of the actual control logic.
- We then run a simulated start-up and verify and correct control logic against this “virtual plant,” months before start-up.
- The models are then used for operator training.

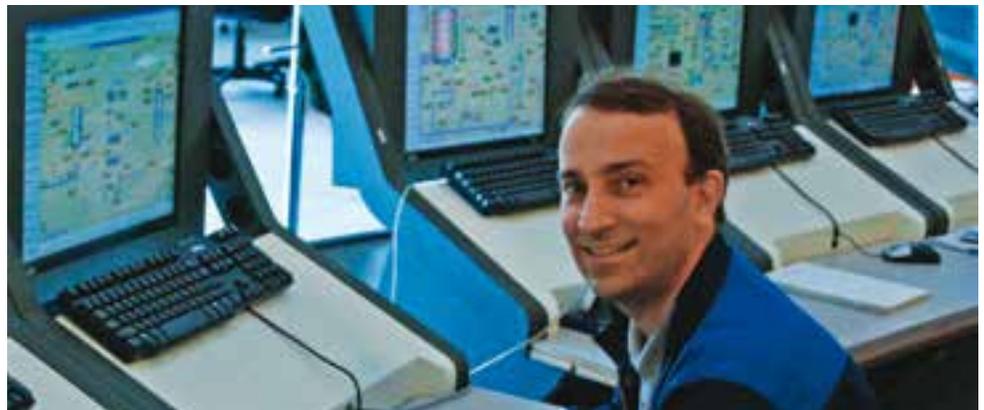
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Benefits

- Test and verify design concepts, quickly and at low cost and low risk
- Stage, test, and validate control logic to achieve faster start-up and increase return on investment
- Train operators without risking their safety or plant equipment



The challenge: To design a process that you know will work before you commit capital

The solution: IDEAS steady-state simulation

During the process design phase of a project, IDEAS is a quick and powerful tool that enables users to dynamically model a complete mining project.

IDEAS helps you create a “virtual plant” environment in which process designs, modifications, and retrofits can be fine-tuned and verified, faster than in real time, before you commit to any capital costs.

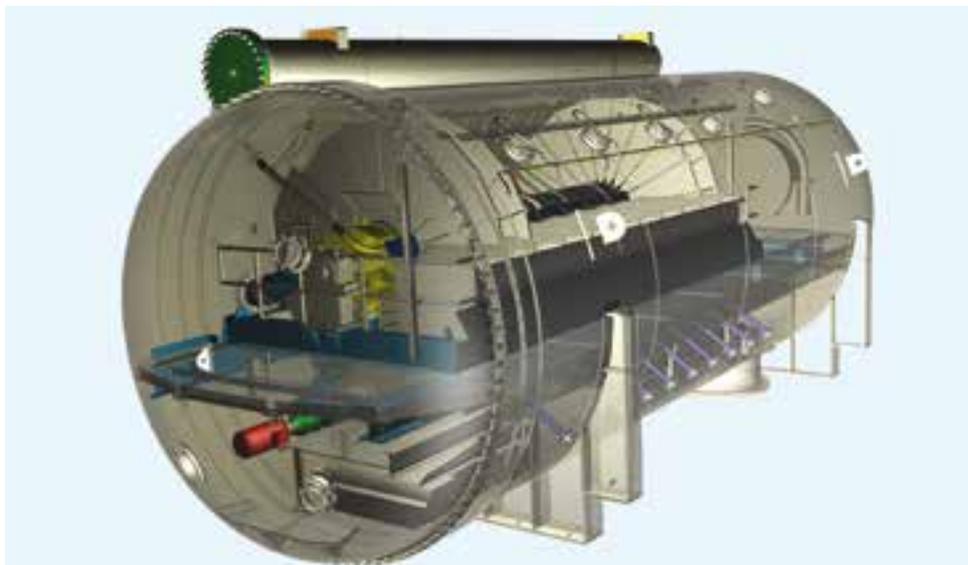
Use the IDEAS simulator to solve complex engineering problems such as:

- Sizing or verifying new process equipment
- Predicting control or process response
- Predicting interaction with other equipment
- Designing control logic
- Increasing product quality

IDEAS is not just an “off-the-shelf” software package. The modular structure of IDEAS means that you do not have to buy a full-performance, plant-wide package when you only need to simulate a small area. IDEAS can be customized by our process experts

Benefits

- Create live process flow sheets
- Quickly determine flows and temperatures
- Help verify the selection of process equipment
- Make economical design decisions



specifically for your industry, process, and site.

IDEAS includes comminution and hydro-metallurgical libraries that enable users to simulate a conventional mining operation at a macro level of fidelity. These libraries feature a flexible and easily customized database that contains the material properties for components commonly used in the mineral industry.

IDEAS has the ability to perform steady-state mass and energy balances; track components, compounds, and element flow and concentration; handle particle size distributions; and calculate specific gravity and excess enthalpy. IDEAS also has the flexibility to define chemical reactions. Depending on user needs, process reactions can either be user-defined (for most process analyses) or performed separately by a first principle model (for example, OLI aqueous engine or Gibbs free energy minimization).

IDEAS has been used successfully to model complex plants that include comminution,

high pressure acid leaching, heat recovery circuits, neutralization, countercurrent decantation (CCD), pressure oxidation, precipitation, filtration, solvent extraction, and electrowinning.

IDEAS acts as a superior tool for “what-if?” analysis of mineral production and optimization. Steady-state models can link to operating costs, complex production logic, discrete simulation of discontinuous events, and to spreadsheets for dynamic exchange of data.

In addition, as the complexity of the project advances, steady-state models created in IDEAS can be easily converted to a dynamic environment to include detailed dynamic specifications and process control logic.

Success story

Customer: Teck Resources

Simulation objective:

- Smelter process simulation
- Pretest control logic and debug errors
- Train plant operators

ANDRITZ AUTOMATION developed a dynamic model of a retrofit KIVCET furnace for Teck Resources' Trail Lead Smelter in British Columbia, Canada, one of the largest zinc and lead production facilities in the world.

Working closely with the customer's personnel, we created a model that accurately characterized all the values predicted by Teck Cominco Research.

This accuracy gave Teck Resources confidence in the changes proposed to the control strategy. The IDEAS model also assisted in control system development, and "what-



if" analyses of the process controls.

"We saved a good three weeks' commissioning time at start-up as a result of using the IDEAS simulator for staging the DCS," said Russ Babcock of Teck Resources.

IDEAS training software played an important role in training operators at the plant. In the words of Corey Engel at Teck Resources: "Within a week we had a power failure at site,

and training on the IDEAS simulator allowed the operators to respond without a hitch, avoiding a potential disaster."



The challenge: To verify that your complicated control scheme will run your plant correctly

The solution: IDEAS dynamic simulation

IDEAS is an effective tool for control logic verification, helping to stage and test control systems quickly and accurately, reducing the steep curve to start-up.

Implementation of control logic is a difficult task, since the performance of the plant is not only dependent upon the electrical and mechanical components, but also on the control logic and the design concept used to control those components.

That's where IDEAS enters the picture. If the control logic cannot start a simulation, it will not be able to start the actual equipment. By using IDEAS for control logic verification, you will reduce costly design errors that could otherwise delay start-up.

Studies have shown that using simulation to help with start-up can correct up to 82% of control logic problems before field implementation.

The cost savings are enormous. Control logic verification translates into immediate savings through a smoother start-up and



can easily realize a 200% or more return on investment.

IDEAS communicates with all major PLC or DCS equipment. Using our OPC server, OPC client, or one of our custom communication drivers, IDEAS makes the task of control system logic verification more manageable and consistent. In addition, new control logic can be tested and verified on the IDEAS simulator while the actual plant continues to run without interruption.

The biggest benefit of using IDEAS for your control logic verification is that our team

works with you every step of the way. Our experts travel directly to your plant site, anywhere in the world, and work directly with the equipment vendors, control company, and plant personnel during commissioning.



Benefits

- Detect and correct up to 82% of control logic errors before field implementation
- Achieve quicker and smoother start-up, resulting in 200% return on investment

	DCS loop back	IDEAS model
I/O and loop test	✓	✓
Process-wide logic test	x	✓
Tuning constants known before start-up	x	✓
Realistic process models	x	✓✓
Remove control logic errors	x	✓✓
Remove process intent errors	x	✓✓
Verify advanced control logic	x	✓

Success story

Customer: Cerro Verde

Simulation objective:

- Model process design
- Verify control logic
- Train plant operators

ANDRITZ AUTOMATION was selected by Freeport-McMoRan Copper & Gold as the simulation supplier for the 850M USD Cerro Verde expansion project in Peru.

During commissioning, Freeport-McMoRan used IDEAS to make sure that all critical logic errors were removed so that the project experienced an improved start-up and achieved production targets faster.

“The IDEAS simulation software provides a ‘virtual plant’ to allow control designers to make modifications to process logic, months before the real start-up,” explained Ron Cook, Project DCS Manager for the Cerro Verde project.

In addition, Cerro Verde operators used the IDEAS simulator to practice start-up, shut-down, and emergency sequences in the months prior to start-up. This allowed the operators to be better prepared when it came to the operation of the actual plant.



A standardized test was developed with approximately 300 random questions was developed to test Cerro Verde operator competency. The test questions were given in three intervals, once before any training, once after class training, then once again after IDEAS. The results clearly showed that the IDEAS training made a remarkable improvement in operator competency.

Student competency	
Before any training	20.3%
After classroom training	26.7%
After IDEAS training	85.0%



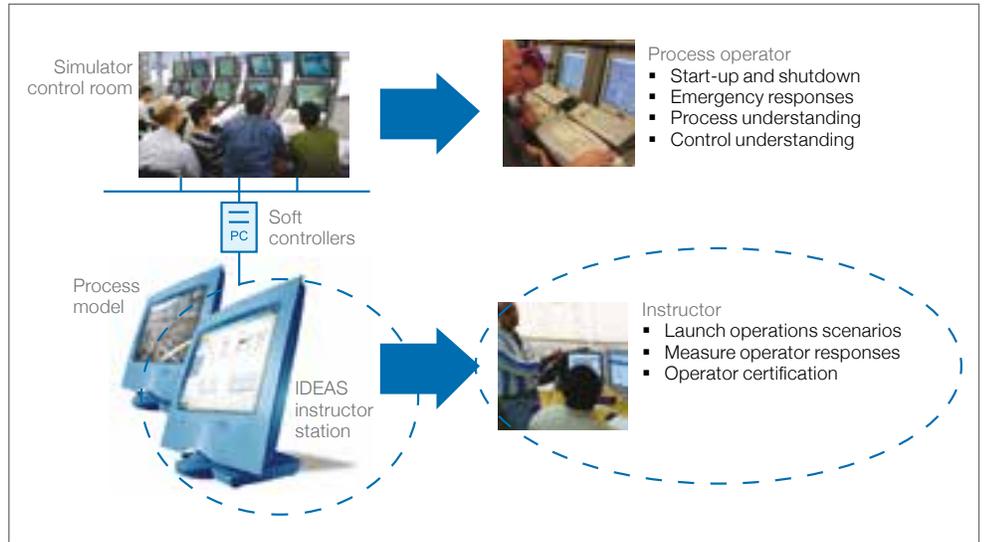
The challenge: To train your operators on a process—and meet your start-up schedule

The solution: IDEAS instructor

IDEAS is an essential tool for operator training; it works like a flight simulator, allowing trainees to gain realistic, hands-on experience without inflicting harm on themselves, the environment, or the plant.

The IDEAS instructor module can help train operators months before the actual plant is up and running. It helps produce better trained operators—operators who will start up new processes faster, react more wisely to plant upsets, and be more productive.

IDEAS instructor contains preconfigured scenarios that teach, train, and challenge trainees on process upsets, including two of the most intensive and complex procedures—start-up and shutdown. We can all imagine this scenario: a relatively new operator is on shift when suddenly a tailings line starts to sand-out. In most cases, such a scenario would have significant safety, environmental, or production consequences—but your new operator, who has practiced start-up and shutdown on the IDEAS simulator, immediately



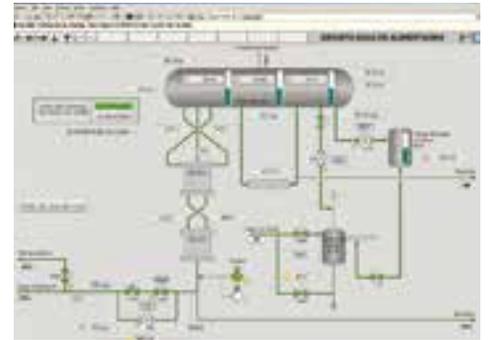
▲ Where IDEAS instructor fits into an operator training system

ately makes the correct decisions and your operation continues without incident.

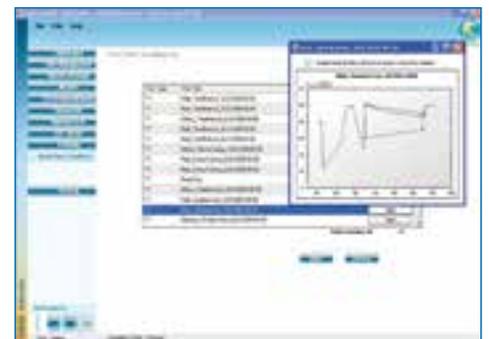
Operator interface

The simulator allows the actual plant configuration to be loaded into the training system, so that operators will be trained using the same interface (including the same logic, keyboard, and graphics) as the actual plant. The simulator enhances the learning process by actively involving the operators and providing immediate feedback without risk to production.

The view from the simulator is identical to the actual DCS screen. ▼



A screen shot from IDEAS instructor demonstrates the easy-to-use interface. ▼



Instructor interface

IDEAS instructor software enables you to track individual employee performance, including login and fault scenario management. The operators' performance in executing start-up, shutdown, and normal operating procedures is assessed by tracking selected process variables (for example, temperature, pressure, and flow).

Benefits

- Teach plant operators safely and reliably
- Have personnel practice intensive and complex procedures
- Monitor trainee progress and assess performance
- Standardize and create consistent training

Success story

Customer: Shell Albian Sands

Simulation objective:

- Process verification
- Control logic verification
- Train plant operators

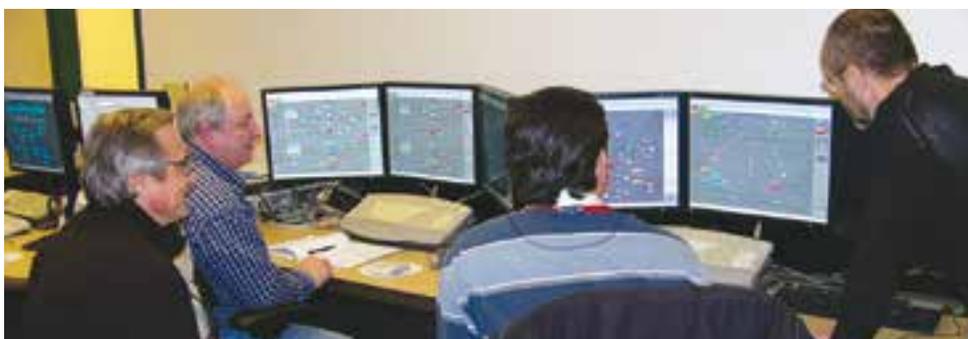
IDEAS played a significant role in the Shell Albian Sands facility in northern Alberta, Canada. The project implemented new technology to produce superior quality bitumen product and IDEAS was used to verify process concepts before the plant went into operation.

IDEAS was then used to check not only the I/O of the DCS, but also the DCS logic and complicated control loops—saving money and valuable time during start-up. For example, IDEAS was able to detect an error in a viscosity control loop equation that would only have become apparent during start-up.

The other key project goal for IDEAS was to train operators prior to start-up of the facility—something accomplished with great success.

“The feedback from the operators has been extremely good,” said Gary Foulds of Shell Albian Sands. “We’ve been able to take them through the operating procedures, the more typical ones like start-up and shutdown, but also taking them into process operating regimes, which are undesirable, so that they can also see the consequences prior to start-up rather than on the real plant.”

The training simulator has since been updated to allow operators to train on different process units to help increase their skills and expertise in each area. The system uses the same configuration and displays as the ac-



tual operator workstations in the control room, DCS and PLCs, and represents a dynamic model of the different process units found in the Shell Albian Sands plant. In addition, it has trainer functions such as the “snapshot” feature, which allows the trainer to start the process plant from pre-saved operating conditions.

When this project was proposed, the oil sands industry was at a crossroads and Shell Albian Sands was looked on as a key “test case” for future expansions of the industry. Because of the technical and commercial

success of this project, many new projects have come online since.

The IDEAS models were useful in minimizing the process risk associated with the development of new process concepts. A project of this magnitude called for the best practices that the customer could bring to bear and IDEAS was considered a small price to pay compared to the process risk and the magnitude of the capital investment being made.

Success story

Customer: BHP Billiton

Simulation objective:

- Process modeling

BHP Billiton is the world's largest diversified resources company, with over 128,800 employees and contractors at 141 locations in 26 countries. As such, when it came to picking a simulation standard, BHP Billiton wanted the best solution available. That is why the company chose IDEAS as its standard for process modeling for its stainless steel material group.

The decision was made after a rigorous competitive selection process lasting nine months, and in the end BHP Billiton decided that IDEAS presented the best long-term benefit.

The IDEAS simulation package possesses a number of novel advantages over its com-



petitors, coupled with excellent customer service and development teams.

Process simulation is an important aspect of process engineering, which helps BHP Billiton develop process technology, improve operational performance, and advance their world class projects.

Not only did BHP Billiton view IDEAS as the right tool to accomplish these objectives, but they know that ANDRITZ AUTOMATION possesses the depth of resources to respond to current and future simulation requirements.



Automation solutions

Release your full potential



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