



AUTOMATION

**IDEAS SIMULATION
TECHNOLOGY**

SOLUTIONS FOR MINING OPERATIONS



ANDRITZ

ENGINEERED SUCCESS

ENGINEERED SUCCESS

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Reduce the risk to your people, your equipment, and your investment

In every industry, in every business, there is risk. Setting your operation free of these risks is what IDEAS is all about. IDEAS is a leading dynamic simulator for mining operations that helps customers to save time, money, and resources.

LEADING THE WAY

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 operations 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.

HOW IDEAS CAN HELP YOUR PROJECT

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

BENEFITS

- Test and verify design concepts, quickly, 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

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)

Stage, test, and validate control logic with IDEAS—identify and correct errors to achieve a faster, smoother start-up.



OPERATOR TRAINING

Provide your operators with realistic, hands-on training modules to reduce risk to your operators and your equipment.



Design a process and know it works before you decide to commit capital

IDEAS is a quick and powerful tool that will enable you to dynamically model a complete mining project. During the process design phase, IDEAS helps you create a “virtual process” environment in which process designs, modifications, and retrofits can be fine-tuned and verified faster than in real time and well before you commit to any capital costs.

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 specifically for your industry, process, and site.

SIMULATION CAPABILITIES

The IDEAS simulator can be used 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 includes comminution and hydrometallurgical 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.

MEETING USER NEEDS

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).

MODELING AND ANALYSIS

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.

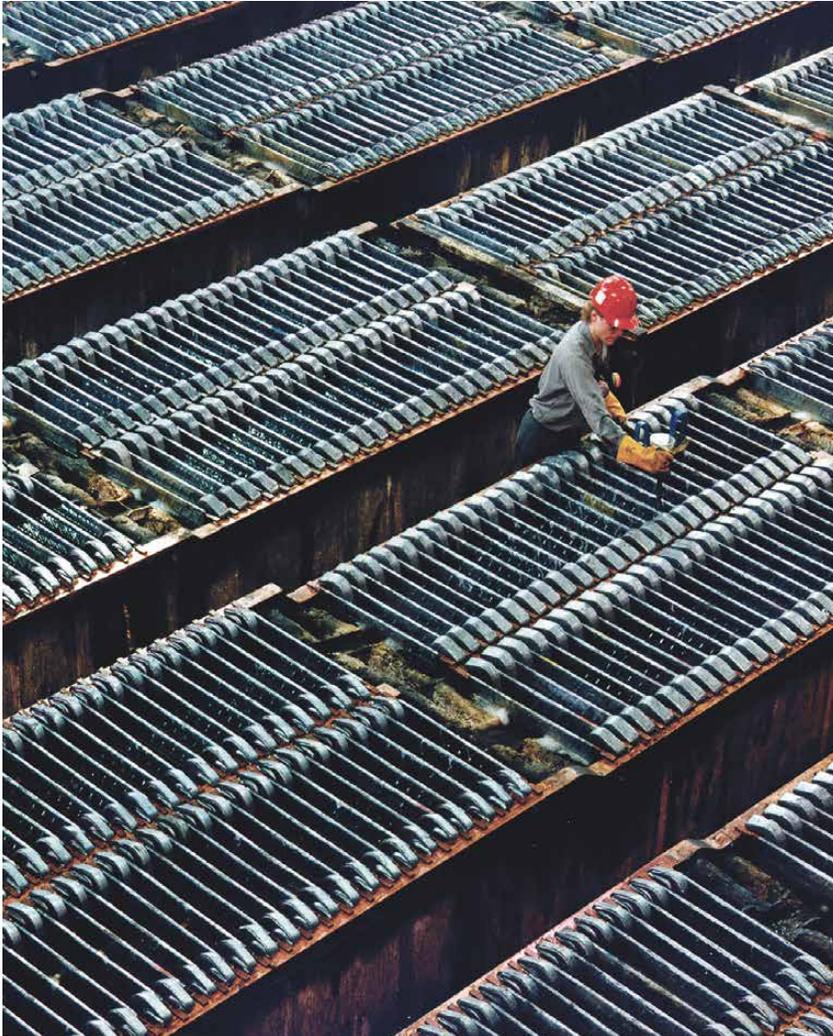
IDEAS acts as a superior tool for “what-if?” analysis of mineral production and optimization. Steady-state models can link to operating costs, complex production logic, discrete simulation of discontinuous events, and to spreadsheets for dynamic exchange of data.

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.

BENEFITS

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





Success story: Teck Resources

ANDRITZ 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.

SIMULATION OBJECTIVES

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

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."



Verify that your complicated control scheme will run your plant correctly

IDEAS is an effective tool for control logic verification. Using IDEAS dynamic simulation, you can 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.

APPLYING SIMULATION TECHNOLOGY

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.

A HIGHER RETURN ON INVESTMENT

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.

EASY TO USE

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.

EXPERT SUPPORT

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 a quicker and smoother start-up and realize a 200% return on investment

Control logic verification with IDEAS	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: Cerro Verde

ANDRITZ 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.

SIMULATION OBJECTIVES

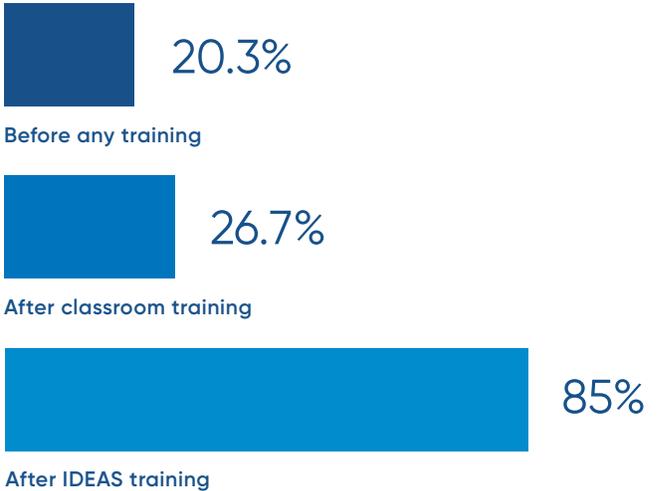
- Model process design
- Verify control logic
- Train plant operators

“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, shutdown, 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 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.

OPERATOR COMPETENCY



Train your operators and meet your start-up schedule

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 to themselves, the environment, or the plant.

IDEAS INSTRUCTOR

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.

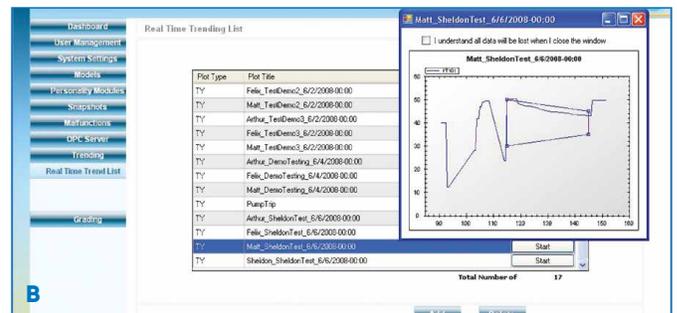
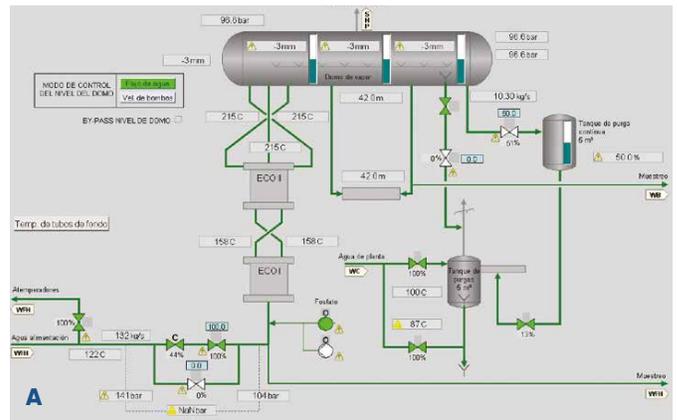
IDEAS instructor contains preconfigured scenarios that teach, train, and challenge trainees on process upsets, including two of the most intensive and complex procedures—start-up and shutdown. We can all imagine this scenario: a relatively new operator is on shift when suddenly a tailings line starts 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 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.

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).



A The view from the simulator is identical to the actual DCS screen.
B A screen shot from IDEAS instructor demonstrates the easy-to-use interface.

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: Shell Albian Sands

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

SIMULATION OBJECTIVES

- Process verification
- Control logic verification
- Train plant operators

IDEAS was 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 shut-down—but also take 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 actual 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.



Realize the net best present value on your capital project

IDEAS is the leading simulator for the oil sands industry in northern Canada and is quickly becoming the simulator of choice for the mining industry.

SIMULATION EXPERTS

We can model any vendor equipment and are able to communicate with every DCS supplier. Your operators train on the same graphics and logic that they will use in the actual plant.

REALISTIC PROCESS MODELS

IDEAS has realistic models, based on first principles of chemistry and physics, to accurately represent your process. IDEAS allows you to model your plant or process at a micro or macro level of fidelity, depending on your need.

SMOOTH START-UP

IDEAS catches hundreds of errors in control logic before start-up, which means your plant achieves production on—or ahead of—schedule.

ON-SITE IMPLEMENTATION

Our personnel include experienced mining project managers who understand your industry. We travel

directly to your site to work with vendors and control suppliers during commissioning.

RISK-FREE TRAINING

The IDEAS instructor module allows staging and operator training to take place in complete safety, without risk to your employees or the environment.

ONGOING BENEFITS

Since IDEAS is modular and scaleable in design, many plants continue to use the simulator past start-up for a variety of applications, including process design and training of new operators.

RETURN ON INVESTMENT

The IDEAS simulator acts as a virtual plant that will help pinpoint plant production improvements and shorten projected start-up dates. In many cases, the IDEAS return on investment has been over 200%.

INCREASE YOUR REVENUE

Sample calculation, showing return on investment of simulation on start-up

Start-up tonnes/month		Months		Additional Revenue
⋮		⋮		⋮
60,000	x	\$400	x	5
		⋮		x
		Incremental \$/tonne		17%
				⋮
				Additional production (%)
			=	\$20,400,000



Success Story: BHP

BHP is the world's largest diversified resources company, with over 62,000 employees and contractors working at 90 locations in 15 countries. As such, when it came to picking a simulation standard, BHP 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 decided that IDEAS presented the best long-term benefit. The IDEAS simulation package possesses a number of

novel advantages over its competitors, coupled with excellent customer service and development teams.

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

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



WHY WORK WITH ANDRITZ

For over 20 years we've been providing modeling and OTS services to customers across a variety of different industry verticals, offering our customers proven OTS solutions that enable them to achieve their operator training objectives. We can connect our clients with any third-party DCS vendor, as well as develop software, offer flexible commercial models, and provide technical support 24/7 thanks to our global presence.

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