ANDRITZ Automation

IDEAS

Simulation solutions for industry

www.andritz.com

We accept the challenge!

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 industrial 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 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.

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.

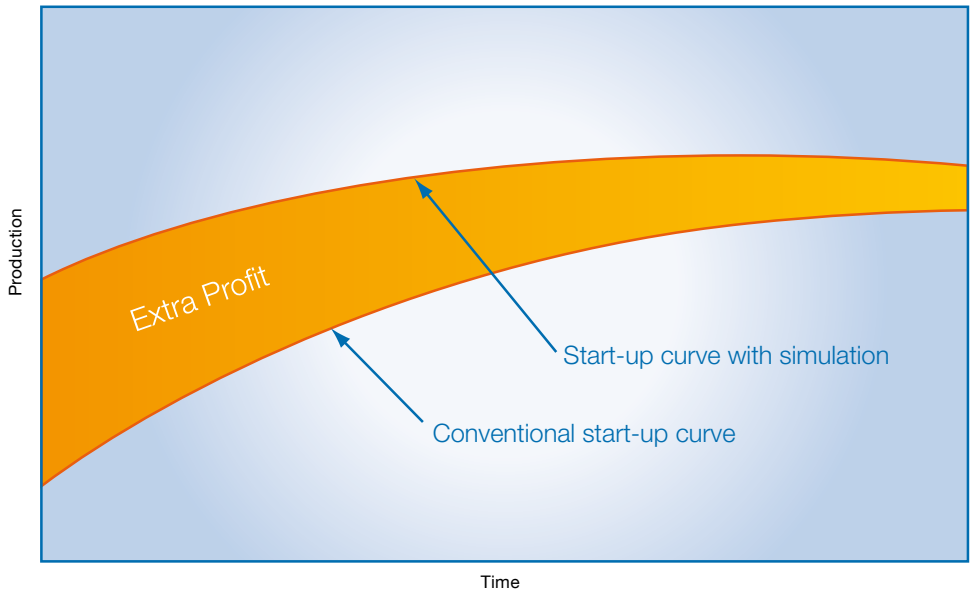
Operator training
IDEAS works much the same way as a flight simulator, providing your operators with realistic, hands-on training modules—reducing the risk to both themselves and your equipment.

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.

Find out more:



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 industrial 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 specifically for your industry, process, and site.

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 acts as a superior tool for "what-if?" analysis of 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

Customer: Enbridge Pipelines

Simulation objective:

- Simulation for pipeline control and engineering

Enbridge Pipelines, one of North America's premier pipeline companies, has come to rely on IDEAS technology to help select and engineer its entire control valve system.

Pressure control valves comprise 90% of the final control elements in Enbridge's 15,000 km liquid petroleum pipeline network in North America.

Enbridge, along with R.W. Shirt Consulting, have developed a unique technology for evaluating control valve performance in the pipeline system. "IDEAS' flexible interface and embedded ISA control valve standards provide the ideal engineering tool for our work," says Roger Shirt, Ph.D. "IDEAS has helped Enbridge achieve significant equipment cost savings, increase line stability, and reduce energy pumping expenses."

A recent challenge on the line involved the replacement of a 25-year-old control valve installation that Enbridge operators had found extremely unresponsive. An IDEAS simulation model of the pipeline showed the existing control valve installation to be greatly oversized for the current service conditions. Several candidate replacement valves were evaluated from competitive vendor bids including alternatives for adjacent piping geometry.

This process enabled selection of the most effective solution—excellent pressure control loop performance with low pressure drop across the installation.

"Annual savings of $20,000 in pumping energy costs over alternative solutions were realized," Shirt says.

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 real 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	×	✓
Tuning constants known before start-up	×	✓
Realistic process models	×	✓✓
Remove control logic errors	×	✓✓
Remove process intent errors	×	✓✓
Verify advanced control logic	×	✓

Success story

Customer: Aracruz Celulose

Simulation objective:

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

Aracruz Celulose was able to realize significant savings by using IDEAS on the Fábrica C expansion project at its kraft pulp mill in Brazil. The first job for IDEAS was to simulate and verify the process.

"The simulator allowed not only a comprehensive check-out of the process models, but also verification of the process control strategy," said André Luis Bogo and Patrícia Nunes. "(This) contributed to a comprehensive commissioning process and to one of the fastest and most effective start-ups yet witnessed in the industry."

IDEAS was also used to stage the entire DCS of the expansion. IDEAS experts traveled to the mill site in Brazil and worked directly with equipment vendors, control company, and mill personnel during commissioning. Over 1,800 DCS errors were corrected, helping the mill to achieve a record start-up of 17% above target, a figure that will see the mill generate millions in additional revenue.

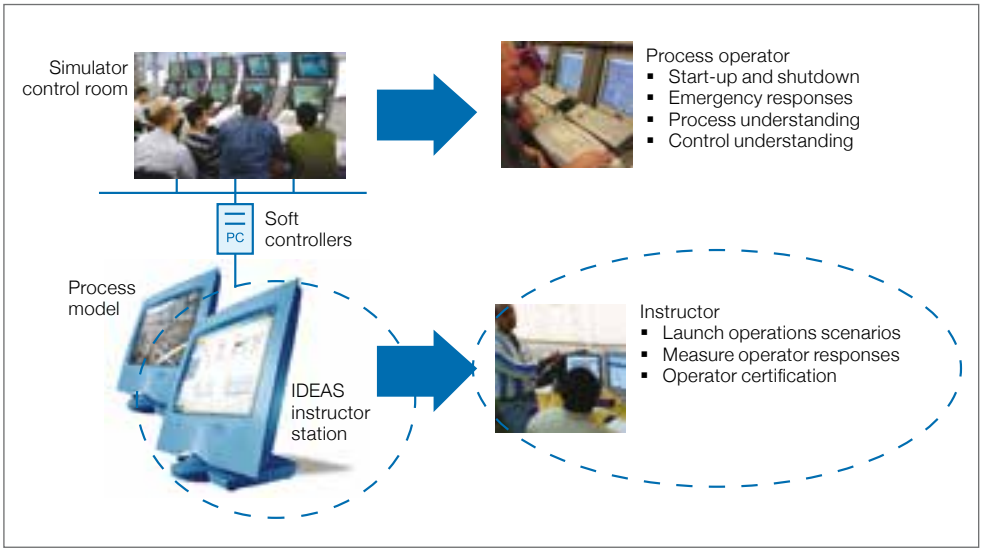
Operators were also able to learn how to run the new systems at the mill by using IDEAS.

"The whole mill was operating like it was 'real' a full two months before start-up," said Renato Guéron, Project Director for Aracruz Celulose. "The IDEAS simulation software for our new pulping line gave our operators a head start. The simulation was so close to the actual running of the line that start-up was easy, and the ramping up process was unusually fast. When you are aiming for 2,000 tpd on average, a lot of pressure was put on all of us. IDEAS reduced the pressure dramatically."

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 to themselves, the environment, or the plant.



▲ Where IDEAS instructor fits into an operator training system

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 real plant. The simulator enhances the learning process by actively involving the operators and providing immediate feedback without risk to production.

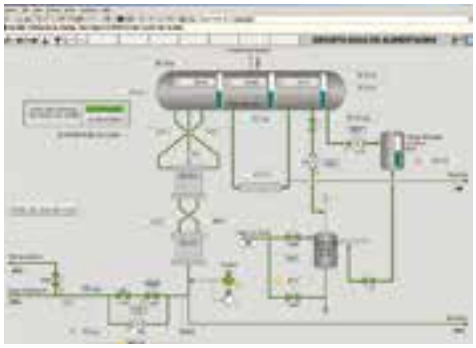
Instructor interface

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).

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

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



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

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 that 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 real 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.

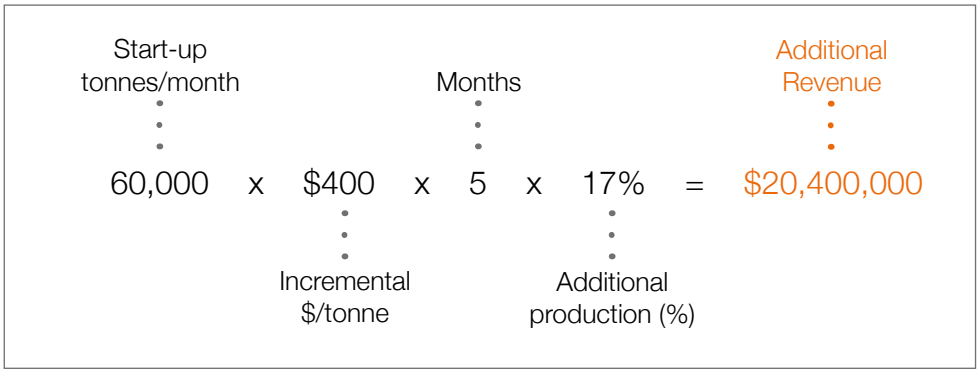
When this project was proposed, the oil sands industry was at a crossroads and Shell Albian Sands was looked on as a key "test case" for future expansions of the industry. Because of the technical and commercial success of this project, many new projects have come online since.

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.

The challenge: To realize the best net present value on your capital project

The solution: IDEAS simulation

IDEAS is the simulator of choice for the kraft pulp mill industry, being used by virtually every major pulp line to come online in the last decade. It is also the leading simulator for the oil sands industry in northern Canada and is quickly becoming the simulator of choice for the mining industry.



▲ **Increase your revenue**
Sample calculation, showing return on investment of simulation on start-up

IDEAS has been used to help some of the world's largest plants achieve start-ups that are faster, smoother, safer—and more economical. By using IDEAS, plants have realized hundreds of thousands of dollars in savings.

Simulation experts

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

Realistic process models

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

IDEAS helped these plants achieve record-setting start-ups:

- Aracruz Fábrica "C"
- Veracel
- CMPC Santa Fe II
- Botnia

Smooth start-up

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

On-site implementation

Our personnel include experienced pulp and paper 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.

The data agrees. At one South American plant, 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 'real' plant.

A standardized test with approximately 300 random questions was developed to test operator competency. The test questions were given in three intervals, once before any training, once after class training, then once again after IDEAS training. 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%

Ongoing benefits

Since IDEAS is modular and scaleable in design, many mills 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%.

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 working 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 competitors, 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.

ANDRITZ Automation

Automation solutions

Release your full potential

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