



AUTOMATION

**OPTIMIZE EFFICIENCY,
MAXIMIZE PROFITABILITY**

AUTOMATION SOLUTIONS FOR MINING

ANDRITZ

ENGINEERED SUCCESS

Optimizing plant efficiency and maximizing profitability

ANDRITZ helps mineral processing plants around the world realize their full potential by maximizing output, reducing risk, minimizing costs, and optimizing operations.

ANDRITZ can help your project to achieve superior operating results through the application of simulation-based engineering and optimization solutions, innovative process control systems and control strategies, and advanced operator training systems. ANDRITZ helps you achieve the most from your plant, your people, and your equipment.

SAFETY

Automated and optimized operations, coupled with advanced simulator-based operator training, reduces risk to operators, equipment, and the environment. This improves safety and protects your license to operate. We have had no reportable accidents or injuries in the last seven years and are MSHA accredited in the USA.

QUALITY

Simulation-based engineering reduces risk and process uncertainty, enabling the project to achieve both a smooth start-up and a quick ramp-up to full production. ANDRITZ's automation and optimization solutions help you produce consistently higher quality products.

REDUCED COSTS

Simulation-based engineering reduces capital costs by identifying opportunities for scope reduction and correcting design and logic errors that contribute to cost over-runs and project delays. Simulation also provides detailed capex and opex information to support deployment of capital decisions. Advanced process control, plant automation, and process optimization reduce operating and maintenance costs and maximize plant throughput.

SIMULATION-BASED ENGINEERING

Via high-fidelity simulation modeling and evaluation of the proposed process design and control system, simulation-based engineering unifies engineering disciplines, reduces contingencies, and corrects design issues that could lead to suboptimal operations. Process designs and control systems are validated and corrected before any equipment is ordered.

ANDRITZ's control systems are designed to ensure that systems are fully automated and optimized. For existing operations, we can determine the most cost effective





approaches for equipment replacement, process changes and plant expansion. We are vendor independent and our tools and services work with any leading electrical/power/control supplier.

AUTOMATION AND OPTIMIZATION

ANDRITZ helps you achieve greater production via process automation and the application of optimization tools such as ANDRITZ's BrainWave and Advanced Control Expert (ACE) software. BrainWave, a PID replacement controller, predicts and prevents disturbances before a process is pushed off target, and ACE acts as an "expert operator," ensuring that your plant stays at peak performance. The result is significant improvements in throughput, reductions in energy and reagent consumption, improved environmental performance, and overall decreased cost of production.

ANDRITZ also offers remote monitoring and remote operations so that a plant can be effectively managed from afar.

TRAINING

ANDRITZ helps reduce operator errors and operational inefficiencies through the use of advanced simulation-based operator training systems that are identical to what operators see and use in their control room. Operators learn how to optimize operations and how to effectively manage emergency situations before the plant is started. Risks are therefore reduced, costly errors are avoided, and the project starts smoothly and ramps up quickly to full production.

Simulation

The challenge: You're designing a multi-million dollar process, but how do you know it will work?

The solution: Fix problems before equipment is ordered.

The ANDRITZ dynamic simulator, IDEAS, is the world's leading simulator for kraft pulp mills and oil sand developments. It is becoming the simulator of choice for the mining, pulp and paper, power, chemical, and manufacturing industries.

Simulation unifies the multitude of engineering disciplines by using a centralized design database. The use of a centralized database leads to fewer design errors and control system problems, reduced contingencies, faster design and implementation, and improved business readiness.

IDEAS lets you test innovative design concepts at low cost and low risk, and helps you audit your plant so that you can identify and implement improvements. The modular structure of IDEAS means that you don't have to buy a full-performance, plant-wide package if you only need to simulate and review a small area.

SOLUTIONS FOR PROCESS DESIGN AND EXPANSION REVIEW

IDEAS simulation 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 and before any capital is committed. Simulation allows for quick and easy scale-up from a bench or test plant process to a full-scale plant complete with capital and operating cost information.

DISTRIBUTED CONTROL SYSTEM (DCS) VERIFICATION

IDEAS simulation stages and tests your control system quickly and accurately, reducing the steep curve to start-up. Studies show that using simulation to help with start-up can correct up to 82% of control logic problems before field implementation. By using IDEAS for DCS verification, mineral processing plants have realized hundreds of thousands of dollars in savings.

BENEFITS

- Design processes without spending capital
- Test and verify control logic for smoother start-up—catching 82% of errors before field implementation



Operator training

The challenge: You're training operators on a new process, but can you meet your start-up schedule?

The solution: Use simulation-based operator training.

SIMULATION-BASED TRAINING

Our specialized training software, IDEAS Instructor, works like a flight simulator. Trainees gain realistic hands-on experience without harming themselves, the environment, or the plant. The IDEAS Instructor can integrate with all major control systems or operate alone to provide the industry's most realistic training experience.

At one plant, operators used the IDEAS simulator to practice start-up, shutdown, and emergency sequences months prior to start-up. A standardized test with 300 questions was developed and given at three intervals—once before training, once after class training, and once after IDEAS training. The results clearly showed that the IDEAS training remarkably improved operator competency.

WEB-BASED TRAINING (WBT)

WBT also provides an effective and measurable form of personnel training. Information about the process is gathered, organized, and delivered in a way that moves from broad concepts to detailed information on specific pieces of equipment.

Incorporating the senses accelerates learning, so WBT uses pictures, animation, graphics, sound, and text to

create an engaging experience. Students learn up to 70% faster and retain up to 60% of the information provided with computer-based training vs. instructor-based training. A testing engine measures and stores employee results, and plant-specific knowledge can be incorporated into the training program to ensure it is successfully passed on to future generations of operators.

When combined with the IDEAS simulator, WBT effectively reinforces operations knowledge by allowing trainees to see the procedures first on the WBT and then again on the simulator. The system can be updated, maintaining your investment into the future.

BENEFITS

- Train operators to reduce risk to equipment, personnel, and the environment
- Training software that operates like a flight simulator

“The operator interface was so intuitive that on the job operator training took little time. Implementation of the new system took place while we continued to operate and deliver ore to our operations; nothing was compromised .”

JOHN BRADY

Operations Supervisor, Rio Tinto Alcan



Electrical, power, controls, and instrumentation

The challenge: The equipment is installed, but will it start up?

The solution: Review every aspect of your plant's system.

Whether it's a greenfield or brownfield project, electrical, power, controls, and instrumentation typically account for a small portion of the total project budget, but their importance is paramount. All mechanical equipment must be "bolted down" before these systems can be installed. Come installation, most of the project budget has been spent and many owners assume that the plant will simply start up without incident or delay.

ANDRITZ has an engineering group focused on the design of these systems. Our battery limit covers:

- Substations, including complicated and protracted negotiations with power utilities
- Power distribution, including harmonics and filtering; MCC; E-Houses
- DCS, PLC/HMI
- Instrumentation
- Field cabling, including data networks, power, controls, and instrumentation
- Process data, ready for import into your Enterprise Resource Planning system

Studies show that reducing start-up time can generate benefits of \$100–500K per day. Further, reducing unscheduled downtime can save \$5–50K per hour, and reducing failures and incidents can save \$50K–1M per incident.

"We saved a good three weeks commissioning time at start-up as a result of using the IDEAS simulator for staging the DCS."

RUSS BABCOCK

Teck Ltd., Trail Operations, B.C.



On one recent mining project, ANDRITZ used its innovative engineering capabilities to achieve a smooth and error-free start-up with minimal impact to existing operations.

ANDRITZ structures its scope of supply to fit your commercial needs, from engineering to equipment supply, procurement, and construction. We have the people, the patents, and the proven tools to help your plant release its full potential.

BENEFITS

- Achieve maximum operational efficiency
- Increase productivity and improve product quality
- Improve environmental compliance
- Achieve maximum ROI





Optimization

The challenge: Your plant has complicated processes, but are they being controlled adequately?

The solution: Optimize your plant's processes with our advanced predictive control systems

ANDRITZ offers complete optimization solutions, helping industrial facilities worldwide achieve operational readiness quickly and efficiently. Our real-time database tool scans all process points in an operation, identifying where the biggest process control benefits can be realized. Advanced analysis tools help to further determine where the process needs improvement.

PROCESS CONTROL

Once a problem has been identified, our patented PID replacement controller, BrainWave, can be implemented to help optimize your operation. BrainWave easily integrates with existing control systems and has an average implementation time of less than two weeks.

BrainWave outperforms PID because of two main components: an adaptive model and a predictive controller. The adaptive model builds its own live models during normal plant operations, a powerful feature not offered by traditional Model Predictive Control systems.

In addition, the patented Laguerre methodology of BrainWave builds high-fidelity models in real time without disrupting operations. These models adapt as the dynamics inside your operation change due to weather, wear, and other factors.

BrainWave's predictive controller accurately forecasts process responses and accounts for multiple objectives. It predicts and prevents disturbances before a process is

pushed off target (PID, by comparison, must wait for the error to occur, then react).

EXPERT OPERATION

Once BrainWave has stabilized your process, your operation can be taken to the next level with Advanced Control Expert (ACE). ACE is an automated "expert operator" that works in conjunction with the BrainWave solution to fully optimize a process. ACE determines the best set points so that a process can operate at maximum efficiency. The expert operator in ACE is always at full attention, never distracted, and achieves optimum conditions for your plant.

Using BrainWave and ACE, clients have reported significant operational improvements. The Collahuasi Mine in Chile has reported reductions in process variability of up to 52%, increases in flotation recoveries of over 2%, and crusher throughput increases of over 10%.

BENEFITS

- Stabilize and control difficult processes
- Easily integrate existing control systems
- Increase production efficiency, product quality, and profitability





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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