

Automation solutions

Release your full potential



Simulation



Electrical
and controls



Operator
training



Optimization

The challenge: To release the full potential of your operation



The solution: Simulate. Measure. Control. And profit.

Every organization has its strengths and a good leader knows what they are. But knowing your strengths and maximizing them are two different things. How do you know you are releasing the full potential of your assets? How do you know you are getting the most out of your people and processes?

That is where ANDRITZ AUTOMATION can help. We work in four key service areas, providing solutions that have helped industrial facilities around the world maximize output,

minimize costs, and optimize operations. We are technology leaders in several industries, including pulp and paper, oil sands, mining, lime, chemicals, and power. Our solutions harness the creativity, talent, and strengths already inherent in your company. No matter where you find yourself in the project approval process, we have the knowledge, the patents, and proven tools to help you realize the best Net Present Value (NPV), and to embark on a path of continuous improvement.

Simulation

Our dynamic process simulation tool, IDEAS, lets you quickly test and verify design concepts at low cost and low risk. It is an excel-

lent tool for staging, testing, and validating control concepts and logic. If you need to make the most of your existing assets, then IDEAS can also be used as a model predictive planning tool.

Electrical and controls

Our team of engineers and designers has hands-on experience at facilities around the world. We focus on electrical, controls, and instrumentation solutions for a wide range of industries, and bring the knowledge of our people and the power of our products right to your site, whether it's in the middle of an urban industrial complex—or the middle of the jungle.



Success stories from around the globe

- The IDEAS simulator helped the Aracruz Celulose kraft pulp mill in Brazil achieve a record start-up: 17% above target, generating millions of dollars in additional revenue
- The BrainWave advanced controller enabled Lonza Group to increase capacity by 40% at their manufacturing plant in Pennsylvania
- ANDRITZ AUTOMATION used advanced control concepts at a pebble lime facility in the United States to reduce product variability by 50%, increase fuel efficiency by 3% and increase production by 15%



Operator training

We offer proven solutions for industrial training, including web-based and simulation-based training, which provide your workers with realistic, hands-on training modules—reducing the risk to themselves, your equipment, and the environment. We will make sure your operations team is prepared to start the plant and run it so that it is always optimal.

Optimization

Our real-time database can detect operational issues in a process that can then be optimized with our advanced process control tools and controls specialists. Our pat-

ented PID-replacement controller, BrainWave, helps stabilize operations and difficult control issues. Once the process is stabilized with BrainWave, we optimize your process with Advanced Control Expert (ACE), which acts as an “expert operator,” ensuring that your plant stays at peak performance.

Releasing your full potential results in continuous innovation

ANDRITZ AUTOMATION believes that in order to remain competitive, you need to be constantly looking for new ways to improve your operation: New ways to automate your existing equipment, new ways to measure performance, and new ways to motivate

your people to enhance operating and reporting methods.

We will work with you to identify your full potential, and continuously innovate with you to reach for it. Releasing your full potential is more than a destination—it is an attitude of embracing continuous innovation.

The challenge: You're designing a multimillion dollar process — are you sure it's going to work?



The solution: Simulation

The **ANDRITZ AUTOMATION** dynamic simulator, **IDEAS**, is the world leader for kraft pulp mills and oil sand developments and is quickly becoming the simulator of choice for the paper, mining, power, and manufacturing industries.

IDEAS lets you test innovative design concepts quickly, at low cost and low risk. Its real-time graphic interfaces are so life-like that it can train your operators quickly and cost-effectively. It helps you audit your plant so that you can identify and implement improvements. And the modular structure of IDEAS means that you don't have to buy a full-performance, plant-wide package when you only need to simulate a small area.

Solutions for process design

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

Solutions for control logic (DCS) verification

IDEAS simulation helps stage and test your control system quickly and accurately, reducing the steep curve to start-up. In fact, 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. By using IDEAS, plants have realized hundreds of thousands of dollars in savings.

IDEAS communicates with all major PLC or DCS equipment. Using our OPC server, OPC client or one of our custom communication drivers, IDEAS can make the task of control system logic verification more manageable and consistent.



What our customers say

“I believe the IDEAS models are the highest fidelity that have ever been achieved in the oil sands industry. They were very complex...they [ANDRITZ AUTOMATION] have created a simulator that without any question is the best there is in the industry.”

Bob Tipman, PhD, Process Specialist
Shell Albian Sands

“A combination of superior operator training and correction of DCS logic errors resulted in the smoothest and fastest start-up in fiberline history...we reached full capacity in 16 days [instead of 90] and were above design within one month; we would not have achieved this without the IDEAS simulator.”

Jeff Stevens, Manager, Pulping Technology
Bowater, Catawba Operations

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

André Luis Bogo and Patrícia Nunes
Aracruz Celulose

Success story

Aracruz Celulose was able to realize significant savings by using IDEAS on the Fabrica C expansion project at its kraft pulp mill in Brazil.

IDEAS was used to stage the entire DCS of the Aracruz mill. 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 of dollars in additional revenue. Total site capacity is now 2 million tons per year. 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 t/d on average, a lot of pressure was put on all of us. IDEAS reduced the pressure dramatically.”



Benefits

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

The challenge: Your equipment is installed— but will your plant actually start up?



The solution: Electrical and control services

The control system in a modern industrial facility touches every piece of equipment and instrument in the plant, like a nervous system touches every muscle and receptor in your body. Nothing will be conveyed, ground, classified, pumped, processed, calcined or dried until the plant's "nervous system" is operationally ready. In short, the control of your plant's system can mean the difference between profit and loss.

That's why ANDRITZ AUTOMATION has an engineering group focused on the design of your electrical, controls, and instrumentation systems. Whether it's a greenfield or brownfield project, electrical, controls and instrumentation typically account for a small portion of the total project budget—but its importance to the operation of a plant is paramount. All mechanical equipment must be "bolted down" before the electrical, controls, and instrumentation systems can be

installed—by the time it is installed, most of the project budget has been spent and many owners assume that the plant will simply start up without incident or delay. But before you can start realizing a return on your investment, we ask you to consider these critical questions about your plant's control:

- Has all your wiring been properly terminated?
- Have all your motors been "bumped"?
- Has your I/O verified against the DCS/PLC/HMI?
- Are your control networks operational?
- Is your control system configured correctly?
- Is your operating and maintenance staff trained?

ANDRITZ AUTOMATION will help your plant be ready for operation—on time. Our battery limit covers all electrical, controls and instrumentation, including:

- Substations, including the complicated and protracted negotiations with power utilities

- Power distribution, including harmonics and filtering
- MCCs
- DCS
- PLC/HMI
- Instrumentation
- Field cabling, including data networks, power, controls, and instrumentation
- Process data, in a form ready for import into your Enterprise Resource Planning system

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

What our customers say

“The control system did everything as expected; 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

“ANDRITZ AUTOMATION engineers worked on the Cerro Verde Copper Concentrator DCS programming and configuration project in Arequipa, Peru. It was my pleasure to work with ANDRITZ AUTOMATION engineers as they performed their work in a professional manner. I would highly recommend them on any DCS configuration project.”

Ron Cook, Superintendent, Process Control
Freeport-McMoRan

“During our recent conversion to PLC operations at both our Harrington & Tolk coal handling facilities, it was particularly important that we were able to continually supply fuel to our customer without interruption. ANDRITZ AUTOMATION did a fantastic job and our ability to serve our customer was never compromised.”

Byron P. Lawrence, General Manager
Savage Energy Services

Success story

The ANDRITZ AUTOMATION project team supplied all engineering, procurement and project management services to triple the capacity of a hydrator plant and reduce

emissions to current day standards, all within the original plant’s footprint. In order to meet the project budget, the product milling and classifying system was upgraded using re-conditioned equipment.

In addition, ANDRITZ AUTOMATION fully automated the process so that the plant could be remotely operated from a control room 200 meters away.



Benefits

- Start up your plant — quickly, safely, reliably
- Achieve maximum operational efficiency
- Increase productivity
- Improve product quality
- Improve environmental compliance
- Achieve maximum return on investment

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



The solution: Operator training

ANDRITZ AUTOMATION offers proven solutions to help you release the full potential of your most valuable resource — your people.

Web-based training

Web-Based Training (WBT) provides the most effective and measureable form of training for your personnel. Information about the process is gathered, organized and delivered to customers so that operators with or without experience can learn in a way that starts with broad concepts, right down to detailed information on specific pieces of equipment.

WBT uses pictures, animation, graphics, sound and text to bring information together in an engaging way that keeps the student wanting to learn. Knowledge is accelerated when more senses are involved, so your employees will learn more, faster and will have higher retention rates. Back that up with a

testing engine that measures and stores employee results, and you have a way to train that is exceptional.

When combined with the IDEAS simulator, WBT allows a very effective reinforcement of operations knowledge by seeing the procedures first on the WBT and then again on the simulator. The system is designed so that it can be maintained and updated, so your investment is maintained into the future.

Simulation-based training

Our specialized training software, IDEAS Instructor, works in much the same way as a flight simulator, allowing your trainees to gain realistic hands-on experience without inflicting harm on themselves, the environment or the plant. IDEAS Instructor can integrate with all major control systems or operate stand-alone to provide the most realistic training experience in the industry.

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%

What our customers say

“The IDEAS Simulator is the core of our Panel Operator Training Program. Without this tool, the effectiveness of our training program would be significantly reduced.”

Jeff Lee, Lead Simulator Trainer
CNRL

“The main objective of the IDEAS simulator was to prepare our operators before the opening of the Santa Fe plant. The result was very good; I would say excellent. The users’ understanding of the simulation’s objectives was very well accomplished, as they made their way out from situations of difficult scenarios of operation.”

Javier González, Project Engineer
CMPC Celulosa

“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 t/d on average, a lot of pressure was put on all of us. IDEAS reduced the pressure dramatically.”

Renato Guéron, Project Director
Aracruz Celulose

Success story

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 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 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.



Benefits

- Train operators to reduce risk to mill, personnel, and the environment
- Training software that works like a flight simulator, helping employees gain valuable experience

The challenge: Your plant involves complicated processes — are you controlling them adequately?



The solution: Optimization

ANDRITZ AUTOMATION offers complete optimization solutions for industry, helping facilities worldwide achieve operational readiness—quickly and efficiently.

Process analysis

Our real-time database tool scans all process points in an operation, identifying where the biggest process control benefits can be realized. This data is then used in our planning and continuous monitoring. It includes advanced analysis tools to determine where the process needs the most help

Process control

Once a problem has been identified, Our patented PID replacement controller, BrainWave, can be implemented to solve difficult process control problems and help optimize your operation. BrainWave easily integrates with existing control systems and has an average implementation time of less than two weeks. In addition, your own people can

deploy and maintain BrainWave, making it a technology that you can live with—and one you can't afford to live without.

BrainWave outperforms PID because of its 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, then 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.



What our customers say

“The control continues to be excellent. In DCS control, our level was ± 0.015 ", while BrainWave was able to maintain ± 0.002 ". I printed the 24-hour trend chart for that period showing BrainWave controlling for 7 hours, Bailey DCS for 10 hours, and back to BrainWave for the remaining 7 hours and the charts show a graphic picture of why we need BrainWave for controlling glass level in our furnace!”

Ernie Curley, QA Manager
Cardinal Glass

“BrainWave provided the robust and reliable control demanded by industry, and is a significant improvement over the existing DCS-based PID control scheme.”

Dr. Bruce Wilson, Sr. Control Applications Engineer
Suncor Energy

“This was something that could be done immediately with very little cost. And it did not require any outages; it was done on the run.”

Andrey Pawelczak, Contact Engineer
Syncrude Canada

Success story

Antofagasta PLC's Minera Los Pelambres has one of the largest open pit mines in Chile and produces approximately 320,000 tonnes of copper concentrate annually.

The patented BrainWave advanced controller was successfully installed at the mine's copper concentrator site in order to tightly control the weight in the SAG mill to promote optimum grinding. While the site already had

an expert system in use to help stabilize the process and boost production, the BrainWave advanced controller was able to enhance the overall performance by providing precise control of mill weight.

Optimal operating conditions were better maintained without the risk of mill overload. The complete solution for both SAG mills was installed in two weeks, with some remote follow-up.

Once BrainWave was installed, the improvement was noticeable immediately. Weight was easily stabilized, and previously troublesome events such as large and sudden changes in recycle were easily handled. This improved SAG mill control performance translates directly into higher profits.



Benefits

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

Automation solutions

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