

Automation Solutions

Are you ready?



We accept the challenge!

ANDRITZ

The challenge:

To achieve operational readiness

Whether you are installing a new process within an existing plant or starting up a brand new mill, your challenge is the same. Your equipment needs to be online and ramp up to optimal production—quickly. Your people need to know how to run the plant—safely and reliably. And you need to start realizing returns on your capital investment—immediately.

And so, as you stand on the shoreline of your project and stare out into the uncharted waters ahead, there is really only one question you need to consider: Are YOU ready?

Are you ready to perform? Are you ready to produce results? Are you ready to leverage everything you can from your project? Are you ready to ride the waves to success?

Andritz Automation will help you be ready. We help customers cross the rough waters between concept and production to help you achieve operational readiness — quickly, safely, accurately, and ahead of the curve.

How do we do it? Through the power of a dedicated team, focused on implementation, a team that draws on the power of some of the world's leading simulation, control and measurement tools.

Engineered Systems

Our team of engineers and designers has years of hands-on experience at facilities around the world. We focus on electrical, controls and instrumentation solutions for a wide range of industries including pulp and paper, oil sands, mining, metals, glass, lime, chemicals,

power, food and beverage, and consumer products. We 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.

Tools

We have a suite of dedicated tools to help you reach operational readiness, regardless of where you find yourself in the project life cycle.

Our **dynamic process simulation tool, IDEAS**, lets you quickly test and verify design concepts at low cost and low risk. It is an excellent tool for staging, testing, and validating control logic. When it comes to operator training, IDEAS works much the same way as a flight simulator, providing your workforce with realistic, hands-on training modules—reducing the risk to both themselves and your equipment.

We offer a complete **advanced process control** solution for industry. Our patented PID replacement controller,



BrainWave®, helps stabilize operations and difficult processes. Once the process is stabilized with BrainWave, we optimize your process with **ACE® (Advanced Control Expert)**, which acts as an “expert operator,” ensuring that your plant stays at peak performance.

Of course, you can't improve what you can't control—and you can't control what you can't measure. That's why we offer a suite of **online instruments** to measure critical operational parameters. All our instruments are automated and installed in your facility to provide a live, ongoing picture of your operation, using the latest technology to deliver the most accurate measurement.

Andritz Automation is dedicated to working with you to help harness the power of our products and services to bridge the gap between the concept of your project and its actual operation. With your vision and our technology and expertise, the possibilities are limitless. You may not be ready yet—but with our help, you soon will be.





Success Stories from across 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
- ▶ By installing Andritz Automation's SpectraVision sensor, the PERLEN mill in Switzerland was able to control the high consistency TWIN refiner in an optimal operation window, **leading to better product quality**
- ▶ 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%**



The challenge:

My equipment is installed—but how do I know my plant will actually start up?

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 Engineered Systems group focused on the design of your electrical, controls and instrumentation systems. We have the people, the patents, and the proven tools to ensure that your plant is operationally ready—so that when you press that "start" button in your plant...it actually starts.

Whether it's a greenfield or brown-field 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 again 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 our scope of supply to fit your commercial needs, from engineering to engineering and equipment supply, to engineering, procurement and construction.

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 reconditioned equipment. In addition, Andritz Automation fully automated the process so that the plant could be remotely operated from a control room 200 meters away.

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

Benefits

What our clients 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
Phelps Dodge Corporation

“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. We are very appreciative of the team's efforts and will welcome other opportunities to work with them.”

Byron P. Lawrence, General Manager
Savage Energy Services



The challenge:

You're designing a multimillion dollar process — how do you know it's going to work?

Andritz Automation's 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. Simply put, it is the best simulator available for helping your facility reach operational readiness.

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.

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.

Solutions for Operator Training

IDEAS can help you get the most out of your most valuable resource—your people. 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 standalone to provide the most realistic training experience in the industry.



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 to achieve smoother start-up**
- ▶ **Train operators to reduce risk to mill, personnel, and the environment**

What our clients 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 [IDEAS] have created a simulator that without any question is the best there is in the industry."

Bob Tipman, PhD
Process Specialist
Albian Sands Energy

"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

"IDEAS allows numerous complex alternatives to be evaluated quickly and accurately to facilitate the definition and selection of investment solutions of higher value. International Paper has identified capital effectiveness improvements from the system to be in the order of \$100 million annually."

Paul Herbert
International Paper



The challenge:

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

Andritz Automation offers complete advanced control solutions for industry, helping facilities worldwide achieve operational readiness—quickly and efficiently.

Solutions for Control

Our patented PID replacement controller, BrainWave®, solves difficult process control problems and helps 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).

Solutions for Expert Operation

If you have achieved outstanding success stabilizing your process with BrainWave, you can take your operation to the next level with ACE® (Advanced Control Expert). ACE is an automated "expert operator" that works in conjunction with the BrainWave solution to fully optimize a process.

BrainWave makes sure your process gets to set point and stays there. But how do you know if you have the best set point to run your process? Which set point will help you save the most energy? Will changing the set point improve your product quality? Will it help you save money?

That's where ACE comes in. Once BrainWave has stabilized your process, then ACE can be implemented to determine the best set points, so that the 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.



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**

What our clients 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

"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

"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,
Senior Control Applications Engineer
Suncor Energy



The challenge:

You are producing tons of product every day — how do you know it's meeting specification?

Andritz Automation offers a suite of state-of-the-art online instruments that help facilities run more smoothly, reduce downtime, and improve their operational readiness.

Solutions for Condition Monitoring and Diagnostic

Measuring condition diagnostics can be extremely challenging. The Andritz Acutest™ solution uses acoustic emission-based technology to detect failures in slowly rotating machine elements and cracks/leakages at pressure vessels and pipes in a wide range of industrial facilities. By receiving predictive diagnostics information from the process equipment on time, Acutest can help you avoid unplanned shut-downs and production losses.

Solutions for Refiner Systems

New technologies make it possible to get a picture of your actual process at points in the pulping system that have traditionally been difficult to analyze. Online equipment, particularly for the high consistency area after the first refining stage, is rare on the market and requires labor-intensive calibration procedures. Accuracy and long-term

stability are also big challenges for these devices. Andritz Automation has developed high-tech sensors especially for refiner systems.

SpectraVision™

This powerful online measurement system provides fast and accurate pulp consistency and freeness directly at the refiner's blowline. The fast response of SpectraVision to control those key refining parameters opens new opportunities for controlling energy efficiency and pulp quality.

GAP Scan Measuring System

The refining gap has major impact on the pulp quality. Gap changes occur during operation due to chip feeding variation. The Andritz Gap Scan Measuring System provides refiner control systems with real time refiner gap information. This enables best pulp quality immediately after production starts.

FiberVision™

This state-of-the-art online sensor that helps pulp operations reduce specific energy consumption, achieve higher value product, improve frequency of measurement and decrease downtime. By measuring properties such as specific surface area and specific fiber volume, FiberVision is able to optimize fiber development and improve your energy consumption.

Solutions for Woodyard Systems

Andritz Automation has developed the Scan™ sensor family to automate and optimize the process in the woodyard area. All the Scan products are equipped with a camera, a lighting unit and a separate image processing unit for analysis.

LogScan™

This automatic measuring system is used in combination with log sorters at ground-



wood mills. LogScan identifies logs that are inside the acceptable dimension range, then sends them to the grinder room. Manual log classification and sorting is inaccurate, so why not automate the whole process with LogScan?

ChipScan™

Correct chip size distribution has a strong effect on efficiency and yield in the cooking process, but getting this fact-based information is difficult to obtain by using conventional methods. The ChipScan system provides automatic chip quality information that can be utilized to help downstream processes.

BarkScan™

Raw material consumption has an essential role in the debarking process. BarkScan is a measurement system that provides real time information about the wood amount at the bark conveyor (wood losses), thus enabling the debarking process to run at an optimum level.

WoodScan™

One of the main tasks of the debarking process is to produce a defined capacity of debarked logs with sufficient debarking degree. WoodScan™ is a measurement system that provides real time information of the debarking degree of the logs coming out from the debarking drum, thus enabling the debarking process to run at an optimum level.

Benefits

- ▶ **Measure crucial parameters in key pulping process areas**
- ▶ **Reduce energy consumption**
- ▶ **Improve frequency of measurement**
- ▶ **Produce higher value product**

What our clients say

“At long last, there is a sensor that can measure and improve the control of pulp quality. Clearly the most significant development in pulp quality monitoring in the last twenty years.”

Confidential Client

“By separately measuring the Specific Surface Area of the fibers and that of the fines, FiberVision has given us a lot of information regarding the refining process and its relation to fiber quality. The progresses that we have made in the understanding of the refining process will result in substantial energy savings and improved paper quality.”

Jocco Dekker, R&D Manager
Wageningen UR

“Pulmac testing has been phased out, and total reliance on FiberVision has eliminated slowdown due to dependence on Pulmac data. Historically unreliable [Pulmac] test data had caused slowdown of the machine. FiberVision units have totally eliminated [this problem]. As a result, the mill has increased both GWD and TMP production.”

Art Stickney, Area Manager, Pulp Mill
Verso Paper



Automation Solutions

to help you achieve operational readiness



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