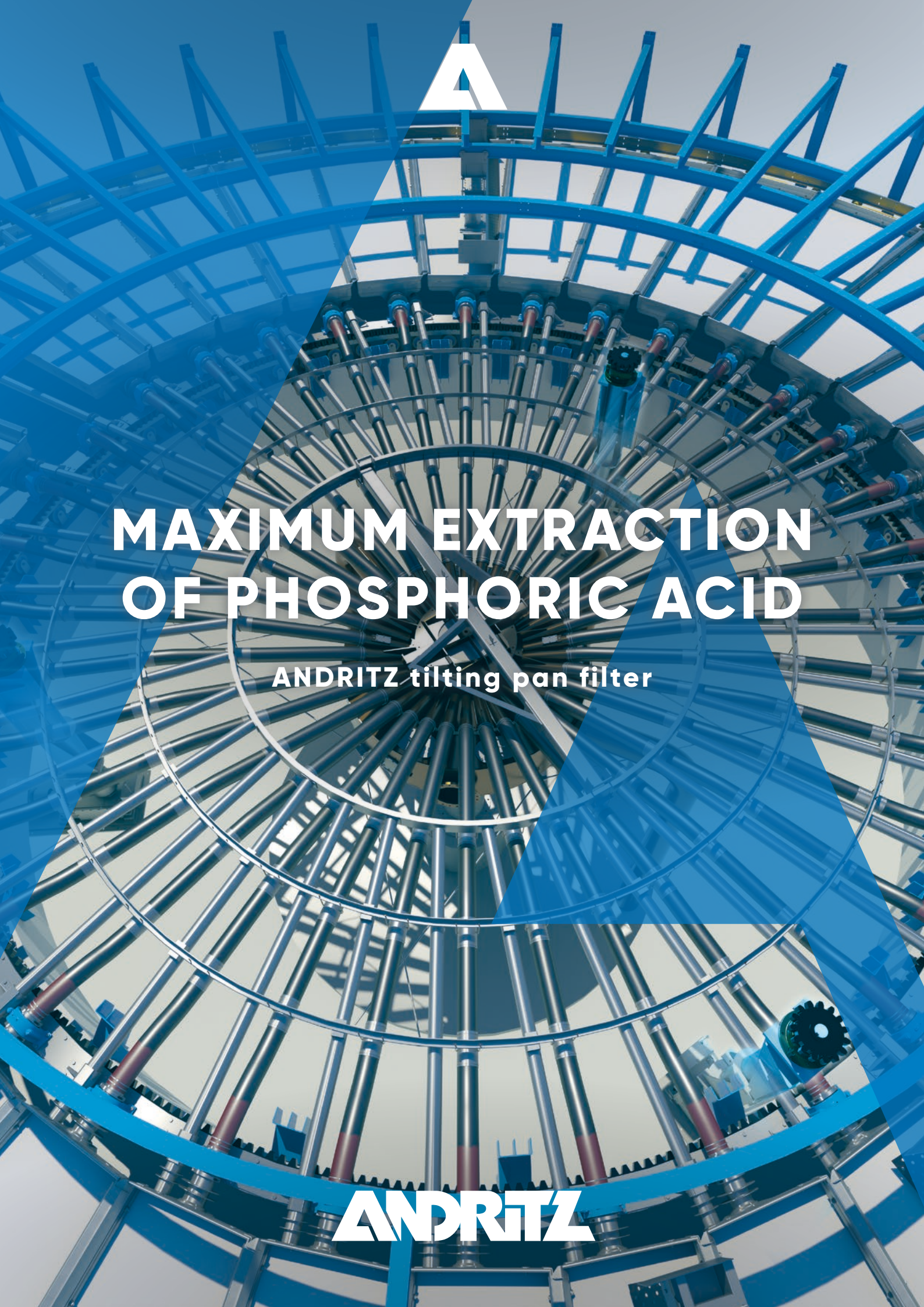


MAXIMUM EXTRACTION OF PHOSPHORIC ACID

ANDRITZ tilting pan filter

ANDRITZ

Formerly known as the Bird-Prayon* tilting pan filter, the ANDRITZ tilting pan filter has evolved into a highly customizable unit to serve the needs of phosphoric acid producers. With over 300 legacy systems installed worldwide and thanks to its robust features and exceptional washing efficiencies, the ANDRITZ tilting pan filter has also been introduced in other applications including phosphate rock desliming, potash slimes, jarosite, copper ore, activated carbon, cobalt, zinc and uranium.

*Please note: PRAYON is a registered trademark owned by Prayon S.A.

A single unit for efficient flood washing

Since its introduction in the 1960s, the ANDRITZ tilting pan filter has evolved to become a highly customizable system. With its large filter sizes (filter areas in excess of 200 square meters), it is the ideal solution for phosphoric acid extraction by flood washing and serves the needs of phosphoric acid producers to best advantage.

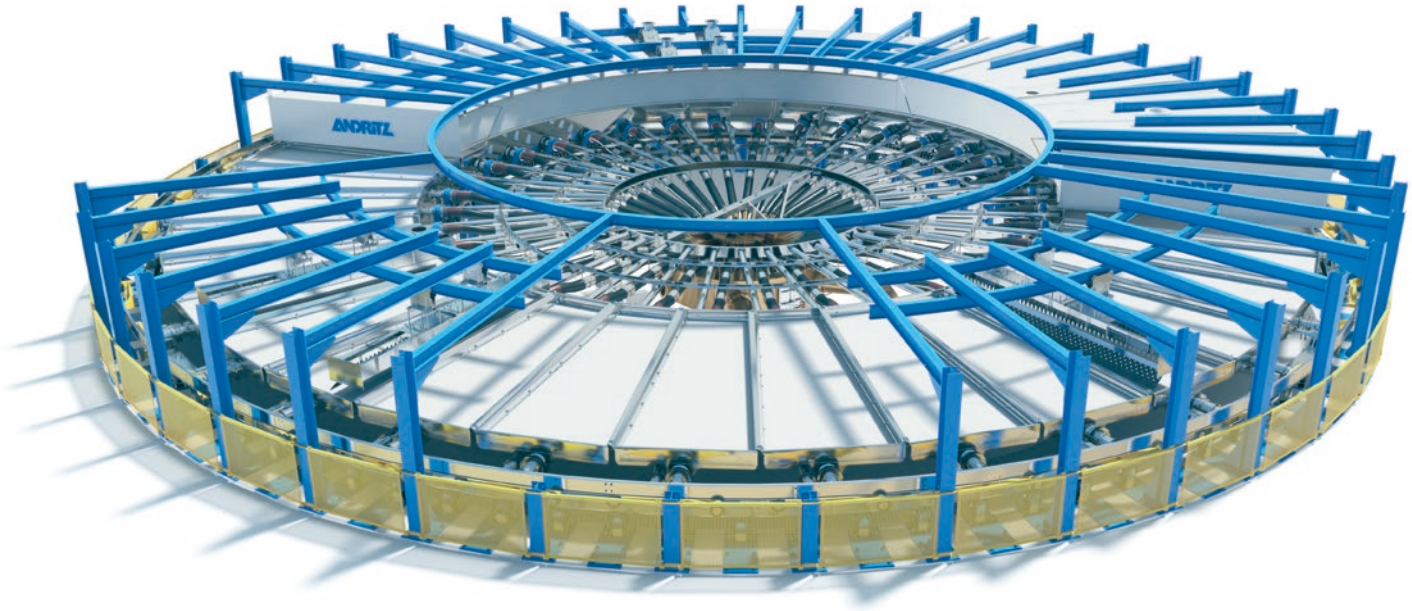
AN INGENIOUS DESIGN TO EXTRACT PHOSPHORIC ACID FROM PHOSPHOGYPSUM

The tilting pan filter is a vacuum filter consisting of two main zones:

- A flood washing zone with multiple counter-current or co-current wash boxes to displace phosphoric acid from the phosphogypsum cake. The cake is flooded at all times to maintain the vacuum seal.
- A drying zone at the end to extract residual moisture.

BENEFITS

- Unparalleled efficiency (uses less water than other separation technologies with comparable filtration area)
- Energy-efficient as the connected horsepower can consist of only a single vacuum pump and compact drive
- Unsurpassed reliability due to robust design
- High production flexibility thanks to heavy-duty rotating frame mounted on support rollers to accommodate extra-heavy loads in times of peak production demand
- Deep pan depth and horizontal cake orientation for flood washing of solids to extract maximum acid content
- Precision filter cloth washing ensures that the filter cloth remains unblinded for the maximum length of time
- Easy maintenance requiring only brief training



ANDRITZ tilting pan filter, a highly customizable system for phosphoric acid extraction

Flexibility in filtration settings with central valve

The flexibility in adjustment of filter settings through the central valve allows for a wide range of feed rates and different ores to be processed.

HIGHLY FLEXIBLE AND EASY TO ADJUST

The ease of adjustability of central valve partitions allows for optimum distribution of product acid, recycled acid and counter-current wash filtrates, which translates into a minimum of fresh water consumption and maximum capture of high-strength acid. In addition, the feed box and wash box designs allow uniform distribution of slurry feed and washing liquor across the pan. Overhead rails can be used to adjust the wash box position, thus ensuring that the filter area is used to best advantage for the respective filter load.

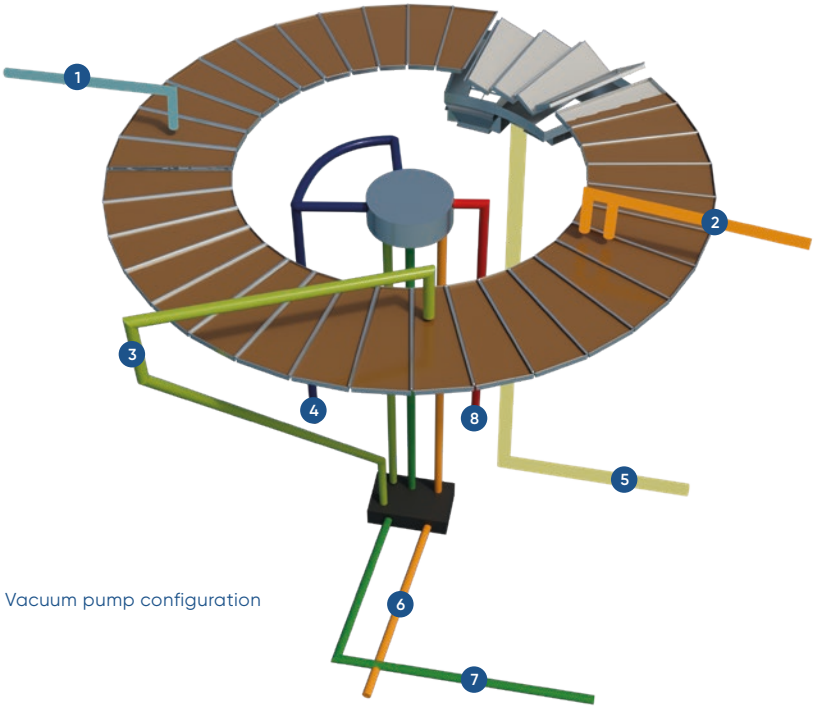
SINGLE OR DUAL VACUUM SECTIONS FOR HIGHEST ENERGY EFFICIENCY AND MAXIMUM VACUUM

The single vacuum section is commonly used for single vacuum pump operation to minimize energy consumption. The dual vacuum sections allow for a dedicated vacuum pump for the cake drying section, translating into a drier cake and a higher vacuum in the cake washing section (because the vacuum in the cake washing section is not affected by air intake in the cake drying section).

Single or dual vacuum selection will depend on the filtration characteristics of the slurry. The faster-filtering the slurry, the more beneficial the dual vacuum system becomes. ANDRITZ can determine the slurry characteristics up front from a bench-scale leaf test to decide whether a dual vacuum system would be beneficial.

BENEFITS

- **Optimum filtrates distribution ensuring minimum fresh water consumption and maximum capture of high-strength acid**
- **Reduced water-soluble P_2O_5 losses**
- **Easy maintenance with central valve upper manifold lifting system**
- **No downtime for greasing, resulting in higher productivity**
- **Lower final cake moisture**
- **Reduced scaling**
- **Adjustable compartment baffles, either manually (standard) or automatically (optional)**



Vacuum pump configuration

1. Cake wash water
2. Feed slurry
3. 3rd filtrate
4. Primary vacuum pump (filtrate extraction)
5. Cake
6. 1st filtrate (product acid)
7. 2nd filtrate (recycled acid)
8. Optional vacuum pump for drying zone (moisture extraction)

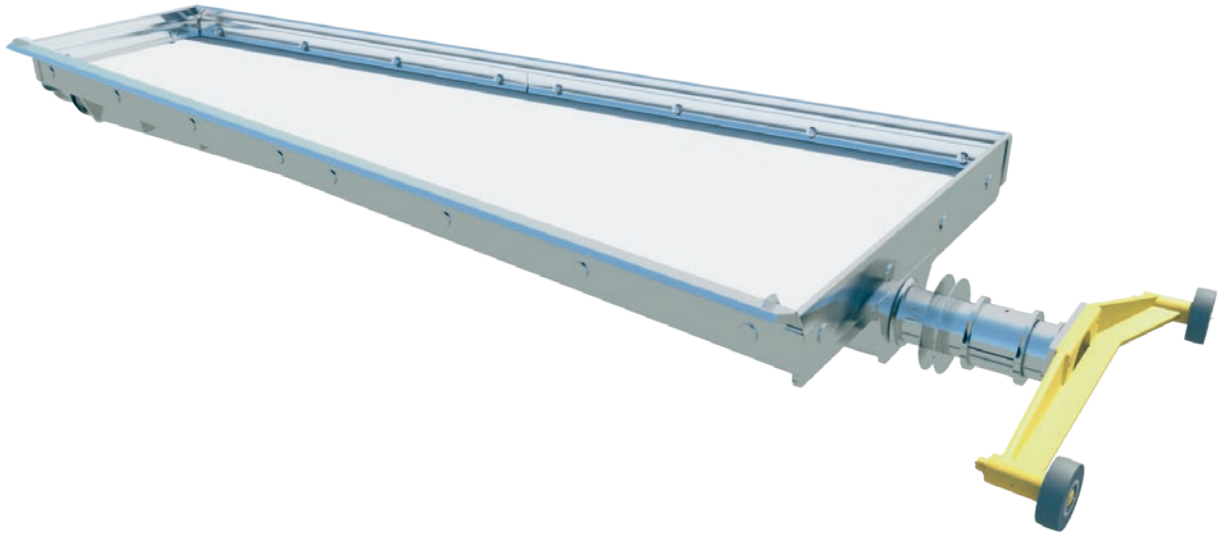
Efficient filtration with cell vessel

As a key part of the ANDRITZ tilting pan filter, the cell vessel plays a major role in increasing filtration rates and improving performance.

The filtrate is collected from the cell vessels in the central valve via vacuum hoses. Using finite element analysis (FEA), each individual cell of the ANDRITZ tilting pan filter has been designed to provide optimum strength. Computer-aided designs have increased the percentage of active filtration area within the same size of footprint, resulting in a higher instantaneous production rate. The faster drainage increases filtration rates by between 5 and 7%. Performance is also improved as slopes from the edges to the trough and within the trough itself help reduce dilution and improve washing by eliminating "pocketing" of liquids.

BENEFITS

- **Maximum filtration rate due to slope bottom geometry**
- **Easy-to-replace filter cloths**
- **Easy cleaning thanks to open construction**
- **Less maintenance and lower replacement costs**
- **Cell design reduces the rate of scale formation, thereby reducing downtime for cleaning**



ANDRITZ cell vessel for tilting pan filter

Meeting your needs for different plant sizes

As a result of its robust features and exceptional washing efficiencies, the ANDRITZ tilting pan filter has been launched successfully in various applications and is available in several models to accommodate different plant sizes.

FILTER MODEL (NUMBER OF PANS)	ACTIVE FILTRATION AREA (m^2)	OVERALL DIAMETER (m)
24	60-130	15-20
30	140-200	21-24
36	220-300	26-28

APPLICATIONS

Phosphoric acid production using the following process routes:

- Dihydrate
- Hemihydrate
- Combined hemi-di or di-hemi

OTHER APPLICATIONS INCLUDE

- Activated carbon
- Copper ore
- Jarosite
- Phosphate rock desliming
- Potash slimes
- Uranium
- Zinc
- Claystone
- Lithium

Optimize your tilting pan filter and phosphoric acid plant

ANDRITZ ACE for PAP delivers advanced process control for tilting pan filters in phosphoric acid plants, ensuring consistent, high-performance operation through predictive stabilization and increased yield.

In phosphoric acid plants (PAP), production is highly sensitive to variations in raw material quality, solids content, and process interactions. With ANDRITZ ACE for PAP, operators gain a fully integrated advanced control solution that keeps the entire process on target – maximizing efficiency, stability, and phosphorus pentoxide (P_2O_5) recovery.

OPTIMIZE YOUR PHOSPHORIC ACID PLANT PERFORMANCE THROUGH PREDICTIVE CONTROL

ANDRITZ ACE uses model predictive control (MPC) together with ANDRITZ Digital Twin technology to forecast process behavior and automatically adjust operating parameters. This ensures tighter control of critical variables such as solids, sulfate, and P_2O_5, enabling more stable reactor operation and improving the consistency of downstream filtration.

DIGITAL TWIN INTELLIGENCE FOR REAL-TIME DECISION-MAKING

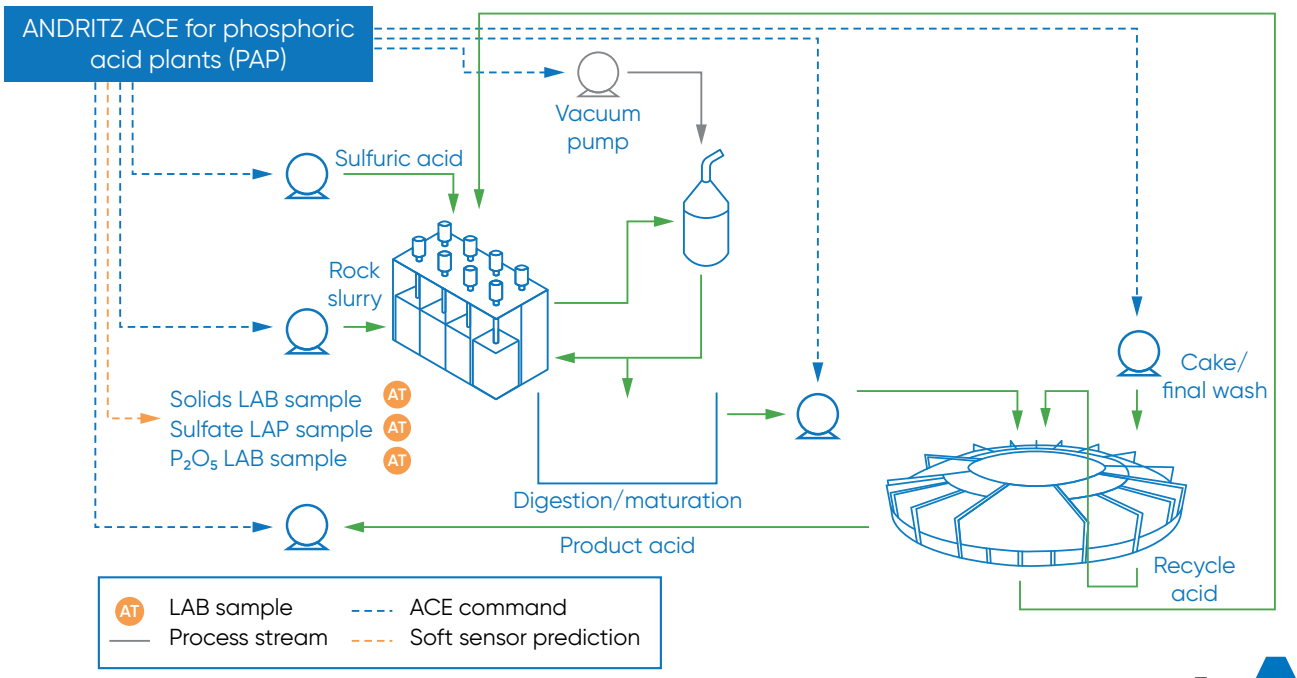
ANDRITZ Digital Twin provides continuous, real-time predictions of reactor characteristics that typically rely on delayed laboratory samples. This allows ANDRITZ ACE for PAP to react faster, keep the reactor within optimal limits, and reduce the variability that leads to inefficiencies and production losses.

FLEXIBLE INTEGRATION FOR ALL PAP CONFIGURATIONS

The system supports dihydrate, hemihydrate, and hybrid process setups as well as various filter and reactor designs. It manages operational constraints, guides operators with clear recommendations, and enhances overall process coordination across all production steps.

BENEFITS

- Higher production and increased P_2O_5 yield
- Stable operation through predictive, real-time control
- Lower P_2O_5 losses in tailings
- Reduced process variability and fewer manual adjustments
- Improved product consistency and filtration performance
- Enhanced equipment protection and higher availability
- Faster, more confident operator decisions
- Applicable to all PAP process configurations



A WORLD OF SEPARATION SOLUTIONS

ANDRITZ provides mechanical and thermal solid/liquid separation technologies, complemented by comprehensive services, automation, and digitalization solutions for the chemicals, environment, food and beverage, as well as mining and minerals industries. Our customized, innovative solutions focus on minimizing resource consumption and maximizing process efficiency, thus making a substantial contribution towards sustainable environmental protection. With over 150 years of experience and more than 2,700 separation specialists around the globe, we are a driving force in the evolution of separation solutions – enabling industries to meet tomorrow's demands responsibly. **ANDRITZ. FOR GROWTH THAT MATTERS.**

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