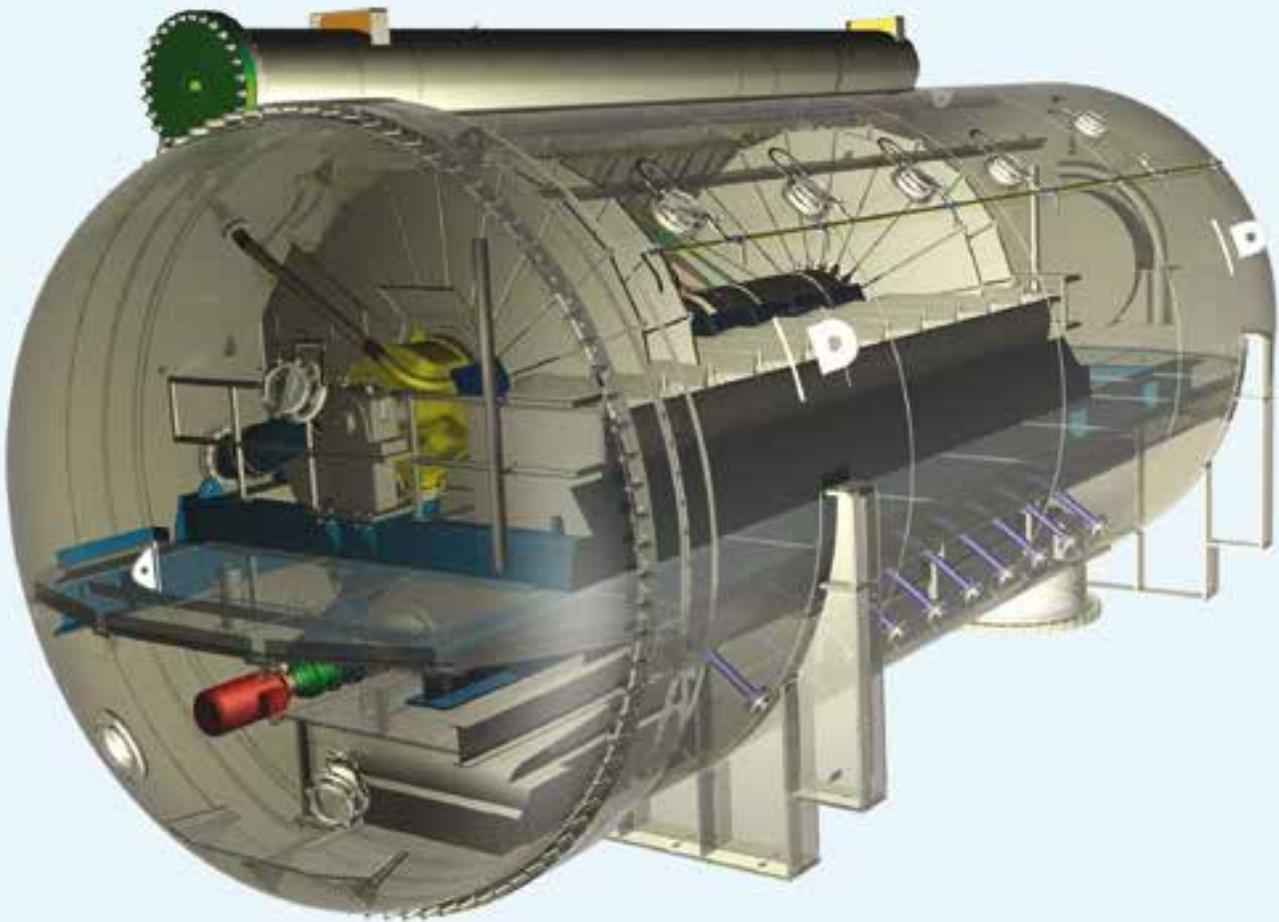# BrainWave
Control solutions for hyperbaric filters

The challenge: To reduce energy consumption by stabilizing control of hyperbaric filters

The solution:
BrainWave HB filter

BrainWave is a proven control system that stabilizes the operation of hyperbaric filters, resulting in improved control of the final product moisture and reduced energy consumption.

BrainWave is a unique control package using patented model-based predictive adaptive control technology, widely used by many mining process areas.

One of the main issues in hyperbaric filter control is the over-drying of product, which can increase energy consumption. BrainWave accounts for transport delay times as product moves through the filter to the online moisture measurement sensor.

Further improvements to control are possible by monitoring incoming moisture content, either on- or offline, and including this in the control strategy as a measurable feed-forward. This allows BrainWave to make control corrections as soon as the incoming mois-

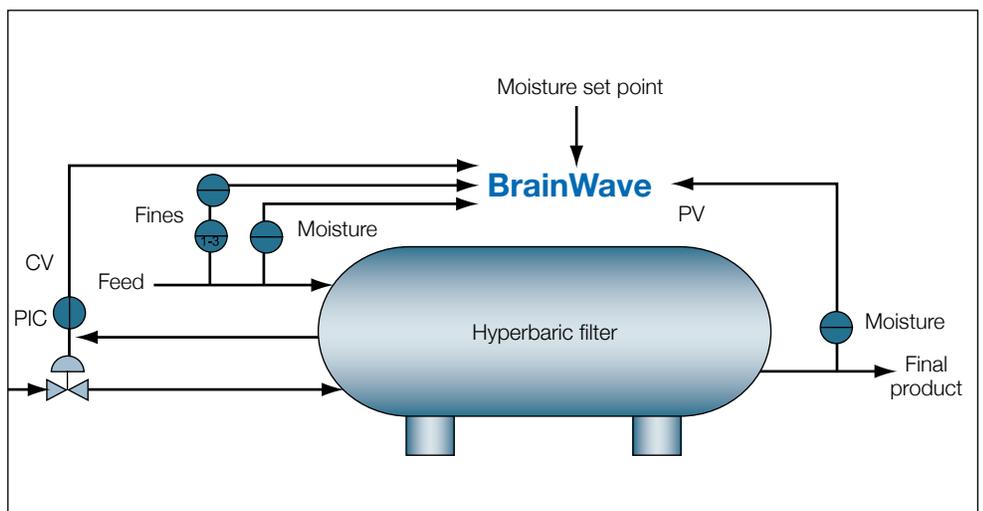ture changes, instead of waiting for the exiting moisture to respond.

BrainWave is also able to reduce spikes in air pressure, which cause increased wear and excessive maintenance on equipment. BrainWave accomplishes this by stabilizing the measured moisture content at the filter exit by continuously adjusting air pressure.

Variations in fines or particle size cause the filter dynamics to change dramatically—a scenario not addressed by PID control. BrainWave, however, utilizes the particle size distribution, either as an online measurement or as a laboratory input, to adapt the control automatically, further improving filter efficiency, reducing air consumption of the blowers.

Benefits

- Improve energy efficiency through tighter moisture control

- Achieve optimal product moisture through tighter, automatic control of pressure responses

- Reduce equipment maintenance by minimizing excessive pressure variations

Schematic of moisture control system with BrainWave HB filter ▼

What is BrainWave?

BrainWave is a patented advanced controller that outperforms conventional Proportional-Integral-Derivative (PID) control. BrainWave outperforms PID systems because of its two main components: an adaptive model and a predictive controller.

BrainWave builds its own live models during normal plant operations, a powerful feature not offered by conventional Model Predictive Control systems.

BrainWave's predictive controller accurately forecasts process responses and accounts for multiple objectives. It adapts to process conditions such as changes in production rate or operating point, keeping your process on target. BrainWave can also accept measured disturbance inputs, like raw ma-

Feature	PID	BrainWave
Controls long dead-time processes	✕	✓
Reacts before being pushed off-target	✕	✓
Handles nonlinear processes	✕	✓
Adjusts to process disturbances	✕	✓
Learns while process is running	✕	✓

terials properties, and takes corrective action before your process is pushed off target (PID, by comparison, must wait for the error to occur, then react).

Because it uses a standard OPC connection, BrainWave easily integrates with an existing control system. In addition, BrainWave's patented Laguerre technology means an average implementation time of just a few weeks,

saving a remarkable amount in operating costs compared to conventional methods. And, best of all, your own staff can support and deploy BrainWave, making it a technology that you can live with—and one you can't afford to live without.

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