PhAcid@Max

In order to help production managers increase the profitability of their Phosphoric Acid production facilities, IPCOS offers PhAcid@Max, the novel optimization solution specifically designed for Phosphoric Acid plants. It is part of the IPCOS' @Max solution family. The @Max solutions help production plants to maximize the profits by maximizing production and minimizing energy consumption, while making use of their existing assets, this without the necessity to make any changes to the plant equipment.

THE BENEFITS ARE OBVIOUS:

- Improved process stability
- Reduced operator intervention and downtime: e.g. no filter overloading
- Reduced variability: more narrow crystal size distribution and improved filterability
- Tight quality control: stable product acid strength
- Minimized energy consumption
- Minimized overall losses (soluble and insoluble losses)

OPTIMIZATION SOLUTIONS FOR PHOSPHORIC ACID

Layered approach

IPCOS and our partners help you achieve optimal operation of your Phosphoric Acid plant, from solving basic instrumentation and control problems to high-end optimization.

Base Layer automation and control:

- Major review and optimization of existing controls
- Tuning of controls and optimization of control structures
- DCS migration
- Standardization of controls
- Documentation
- Instrumentation/actuators review and upgrade (e.g. Pneumatic to Electric)
- Advanced maintenance services on base layer controls
- Performance monitoring services for basic controls
- Engineer and operator training
- Instrumentation maintenance (e.g. online analysers)

Advanced Process Control (APC):

- Softsensor design and installation
- Data reconciliation, yield accounting and other online KPI computations
- Feasibility studies for APC with performance guarantees
- APC installations
- APC system maintenance (on site, remote)

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FERTILIZER SOLUTIONS

ATTACK TANK:

Optimal control of solid content

Improved control of the water balance of the plant which determines the acid strength.

Maintain reaction conditions despite changes in filterability

Controlling the water content of the return acid independently of the filter condition

Sulphate Control: Due to the lack of reliable and fast online analysers softsensing techniques, based on more reliable measurement are introduced

FILTERS:

More stable crystallisation conditions lead to narrowing the crystal size distribution characteristics en thus improved filterability

CONTROL TARGETS OF APC ON PHOSPHORIC ACID UNITS

Advanced process control (APC) helps to standardize all operating rules for control of all variables. Model predictive control is a multivariable control algorithm which uses a dynamic model of the process. By using this control model and past control moves, it calculates the optimal control moves applied to the manipulated variables (MVs) without violating constraints imposed on controlled variables (CVs). The large residence time of the reactor makes the process very suited for model predictive control. MPC typically has a larger prediction horizon than the operator, makes small adaptations at higher frequency and applies the same operation across different shifts.

Typical controlled variables are
- recycle acid strength
- solid content in the reactor
- product acid strength,
- reaction temperature
- sulphate
- water flow to the reactor
- filterability
- wash ratio
- water soluble loss
- cocristallisation loss
- unattacked phosphate loss

Typical manipulated variables are:
- Phosphate flow
- recycle acid flow and concentration
- sulfuric acid flow
- wash water flow
- additional water in recycle flow
- vacuum pressure
- rotational speed

Typical disturbance variables are:
- humidity of the feed flow

By using a process model, the controller anticipates future process behaviour. An MPC application takes into account the inherent coupling of the system. This means that the controller compensates for effects from the filter to the reactor and the other way around. Controlled variables and manipulated variables are controlled within a zone or at an ideal value. The control strategy is defined by the priorities of the zones and the ideal values, ranked according to safety, quality and economic importance.

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ABOUT IPCOS

IPCOS provides high-end automation and optimization products and services for continuous and batch processes. We have particular expertise in providing solutions for the chemical, refining, syngas, fertilizer and power industries. Our products range from advanced PID tuning packages, performance monitoring systems, soft sensors, MPC controllers to dynamic optimizers. We have dedicated products for the glass industry and unique solutions for batch reactors and multi-phase reactors such as fluidized bed reactors, gasifiers, granulators etc.

'Creators in Control' describes exactly what IPCOS is and what we do: we create state-of-the-art process control and optimization products. Thanks to the tremendous efforts in research, we deliver sophisticated products that generate value for our customers. This value can be:

- More throughput
- Less specific energy consumption
- More constant quality
- More environmentally friendly production
- More flexible production (driven by market demand/ spot pricing)
- Much more....

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