

ENHANCING PHOSPHATE REACTOR PERFORMANCE THROUGH THE APPLICATION OF ADVANCED MODELING and MODERN IMPELLER TECHNOLOGY

Michael J. Preston

SPX FLOW – Lightnin Mixer Brand, 135 Mt. Read Blvd., Rochester, NY 14611, USA

Phosphoric Acid production is not a new process. Many and varied are the methods attempted by researchers, engineers, operators and vendors to increase efficiency, process performance, uptime and any other variable to ultimately increase the manufacturing capacity of an existing plant footprint. Current operating practice still relies on old style mixing technology as it is well understood, flexible and able to be adapted by many of the industry experts.

Existing equipment provides the high power intensity needed for satisfactory reactor performance but incorporates high swirl components, poor flow patterns and inadequate solids suspension. It is theorized that this mixing performance can also lead to excess scale formation and can shorten the operating time between shutdowns for cleaning or even catastrophic failure of a mixer assembly and unplanned downtime.

This paper will show through laboratory scale flow modeling and CFD simulations how a more efficient impeller can offer better flow patterns, less swirling, excellent solids suspension and more uniform power dissipation in a phosphate reactor. It is theorized that this operating regime will provide less scaling opportunity and better process performance, thus leading to longer operating times, better plant operation and more production capacity.