

## Sasol Realizes Significant and Sustainable Production Benefits and ROI with Honeywell's Non Linear Control Technology



“Sasol was not looking for a vendor, but rather a technology partner – someone that could provide the holy grail of control solutions for the control of its gas phase polyethylene production facility. The implementation of the NLC solution by a superb implementation team, now operating under the auspices of Honeywell, has enabled us to realize significant and sustainable production benefits and return on investment including a 59 percent reduction in steady run non-prime material and 29 percent reduction in transition time between grades.”

*Jasmeer Ramlal, Process Control Engineer, Sasol Polymers*

### Benefits

Sasol Polymers, a division of Sasol Chemical Industries, set out to identify and implement a control solution for its linear, low-density, gas phase UNIPOL polyethylene reactor within its Polythene Business Unit. Sasol Polymers found this in the NOVA Non Linear Control (NLC) technology and technology partnership with the advanced process control division of PAS, recently acquired by Honeywell. Since the commissioning of Honeywell's non-linear controller, Profit® NLC (previously PAS' NLC Process Suite), Sasol has realized various benefits, including:

- Reduction of within-grade-run non-prime material by 59 percent
- Reduction of transition time between grades by 29 percent
- Robust accurate control across an operating range between 40 - 100% of full production rates
- Increase in agility - execution of rate changes three times faster
- Improvement of ROI through reduced analysis costs, longer productive life of investment and reduced lifecycle cost
- Increase in online time to greater than 90% through use of virtual online analyzers
- Optimized production rates
- Use of the offline simulation capability to determine optimal reactor conditions for grade transitions
- Consolidation of control and reaction engineering roles
- Increase in focus on development, instead of maintenance

Sasol Polymers, impressed by the results achieved and the expertise deployed, is currently in discussions with Honeywell for the implementation of the solution on another of its production facilities. This new project promises to be ground-breaking, posing technical challenges that Sasol Polymers is confident can be resolved in collaboration with Honeywell and the deployment of the Profit NLC platform.

### Background

Headquartered in Johannesburg, South Africa, Sasol is an innovative global energy company with a market capitalization in excess of 23 billion dollars. A workforce of 30,000 deploys its skills and talents to drive the company forward in exploration, mining, science, technology R&D and business development. Sasol is listed on the Johannesburg Securities Exchange (JSE), symbol SOL and the New York Stock Exchange (NYSE), symbol SSL.

Sasol Polymers is a division of Sasol Chemical Industries, manufactures of polymers for a wide range of applications including bottles and profiles, as well as footwear and packaging; while products from its chemicals portfolio are used in gold extraction, pulp and paper, steel, textiles, domestic disinfectants and water treatment industries. Sasol Polymers has achieved remarkable growth by retaining a keen focus on its customers and its entire procurement, manufacturing, technical support and logistical operation. The business employs approximately 3,200 people.

## Challenges

After a comprehensive review of commercially available advanced control solutions, the company began the design and commissioning of a new non-linear advanced process control application to replace its existing application.

"We knew our existing advanced process controller was limited in its development capability and in its potential to significantly increase benefits, not to mention the obsolescence of the underlying platform into which the solution was integrated," said Jasmee Ramlal, Process Control Engineer, Sasol Polymers.

Challenges with the gas phase polymer control include:

- Complex catalytic reaction and no in-reactor measurements for quality control (mi, % solubles, density, etc)
- Apparent dynamics and gains change with different grades (non-linear dynamic optimization / multivariable control problem)
- Polymerization process susceptible to unmeasured disturbances due to catalyst poisons and activation changes
- Transition control and production rate maximization
- Relatively common abnormal situations
- Development of new processes/catalysts require continuous updating of control strategies

Sasol Polymers reviewed its business strategy of updating its technology and increasing ROI at the facility. "Technology had moved on, we needed to play catch up and determined that a non-linear, first principles, multivariable solution with a single model for design, simulation and control was the best option for Sasol Polymers to make a radical change, instead of incremental changes with solutions available to us at that stage. Now we just needed to find the right technology partner who could supply this best-in-class solution and had the resources to implement and sustain benefits," continued Ramlal.

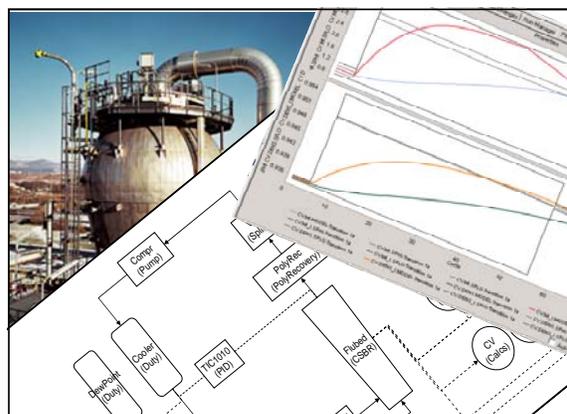
## Solution

Sasol Polymers considered several options for updating its control solution and selected Honeywell's Profit NLC to provide a state-of-the art implementation of a nonlinear, multivariable, model-based controller/optimizer. Sasol felt the first principle's nature of the solution would provide Sasol with a competitive advantage that would contribute to its overall business strategy.

Delivering robust control and optimization, Honeywell's Profit NLC is designed for the control of nonlinear processes. The use of a rigorous process model that describes process equipment design and chemical reaction kinetics removes the need for step testing the plant. This model also combines the advantages of reliable multivariable control and optimization of on-line process and dynamic off-line simulation for new product grades. Profit@NLC's proven architecture provides a robust, user-friendly, real-time application platform.

Since the commissioning of Profit NLC, Sasol Polymers has exceeded its performance targets. Said Ramlal, "In terms of delivery of an effective solution, the project team satisfied our definitions of victory, and we were pleased with the results." I attribute the success of this project to the combined efforts of a focused team comprising Honeywell and Sasol technical resources, in addition to the Profit NLC technology."

Other secondary benefits that Sasol experienced included increased online time through the use of virtual online analyzers, production rate optimization and the use of offline simulation studies to determine optimal reactor conditions for grade transitions.



Sasol relies on Honeywell for application Non-Linear Control and Optimization of its Polyethylene Reactor

"It was comforting to know that once the controller was online, we had ongoing technical and development support from the entire Honeywell team, and" continued Ramlal, "we realized at the outset of the project that we required more than just a new controller implementation: we required a technology partner who shared our commitment to innovation and reaching new frontiers. We believe that Honeywell has the resource capacity in terms of people and technology to deliver value-adding solutions as evidenced by the success of the Profit NLC implementation."

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