



**HONEYWELL
FORGE**

PLANTWIDE OPTIMIZER

PRODUCT INFORMATION NOTE

Honeywell Forge Plantwide Optimizer integrates refinery LP, APC and blending solutions in a unified, real-time, gate-to-gate optimization framework for facility-wide control and optimization.

WHAT IS ENTERPRISE PERFORMANCE MANAGEMENT?

EPM is a set of tools that collect, unify, and take action on operational data to optimize performance, sustainability, and safety at the enterprise level.

CHALLENGES

- Operate within the boundaries of Safety, Quality Regulations
- Improve productivity
- Improve operational consistency in operation performance by different crew across crews
- Sustain the long-term benefits over the long term
- Solving plant-level larger process optimization problems at plant level
- Reduce the gap between production and planning

SOLUTION

Honeywell Forge Plantwide Optimizer is part of the Process Performance Management suite of industrial-focused products in Honeywell Forge, an Enterprise Performance Management tool. Plantwide Optimizer is a higher-level optimization solution which incorporates wider scope within the facility, taking into account yield models, and closes the gap between planning and control. Most plants have the potential to run better and give away less with model-based process optimization, facility wide. To optimize on a wider scale, the overall material, component and energy balances must be established, and the product quality must be controlled within the context of the real operating limits of each unit. Honeywell Forge Plantwide Optimizer solves these coordination issues in real time with a unique cascaded MPC as a form of control and optimization, facility-wide.

BENEFITS

Reduce product quality giveaways

Detailed studies using Plantwide Optimizer in refining have shown that important distillate properties such as cloud point, flash point, sulfur and 90% point can be optimized with significant returns over USD\$1/BBL, even in tank limited facilities where giveaway cannot be eliminated completely. We expect this to be similar in any industry where planning is based on yields and qualities.

Optimize intermediate component production

To achieve the reduction in product quality giveaway, changes to the existing operation must be evaluated (rate adjustment between units) and any intermediate property blending taken into account (i.e. intermediate tankage). Component quality and value can be optimized with high potential returns (for refining~USD\$2/BBL) within the limits of the plant configuration.



Make more high value products with same feed

Honeywell Forge Plantwide Optimizer utilizes the total feasible capacity of the facility, regardless of the industry. Initial studies in refining indicate a USD\$1/BBL return for property giveaway can be accomplished without any adjustment to the incoming crude slate.

The main source of benefits is a slight reduction of the overall crude rate, made possible by detecting the path of maximum volumetric gain through each production unit. As opposed to the traditional case where volumetric gains used in the refinery LP are generally static and not updated using actual operating data.

Increase flexibility to handle new feed

Using this novel approach, additional benefits can be realized by re-evaluating the product potential. Obviously, changes to the product slate will be limited by market opportunity to sell specific products, but there may also be opportunity to buy different raw materials without changing.

THE PROBLEM

Yield Models and Manual Updates

While a compact, well-built yield model makes the planning problem easy to set up, it comes with a drawback. It has no visibility of the detailed variables in any underlying unit. Using a yield model alone, none of the off-line optimization solutions available in the market guarantee honoring the low-level constraints within all the units. A significant profit margin can be lost in translation.

Yield Models and Dynamics

Another reason production plans need to be manually translated is that the time horizon of open-loop planning solutions typically range from several days to a month, and the solution is only updated, at most, once a day. Thus, it lacks an effective feedback mechanism to deal with uncertainties, such as changes in feed quality and/or ambient conditions, process unit upsets, heating or cooling capacity limitations, and maintenance.

THE SOLUTION

Reconciling the Plantwide Optimizer Model with APC Control Models

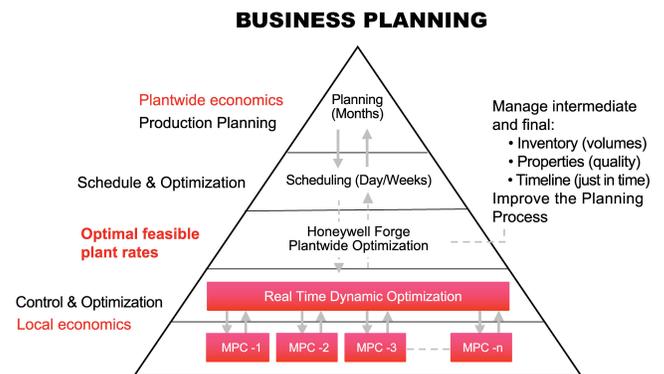
From a facility-wide perspective, control and planning are almost always coupled. Planning relies on control to establish the feasible region for optimization while control relies on planning to coordinate the units and run the entire plant at the most profitable operating point possible.

More specifically, planning depends on MPC to push the constraints inside every unit to get as close as possible to the planning solution.

Meanwhile, MPC depends on guidance from planning to determine which set of active constraints is the most profitable. Obviously, these two levels of optimization depend on each other and there is enormous potential from treating them simultaneously.

The Coordinated Solution

Honeywell Forge Plantwide Optimizer fills the void. The coordinating optimizer uses a pre-existing planning yield model to provide an initial steady-state gain matrix, and the relevant model dynamics can be fleshed out from the historical operating data of the facility. It controls the product inventories, manufacturing activities, and product quality. Its embedded economic optimizer, which is furnished with the same planning model structure and economics, reproduces the off-line planning optimization online and in real time.



Plant Wide Optimizer Key Challenge

The cascading layers provide the coordinating Honeywell Forge Plantwide Optimizer with future predictions of secondary CVs/MVs and the operating constraints inside every unit. With this supplemental information, the real-time planning solution of the two-tier MPC cascade has real-time feedback and will now honor all of the unit-level operating constraints and guarantee feasibility.

Jointly, the MPC cascade provides simultaneously decentralized controls at the low level with fine-scale MPC models and centralized planning optimization at the high level with a coarse-scale yield model, all in one consistent cascade control system.

Honeywell Forge Plantwide Optimizer Opportunity Assessment

The process starts with an initial opportunity assessment on the application of Honeywell Forge Plantwide Optimizer on typical plant process operating scenarios. An Opportunity Assessment will review the modeling and optimization approach and investigate cases:

- Cases are generally optimizations that use different subsets of all the available MVs
- Cases can also be set up for varying “safety margins” on final product qualities and quantifying the associated cost

The scenarios include, but are not limited to:

- Process Unit Interactions
(Examples: CDU units - CDU furnace, CDU fractionator, stabilizer, splitter)
- Distillate, Gasoline Pool Optimization
- H2, Utilities network Management

For More Information

Learn more about how Honeywell Forge Plantwide Optimizer can fit your operations, visit [Advanced Process Control](#) or contact your Honeywell Account Manager.

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Honeywell Forge Plantwide Optimizer Support Services

Honeywell Forge Plantwide Optimizer comes with worldwide, premium support services through our Benefits Guardianship Program (BGP). BGP is designed to help our customers improve and extend the usage of their applications and the benefits they deliver, ultimately maintaining and safeguarding their advanced applications.

Honeywell provides a complete portfolio of service offerings to extend the life of your plant and provide a cost-effective path forward to the latest application technology. Honeywell services include:

- Software installation services
- On-site engineering services
- Migration services
- Scope expansion services
- Assessment services
- Performance baseline and tuning services
- Customized training

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