The Production Optimization Suite combines advanced multivariable control with model based monitoring and optimization in ways that have proven successful results of increased production.

Production optimization is a very wide area ranging from rapid compressor control to long term reservoir management and design modifications. It can all be put into a “control/optimization-loop”, which is monitoring effects of changes, modeling relations between changes and profits, optimization by using the models to find the optimum changes, and implementation of the optimum changes.

It is important to base it on actual field measurements, like for example in a feedback control loop. For the more long term optimization, it is much more difficult to monitor effects of changes to identify the models. Our approach is therefore to use feedback control as much as possible and model identification based on analysis of real time sensor data rather than on complex full field modeling.

**AFC and AWC – Active Flowline and Well Control**

AFC and AWC controls the productions chokes, subsea and/or topside to minimize slugging and reduce flow and pressure oscillations, to allow increased choke openings to get reduced backpressure and increased production. In addition, the products have a module for slug mitigation which controls the topside processing system to minimize oscillations for given slug flow conditions in the wells and flowlines. Reduced oscillations topside enables operation closer to the constraints, which also gives increased production. In addition, AWC includes functionality for optimum well ramp up, gaslift control to enable allow operation in the optimum region (which is often unstable). AWC and AFC are also valuable for monitoring, in that stable flow gives easier multiphase flow metering. For well testing of subsea manifolded wells AFC and AWC are very helpful to maintain the same rates from the well that is not closed.

**WMS - Well Monitoring System**

With WMS, a virtual multiphase flow meter, it is possible to monitor the changes in rates, GOR and WC, without well testing. For subsea manifolded, which requires shutdown of wells for well testing, this gives direct effect on increased production. In addition, knowing the GOR and WC ensures that the right wells are always selected as swing producers,
i.e. throttled back to meet the topside constraints. Further, the online estimation of flowrate for artificially lifted wells, enables identification of lift curves without performing multi rate well tests. And finally more accurate estimation of production rates, gives better production allocation and hence more optimum reservoir management than with conventional polynomial allocation.

**WRIPS - Water Reservoir Injection Pressure System**
WRIPS which calculates the most likely bottom hole pressure, enables operation as close as possible to the maximum allowable without fracturing of the shale layer which would cause major economic loss. The operator can then optimize the production by keeping the injection pressure at the target pressure. In addition WRIPS calculates the most likely injection rates to each well. This results in more optimum reservoir management as it reduces the chance of erroneous assumption in water injection rates.

**Insight Erosion Management System**
Gives better control of sand production and erosion, The operator can then therefore allow increased well production rates in spite of increased sand production as long as the erosion rates is below a maximum safety limit. This approach resulted in substantial production increase for one of our customers.

**800xA Asset Optimization**
The system includes applications for real-time condition monitoring of process equipment like rotating machinery, heat exchangers and valves. Condition monitoring is important to find the optimum tradeoff between production and maintenance, e.g. by selecting when and which equipments to be replaced and how production should be constrained to avoid rapid wear on equipment. Insight can be included in this group of Asset Optimizer Applications.

**Optimization applications**
The core of optimization is to maximize a given objective given a set of constraints. Monitoring the active constraints in the process should be used as the first step in any production optimization strategy. ABB can offer an application, Constraint Monitor, that performs this monitoring and provide support in using this application to further formulate an optimization strategy. ABB can furthermore assist in implementing the optimization strategy. As for optimization technologies, ABB can offer several applications including gas lift optimization (GLO) as well as state-of-the-art linear- and hybrid model predictive control (MPC) solutions to first principle-based MPC solutions.