



A MODEL IN REAL TIME: HOW ENI BUILT A DIGITAL OIL FIELD USING THE PI SYSTEM™

Headquartered in Rome, Eni S.p.A. identifies and extracts oil and gas across 79 countries. Given the volatility of the oil and gas market, Eni's long-term success hinges on the combination of optimizing a network of upstream assets while locating new extraction opportunities. To do so, Eni engineers were using operational data to monitor upstream assets; however, information was not available in real time. Not only did this cause delays in analysis, it prevented the team from capitalizing on new revenue streams. With a goal of creating new efficiencies in production by finding optimal asset parameters, Eni turned to the PI System. Leveraging data to feed simulation models representing real-time oil field conditions, Eni embarked on a journey to optimize asset configuration and maximize oil production across sites.

GENETICALLY OPTIMIZED DATA

As a first step towards maximizing upstream assets, Eni built a robust integrated production optimization system. Sitting at the center of this solution is e-rabbit, Eni's proprietary technology. Just like a geneticist can use chromosome markers to predict certain characteristics or desirable traits, e-rabbit applies genetic algorithms to operational data to create various simulation models. Using a series of inputs, such as pump stabilizer speed, pressure, separator, and more, e-rabbit compares every possible combination of settings to find optimal asset parameters.

With e-rabbit, Eni is going beyond traditional targets and moving towards the best possible configuration of assets.

However, for Eni to leverage e-rabbit most effectively, its engineers needed access to real-time data.

THE DIGITAL OIL FIELD

Already a PI System user, Eni had access to operational data. However, the process of extracting data from the PI System caused delays. Engineers were manually gathering data in the field, connecting it to Excel, and then importing it into business software systems before building simulation models that were run by e-rabbit. Ready to step into real-time, Eni connected the PI System to headquarters, enabling simulation models to be continuously updated. Models are now connected to the PI System and e-rabbit, creating a circular network of integrated

CHALLENGE

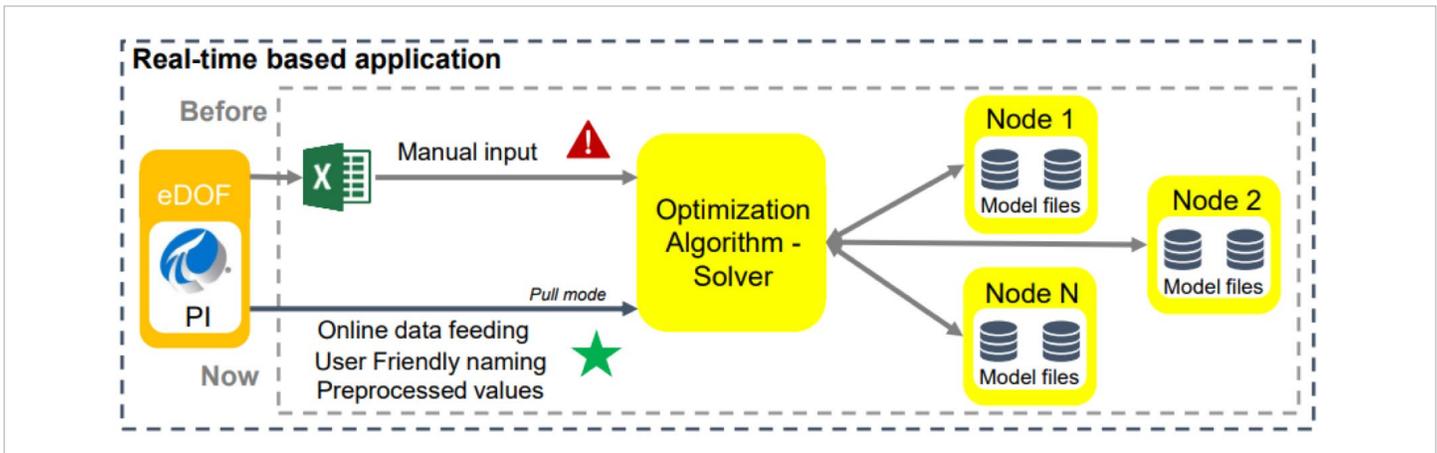
Lack of real-time data to model and simulate production scenarios.

SOLUTION

A digital twin of oil field assets to run advanced algorithms and production simulations.

BENEFIT

Optimized processes and assets, enabling new production opportunities, early issues detection, and optimal parameter settings.



Simulation Models: Using real-time data from the PI System, Eni simulates production scenarios to find optimal equipment parameters.

process simulation. “The PI System can communicate with e-rabbit, and e-rabbit will orchestrate the models that are updated with the real-time data from the field,” said Luca Cadei, Deputy Plant Manager, at Eni.

Beyond e-rabbit, Eni also connected the PI System to its internally developed digital oil field solution called eDO for visualizing data coming from the PI System as well as other data sources. With high-frequency data acquired in real time and mixed with lower frequency data, such as daily and monthly information, the eDOF models and simulates production data to give users across departments the information they need to monitor parameters and understand KPIs.

Through the combination of eDOF and the PI System, key stakeholders have access to remote displays, dashboards, trends, statistics, and more, to perform real-time analysis. Data from the eDOF is visualized in the monitoring room using PI Vision, and real-time data is sent to e-rabbit, allowing engineers to work in a collaborative environment. “If we are not able to visualize what we are building or trending, it’s useless,” Cadei said. “PI Vision gives us a lot of help for building this type of dashboards.”

TWO SIMULATION VIEWS

Once the PI System was connected to the eDOF, Eni had a true digital twin with full simulation capabilities that can be viewed two separate ways. Using the optimization algorithm, users can connect to the

PI System directly, schedule optimization, and receive an output of recommended operating parameters. Those new parameters are then sent to production engineers to implement in the field, often on a weekly basis.

In monitoring mode, users can view trends and KPIs by connecting the PI System with simulation models and structuring the data using OSIsoft’s [Asset Framework \(AF\)](#), the contextualization layer of the PI System. The data model in AF is organized by country and site and connected to e-rabbit, which runs simulation models showing optimal production. Those models are compared to real-time PI System data. Simulations are run throughout the day, enabling engineers to immediately see when assets deviate from projected performance.

Thanks to these simulation models, Eni has optimized production efforts and even identified new production opportunities. Recently, e-rabbit used PI System data to suggest that Eni open a new service line in its West Africa location, increasing oil rate production by 60 percent. Not only that, business units across Eni now have access to operational data, promoting a more collaborative environment and empowering engineers to increase efficiency and production at their sites.

For more information about Eni and the PI System, watch the full presentation [here](#).



We can build a model, but we need the PI System.”

— Luca Cadei,
Deputy Plant Manager

Cadei, Luca. “Real-Time On Line Modeling of Upstream O&G Assets”
< <https://www.osisoft.com/Presentations/Real-Time-on-line-modeling-of-an-oil-and-gas-upstream-asset--ENI/>>