Middle Distillate Optimization with Spiro Digital Twin

UK Refinery Case Study

Spiro

A simple tool to close the gap between planning and operations and drive your refinery to optimal efficiency.

Dynamic data reconciliation ensures that the process model is aligned with the real-world process.

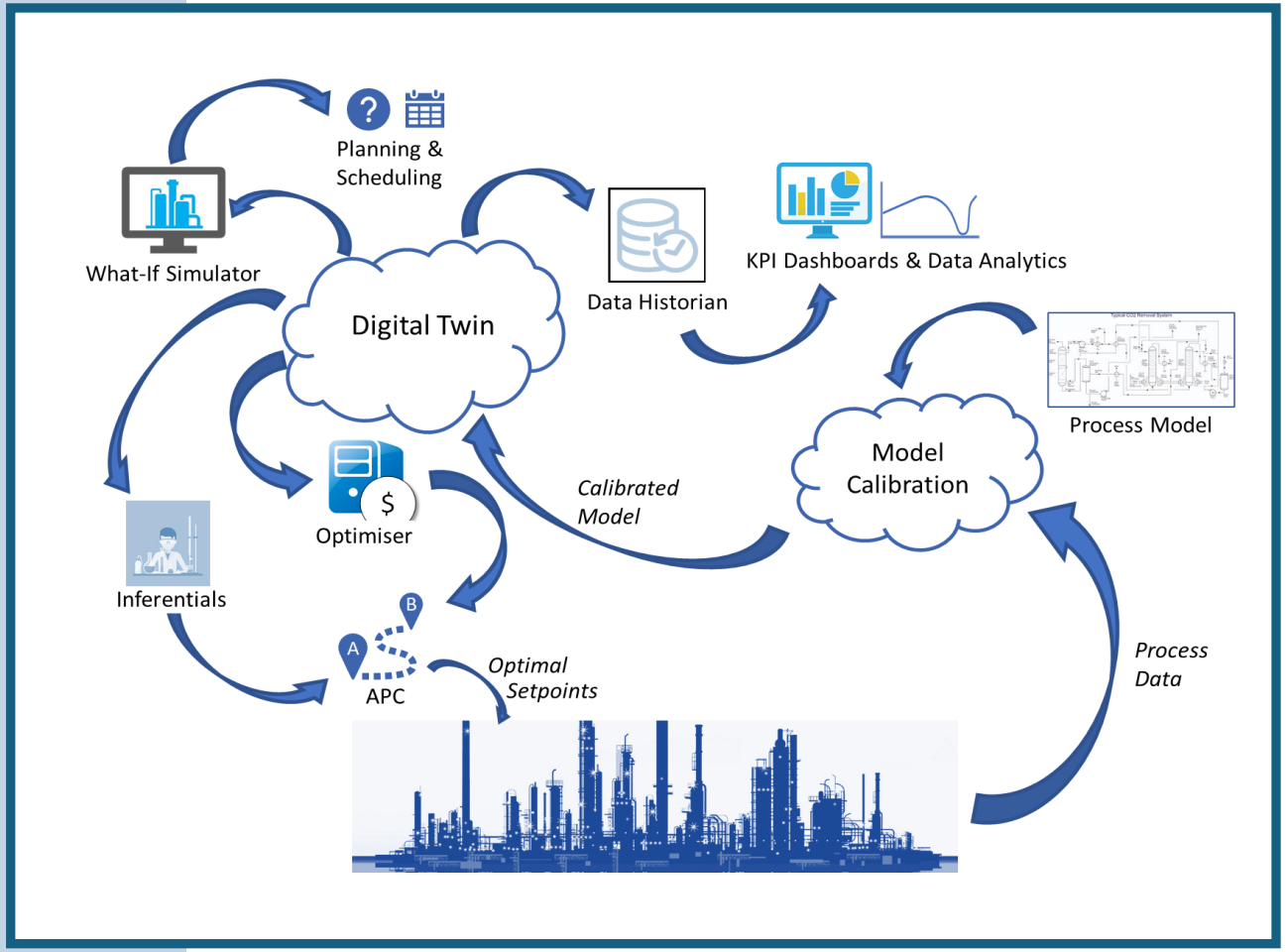
Deployment in the **Cloud** or **On Premises**.

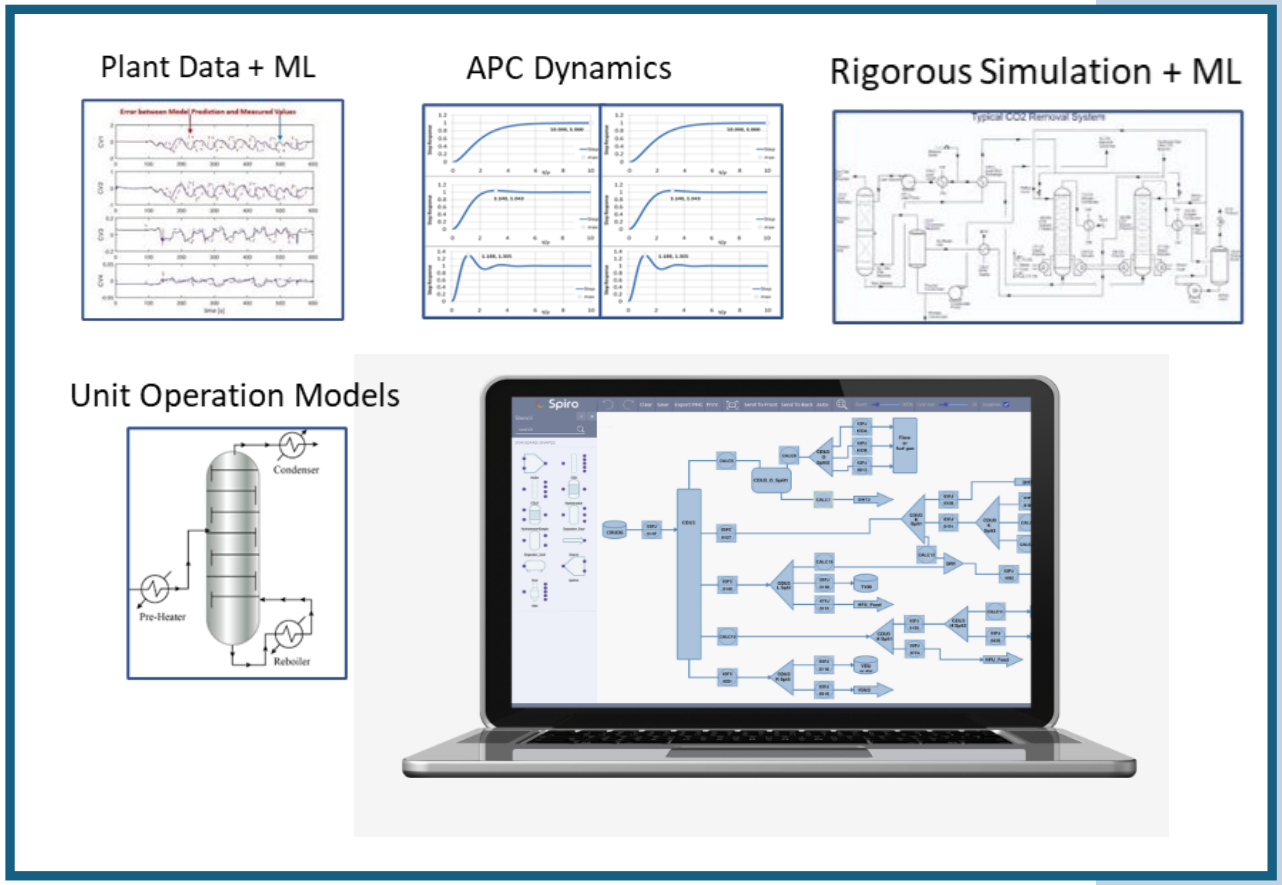
Full integration with local APC including process dynamics

One model provides multiple functionalities

What-if Simulator **Inferentials**

Online optimization **KPI Dashboards**





Easy to use **graphic editor** to build process model with a complete **library** of predefined standard refinery units

All models are **easily customizable** to adapt to different unit configurations

APC gain matrix and dynamics are **easy to import** and integrate with model

Degrees of freedom analysis and full offline initialization of the model

Agile modeling approach. Model is easily scalable from unit model to full process.

Hybrid models which include both data-driven and first principles components **significantly reduce the deployment and maintenance effort**

Case study

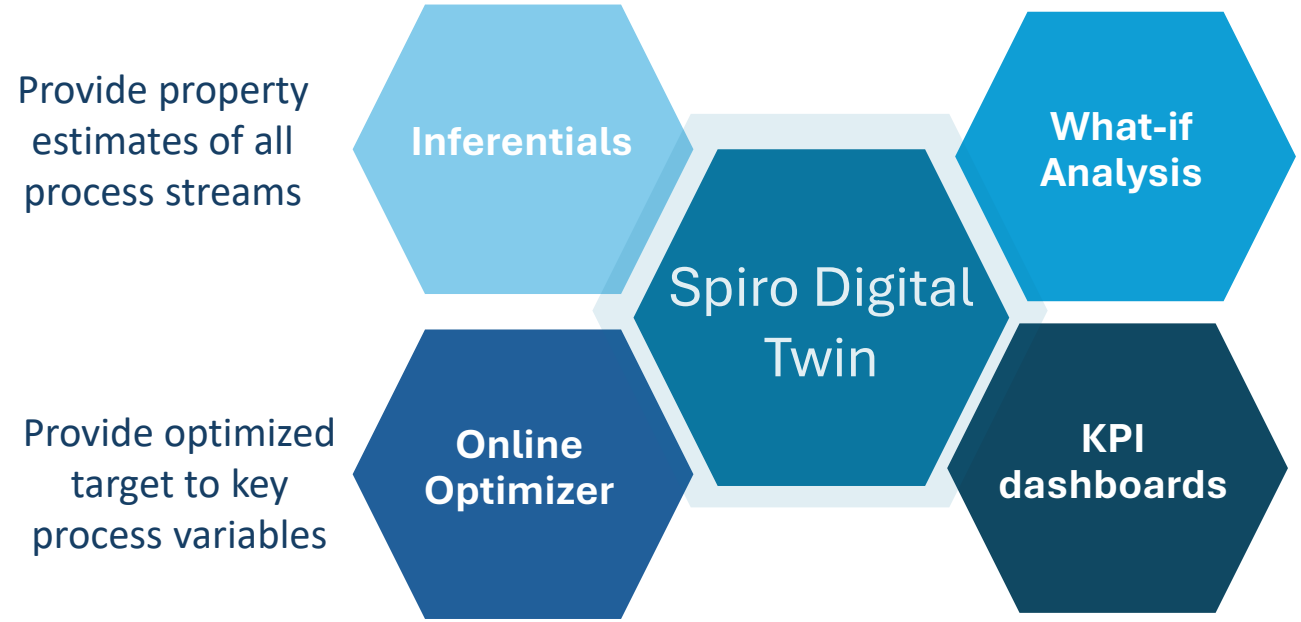
UK Refinery, 140.000 b/d capacity

Target to **increase production of middle distillate products** (Jet Fuel, ULSD)

Project Scope

- 2 Crude Units
- 2 Naphtha Hydrotreaters
- 1 Diesel Hydrotreater
- 1 Vacuum Unit
- 1 Hydrocracker

Project Deliverables



Delivered solution

- Spiro Team worked in **close interaction** with refinery process team to capture all the requirements during the functional design phase
- Model was **built and fully simulated in Spiro Office based on historical data** and delivered onsite ready for open-loop commissioning. What-if analysis tool allowed to **test the model on different scenarios** with limited effort
- Digital Twin provides a **new solution every two minutes** solving the **full non-linear problem**
- **Flows properties** are **estimated by digital twin** based on process values and **updated with analysers and lab samples** where available.
- Connection with the DCS is managed through **OPC-UA.** All Digital Twin parameters are stored in a **dedicated Influx database**.
- Each unit is configured in separated flowsheet which could be **easily switched OFF if the unit is not in service** without affecting overall solution
- **Flow routing is updated in real time** from DCS using valve positions and flow readings
- A **dedicated DCS display** has been configured to set targets and limits which are not included in APC. From same display is possible to **update economic values** of the three main products (Naphtha/Kero/Diesel).

Challenges

- Complex process flow routings
- Highly variable crude slate
- Changing economics
- Multiple turnarounds and units out of service
- APC available only on some units
- Covid restrictions

Delivered results

- New process dashboard for Shift Leaders with major constraints and optimization opportunities clearly highlighted
- Increased awareness of process limits by scheduling team leading to a more accurate daily plan
- Giveaway reduction on final products currently under investigation

"The new MDO helps us to get out of our comfort zone and grab optimization opportunities we would miss„

-- Refinery Shift Leader