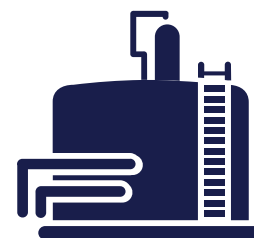## Transforming Data Disgital Assets

Applying Sigmafine in Oil & Gas Refining

A model based solution for data quality driven decisions

The refining world is facing challenges of uncertain oil price in the foreseeable future, new fuel specifications and limited investments which are putting pressure on the existing capacity. Capability of using the actual resources in the most efficient way requires more careful decisions both in planning and in operations. Availability is not enough for data driven decisions: consistency and accuracy are imperative requirements to achieve better sensitivity and judgment: data quality matters!

Solution Area

- Improve data quality for better business decision
- Apply first principles to achieve consistent data
- Monitor energy efficiency
- Track composition and qualities of crudes and semi-finished products

Sigmafine Improves the Quality of Real-Time Data

Sigmafine, the state-of-the-art data validation and reconciliation software, puts in relation raw process data, material transactions and business data in one model constrained by first principles equations, to get a refined set of consistent and more accurate information to support your decisional process. Sigmafine is currently used in major refineries worldwide to drive the daily business, material accounting, inventory reporting, integration with ERP and business intelligence that supports corporate governance.
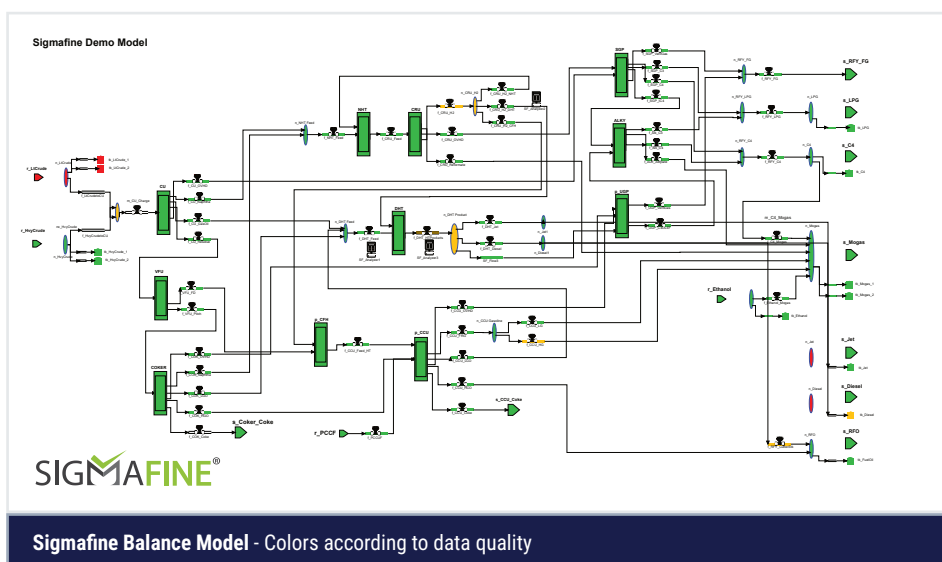
Modeling flexibility and a wide range of data analyses make Sigmafine the ideal solution to target:

- Production and yield accounting
- Composition and quality tracking of crudes and semi-finished materials
- Movement Management
- Energy management and emission monitoring

Sigmafine Demo Model

SIGMAFINE ®

Sigmafine Balance Model - Colors according to data quality

u_HD_CDU	Material	Description	Quantity [t]	%
CONSUMPTION	CRUDE	Crude to be processed	6991,76	100,0
	Total IN		**6991,76**	**100,0**
PRODUCTION	FG	Fuel gas	285,60	4,1
	LIGHT_NAFTA	Light Nafta	2112,44	30,2
	HEAVY_NAFTA	Heavy Nafta	3750,20	53,6
	ATM_RESIDUE	Residue from ATM distillation	843,52	12,1
	Total OUT		**6991,76**	**100,0**

Unit balance report

Production and yield accounting

Sigmafine is daily used in production and yield accounting of refineries with many production units, tank farms and thousands of flow meters.

Sigmafine supports the daily work of the accountant in identifying inconsistencies, bad values or gross errors. By including multiple source of information (historicized data, laboratory data, external inputs) in one single integrated environment, empowers accountants to get one version of the truth, spending time in analyzing cause of deviations rather then feeding data into a system.

Energy & Utilities Management

Accurate monitoring of energy-intensive equipment is essential to improving efficiency, reducing emissions, and controlling operating costs. Sigmafine delivers reconciled balances for furnaces, heat exchangers, rotating equipment, and site-wide utility networks using rigorous thermodynamic modelling to correct meterbias and expose hidden energy losses. This enables plants to understand actual asset-level consumption, allocate utility costs with confidence, and find recoverable operating expenses that are typically invisible in raw data

Sigmafine's validated KPIs—delivered through dashboards for operators, engineers, and energy managers—drive timely corrective actions and continuous optimization of fuel, steam, and power usage across the site. Because the data is fully auditable and historically preserved, Sigmafine also strengthens compliance with energy-efficiency standards such as ISO 50001 and improves the accuracy of GHG-intensity reporting, supporting the organization's sustainability goals. .
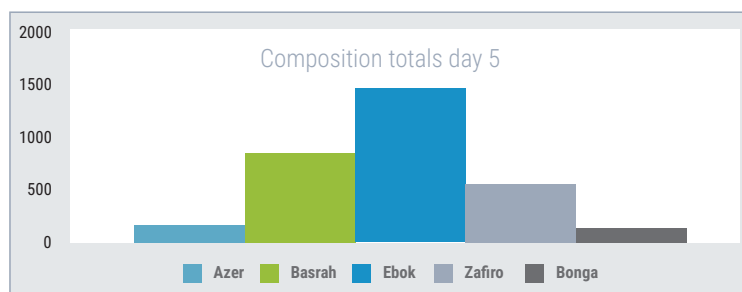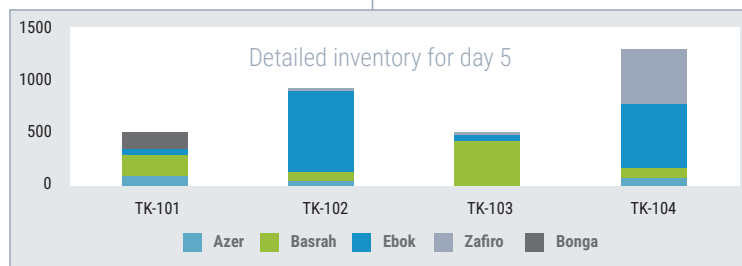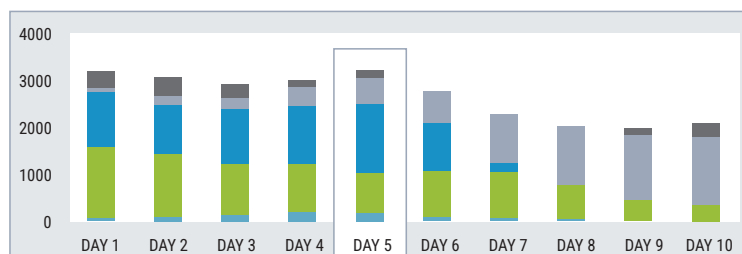
Support planning and operations

Knowledge of crude or intermediate inventories in terms of material quantity is crucial for better planning and yield estimation (evaluate mixtures feeding the units, optimize inventory allocation, etc.).

Sigmafine composition tracking analysis supports the planning department with up-to-date estimation of material allocation.

A further step is the quality tracking analysis that provides in addition an estimation of physical properties of mixtures (e.g. density, viscosity, flash point, Sulphur content etc.), stored in inventories or fed to the process units. Operations can monitor the properties and choose better routing to improve mixture characteristics and minimize out-of-spec semi-finished or finished products and planning decide how to better allocate the inventory based on mixture properties.

Aggregated inventory by material

Detailed inventory for day 5

Azer   Basrah   Ebok   Zafiro   Bonga

Composition totals day 5

Azer   Basrah   Ebok   Zafiro   Bonga

Sigmafine Integrations

Sigmafine comes with Integration Framework component allowing data exposing to external systems and facilitating integration with oil movement systems, reservoir simulators, tank inventory systems, laboratory information system, ERP systems (like SAP), corporate databases and business intelligence platforms.

- **PPPI:** post reconciled figures of Productions, Consumptions & Losses and compare with Planned/Business figures
- **SD:** download from SAP inbound raw material receipts and outbound final product shipments
- **WM/MM:** align physical or logical SAP inventories with Sigmafine ones

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