



A Yokogawa Company

VISUAL MESA

PRODUCTION ACCOUNTING

TECHNICAL DATASHEET

Visual MESA® Production Accounting (VM-PA) software provides a complete state-of-the-art solution for production / yield accounting and data reconciliation for the hydrocarbon and chemical process industry. It can model both the process side as well as the utilities side. It can include the entire supply chain inventories and all material movements (receipts, shipments, tanks to tanks) as well as pipelines.

The goal of the model is to capture all necessary measurement information for the calculation of inventories and material movements in a given period. This information is used to generate a mathematical reconciliation model that provides for the detection of losses, custody transfer errors and data input errors in a generalized and methodical way, which supports a continuous improvement process of the metering system, that over time will reduce the uncertainty of the raw data the site relies on, as well as mass loss detection initiatives in complex industrial environments.

The VM-PA model consists of supply chain nodes and connections. Nodes represent tanks, points of receipt and shipment, process units and other entities. Connections are fixed lines and movements through which material is transferred between nodes in the supply chain.

VM-PA supports the implementation of production / yield accounting and data reconciliation best practices. In addition, it provides an auditable work environment for both operators and yield accountants.

Key benefits

- Production yield accounting - consistency for cost and yields
- Data reconciliation - enhanced accuracy and reliability
- Gross error detection – prioritize instrument maintenance
- Loss (leak) analysis - minimize product revenue loss
- Mass and fuel balance - more accurate view of operations

Actionable results, such as:

- Reduce material losses by \$100s of thousands
- Reduce plan vs. scheduled vs. actual gap
- Avoid costly transaction errors
- Minimize environmental incidents and fines
- Attractive ROI (typical payback 6 months to 1 year)

Technology advantages

- Web-based with J2EE plugin architecture
- Advanced dynamic graphical environment
- Non-linear optimization for reconciliation of components
- Rapid identification of measurement errors using successive error identification and simultaneous compensation methods
- Easy to use, flexible reports, web view, export to Excel
- Robust integration with the Plant Information Management Systems (PIMS) and enterprise systems such as an ERP



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Refinery case studies

35,000 bpd FCC product misalignment:
USD 506,800 savings

- Loss FCCU capacity: USD 13/bpd
- Loss refinery capacity: USD 1.34/bpd

40,000 bpd deasphalting unit with faulty
meter: USD 1,631,247 savings

- Total loss deasphalting unit:
USD 38/bpd
- Total loss refinery: USD 4.32/bpd

Production accounting and data reconciliation

- Integrated sitewide, water-free,
mass balance
- Gross error detection and analysis
- Reconciliation by global mass balance
and component
- Non-Linear optimization for
components reconciliation
- Mass loss detection and analysis
- Graphical analysis tool: fast yield and
loss reporting

Monthly plan vs. actual operation

VM-PA enables the user to compare the
monthly plan to the actual performance
data for any type of plan by material
or component in order to detect early
deviations from the plan.

Composition tracking

VM-PA calculates and tracks the
composition of a group of nodes, tanks
and the movements associated with
them. For pipelines, VM-PA considers
FIFO (first-in-first-out), in order to support
the correct composition calculation in
multi-product and bi-directional pipelines
for reception or shipments of materials.
The composition tracking module is
able to calculate the position inside the
pipeline of each batch, retaining the
information of its composition. VM-PA
supports ownership tracking business
rules from the feedstock reception to the
finished products.

Material movements

VM-PA is not only a reconciliation tool
but also an inventory and movements
calculation system for operators to log
their daily activities. VM-PA implements
international standards such as API,
ASTM, GPA, ISO among others in order
to calculate stocks, movements and
meters compensation.

Tank farm inventory challenges

- Resolves mismatch between plant and
tank farm accounting
- Supervised logging of tank movements
- Ensures data quality validation
- Reliable tank data for planning,
scheduling and ERP
- Provides accurate audit trail

Powerful user interface and reporting

- An advanced and dynamic
graphical environment
- Trend charts for rapid visualization
and analysis
- Library of 40 standard reports plus
custom report designer
- Composition, planning and multi-
product pipeline tracking
- Data integration via OPC, ODBC and
web services
- All reports accessible via web browser

The standard reports cover all processed
data, including inventory, receipt
and shipment, unit yield, production
planning tracking, loss, net production,
sitewide mass balance, tank movements,
composition tracking, security roles,
and audit ability. The embedded report
designer tool easily creates new reports
or modifies the existing ones.

Measurement uncertainty and maintenance

- Typical instruments have an accuracy
limit of +/- 2%
- Instruments are subject to drift and
zero and span errors
- Tank inventory inferred from level and
strapping table
- Taking advantage of measurement
redundancy and mass balances
identifies costly measurement errors
- Helps prioritize instrument maintenance

Audit manager

VM-PA keeps track of the complete
lifecycle of both the balance data (such
as any measurement, movement, flow,
planning specifications, composition
measure, composition transfer, case
study, etc) and the model configuration.
For each audit event (creation, edits,
deletion) it stores the operator who made
each change, the computer used, and
values that changed with time stamp.

Why choose VM-PA?

VM-PA calculates movement
quantities and tolerances using all
available data sources (source tank
inventory differences, destination tank
inventory differences, weigh scale
data, meters data) and stores all of
them simultaneously. It tracks material
transfers and inventory reclassification
(or regrading) even if they occur in the
middle of the analysis period. The user
can compare the monthly LP (linear
program) plan to the actual performance
data for any type of plan by material.
VM-PA discounts the BS&W in flow meter
calculations as well as in tank calculations.

The software architecture, based on
configurable plug-ins, avoids the need
for ad-hoc development. User permissions
assign different access permissions for
the system and for the model on a model
and period status basis. The scheduler
module schedules the execution of
scripts at a given date and time (i.e. run
a report, a connector, create periods, run
reconciliation, and run database backups).
The configuration module provides
complete parameterization of the model
as well as extending the objects.

It stores the complete history of the
configuration of the model. When
the model changes, which is a normal
situation in a plant because new meters,
tanks, etc. are installed, existing tanks are
re-strapped, the user can still return to
the previous periods and recall the valid
configurations at that moment.



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