

Integrated Refinery Information System



Effective refinery planning demands integration of data from multiple sources



PROMACE provides powerful industry oriented data models. The refinery data model defines not only the process relationships, but more importantly the business relationships that govern the refinery's performance. Intelligent external-world interfaces and server-resident calculations ensure up-to-the-minute data availability, consistency and validity.

Coupled with refinery oriented high-value applications, all key departments - from management through planning to maintenance and production - are kept in touch with the information that they need to perform their specific tasks effectively.

Operations Management

These applications are invaluable to unit managers and shift co-ordinators by providing key overview information on their units and the refinery as a whole. The applications suite includes:

PROMACE delivers a suite of powerful added-value applications to support the key refinery functions of:

- Operations Management
- Production Support
- Planning & Scheduling
- Quality Management
- Environmental Management

The concept is an Integrated Refinery Information System (IRIS), which addresses the problems of having accurate, up-to-date data available for critical decision-making.

These support functions are vital to a refinery's profitable operation in an ever increasing competitive situation.

Operations Monitoring & Reporting

- Input and production summaries, actual vs. target throughput summaries, morning reports, KPI trending as well as exception highlighting.
- All presented as hour, shift and day totals and averages - in graphical, tabular and spreadsheet format for further analysis.

Unit Material Balances

- Continuous calculation and presentation of refinery unit balances.
- Trend detection and exception reports, including closure and yield percentages.
- Available as hourly, shift, day and month to date figures and trends.
- Seamless interfacing to commercial mass-balancing and reconciliation tools.

Energy Monitoring

- On-line and continuous evaluation of refinery and unit energy balances and per product-tonne energy utilisation.
- Includes both imported and internal energy usage, steam balances, energy efficiency indices.
- Optionally, energy demand management to take advantage of off-peak electricity and gas charges.

Equipment Performance Monitoring

- Ongoing supervision and reporting of key or rate-limiting equipment with an emphasis on detection of non-peak performance, degradation or excessive resource utilisation.
- Includes running-hour or throughput totalisation with optional links to maintenance management systems.
- Configurable reports to meet client-specific requirements.

Alarm & Event Analysis

- Employing 'smart' retrieval techniques to bring together relevant alarm and event information.
- Presented alongside applicable instructions for effective incident analysis and formulation of recurrence avoidance strategies.
- Used in conjunction with the Operations Logbook application, eliminates the need for paper-based logs and laborious manual scrutiny of entries from disparate registers.

Oil Movement Logging

- Comprehensive support for all aspects of product movement from crude receipt to product shipment.
- Optimum automation and tracking of movements from the planner to product accountant.
- Operator aids for permissible tankage combinations, while supporting all possible shipment methods (pipeline, road-car, barge, etc.)
- Optional full integration with DCS-layer controls for co-ordination of physical movement and its data capture.

Quality Give-Away

- Summary information of the cost of over-conforming to product specification presented in a useable fashion: available by individual blend, tank, product or product group.
- Allows rapid evaluation of re-blend economics with hot-links to blending packages for quick "what-if" assessments.
- QGA values can be queried for any period into the past, providing an effective understanding for the long-term reduction of give-away.

Plant DataBook

- On-line, rapid access to the refinery's process, equipment, material, safety and operational handbooks and bulletins.
- Ready access to this information aids operational decision-making by eliminating judgements based on (incorrectly) memorised process details.
- Deployed refinery-wide to maximise the availability of this valuable data.



Marex the Company

Marex Technology is a British company with 28 years experience in building industrial information systems. Marex concentrates on two business areas, the development and marketing of the PROMACE process management software and implementing customer specific information and control systems which are based on PROMACE.

PROMACE Explorer

- The most effective way to view process information in a Microsoft Windows environment (Windows 95 & NT)
- Ad-hoc reporting for user friendly report, trend and display generation.
- Fully Managed Operations User Interface
- The power, speed and reliability of 32 bit computing.
- Active-X compliant for flexibility and powerful integration.
- Internet and Intranet ready for access via a Web Browser.
- Universal Data Access via OLEDB
- Powerful scripting language (VB) for flexibility

Turnkey Solutions

Marex has supplied IRIS systems to several refineries with systems ranging from 40,000 data points to 300,000. These turnkey supply contracts have covered the complete supply, engineering, and commissioning of the systems as well as the training of users.

PROMACE-Q

A new generation business-focused information server

PROMACE-Q is structured around an intelligent, active object-oriented database. This means that it automatically performs substantive augmentation of the raw process data - by incorporating both engineering and business acumen into the base process database.

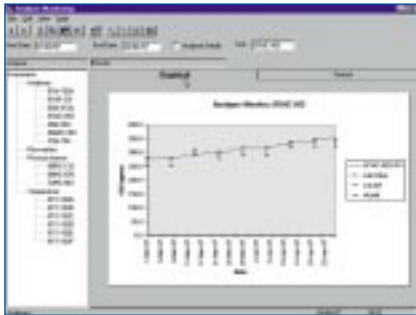
The result is consistently dependable and timely information, presented in the context of the process and business framework - with due cognisance of each user's job function. This way, users get the business information that they need, in the format that they need it.

Production Support

Applications which provide value-added information for day-to-day decision support in the control room.

Analyser Monitoring

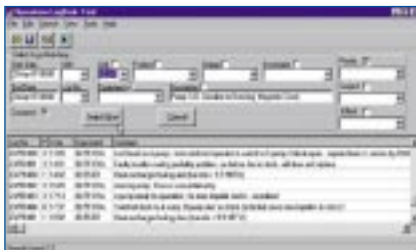
- Ongoing comparison of laboratory and on-line analyser results, highlighting significant deviations resulting from analyser drift or erroneous calibration.
- Essential function for ensuring that critical on-line analysers, upon which key control regimes are based, measure correctly.
- An effective tool for devising analyser maintenance schedules.



"Detect analyser drift before it starts costing you money"

Operations Logbook/Event Registration

- From an operator's perspective, a simple, fast tool for entering shift-relevant data and logs.
- From operation management's view, a really useful tool for reviewing significant incidents, and managing follow-ups to completion.
- All logs are centrally stored, for viewing in the correct chronological or logical context so as to highlight all relevant information.
- Extensive filtering possibilities, e.g. by severity, unresolved, equipment, etc.



"Easy overview of control-room decisions"

Planning & Scheduling

Planning Support

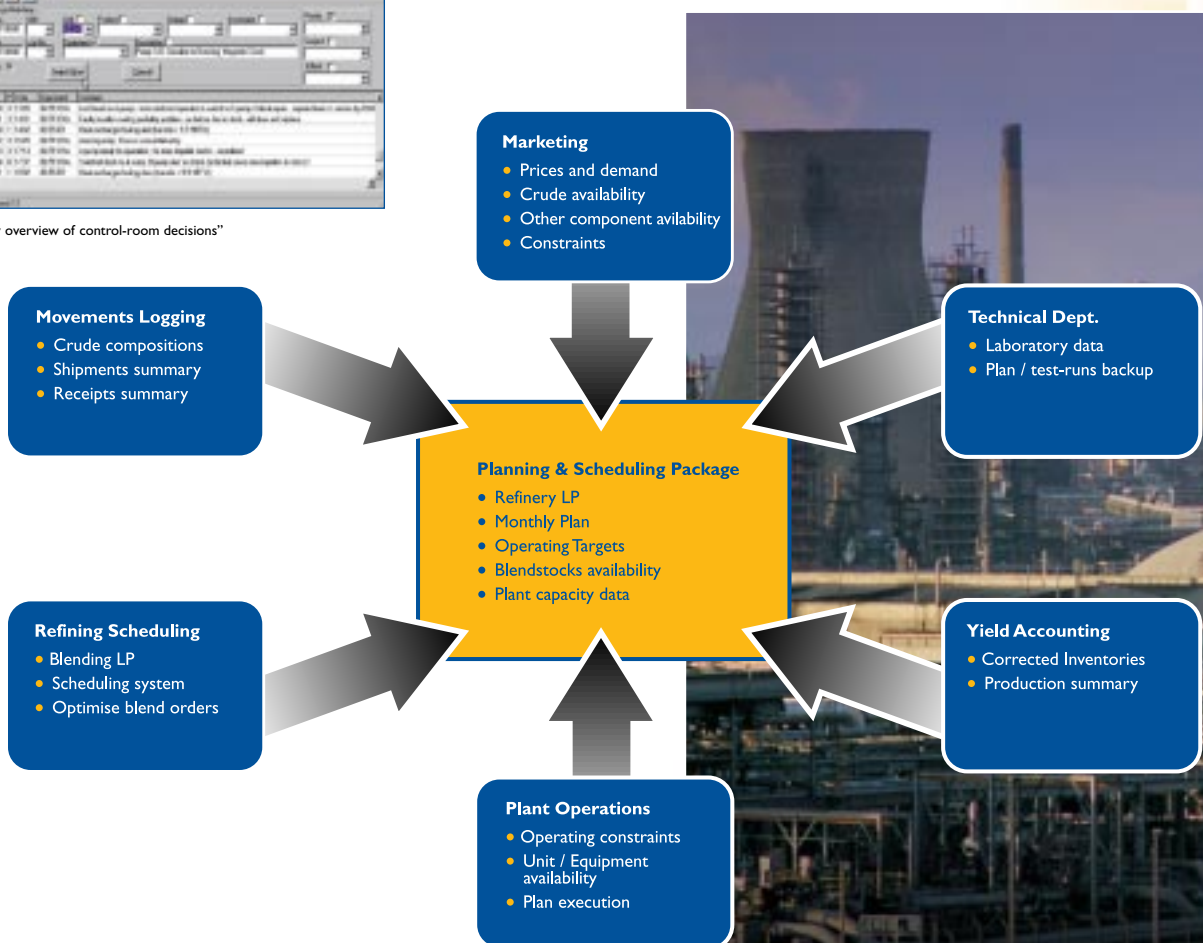
- Powerful application which integrates most aspects of the refinery.
- LP for raw-material and product slate optimisation given costs, unit, equipment and quality constraints.
- Translation of these into tangible short-term instructions: crude tank allocation, unit regimes, unit and equipment op-modes, blend orders, product shipment schedules, etc.
- Tightly integrated with 3rd party Planning and Scheduling tools.

Yield Accounting

- Continually monitors and reports overall refinery production, gross margin and material balance.
- Calculates input/output to determine overall refinery loss reports, based on production, inventories, shipments and receipts.
- Daily gross margin values.
- All available for any period in accessible history and integrated with other refinery applications:- material balances, data reconciliation, planning and scheduling packages and the like.



PROFIT = NET MARGIN x THROUGHPUT



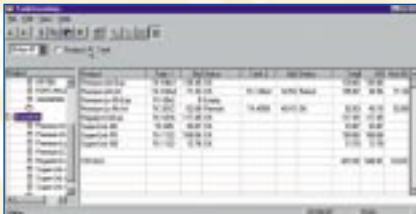
Quality Management

Target Setting

- Closely interacts with the Planning function to interpret the global directives (op modes, charge regimes) and produce individual targets (setpoints, volumes, equipment selections) which the operator and control layer will use as target values.
- Uses the Refinery DataBook to suggest default values and ranges which the planner/process engineer can adapt to suit the ruling conditions.
- The targets produced are used by the Operations Monitoring application for highlighting deviations and problems.

Inventory Monitoring

- Ongoing computation of the refinery's total inventory situation.
- All products in all tanks, process-lines, etc., are calculated at sensible intervals (e.g. hour, shift, day and month end).
- Various reporting styles are possible: gross & saleable quantities, by tank, by product, by product-group etc.
- Can optionally present the \$-value of the reported amounts, plus financial control figures of Quality Give-away.
- Units are user-selectable: volume, mass, or \$-value, while queries are possible for any period of history in a variety of reporting formats.

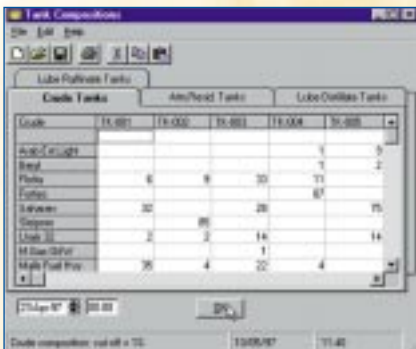


Product	Volume	Value
Crude Oil	10000	1000000
Gasoline	5000	500000
Diesel	3000	300000
Jet Fuel	2000	200000
Other	1000	100000

"Key information such as up-to-the minute display of saleable product at your fingertips"

Composition Tracking

- Calculates the composition of the crude, intermediate and run-down tanks in order to set up processing units correctly.
- Compositions are computed at practical points in time (e.g. during and at the end of movements into a tank, or user-initiated).
- Uses either the previously calculated or the actual lab values for the starting position, then predicts the current value given the amount and qualities of the in-flowing product(s) to report the tank's new composition.



Component	Crude	Gasoline	Diesel	Jet Fuel
API Gravity	30	35	38	40
Distillate	80	90	95	98
Residue	20	10	5	2
Viscosity	100	50	30	20
Flash Point	100	150	200	250
Water Content	0.5	0.1	0.1	0.1
Sulfur Content	0.5	0.1	0.1	0.1

Crude Composition Data

Blend Recipe Management

- Closely integrated with 3rd party Blend Scheduling packages to allow smart "what-if" studies for primary and re-blend decisions.
- Data interchange starts with PROMACE tank inventory and quality information, and results in Blend/Movement Instructions to the DCS and off-sites operator.
- During the batch, tracks the measured vs. predicted qualities to allow in-flight corrections, if required.
- At blend batch completion the application stores all collected information as the batch history for reporting purposes.

SPC / SQC

- Important applications for statistical process/quality control.
- Involves continuous collection and collation of product and production parameters to monitor the statistical stability of the production process.
- Data is drawn regularly from live data feeds, or may be manually entered.
- Current or impending quality excursions are detected and highlighted.
- Key values are trended over the available history, and various daily reports compiled.

Control Charts

- Another useful statistically based quality management tool supplying mean and range, mean and standard deviation plots of current (or historical) periods to show shifts in the processes stability.
- Has the ability to correlate with previous process events and material changes.

Online statistical alarms

- Allows alarms resulting from statistical quality deviations to be treated and viewed alongside normal PROMACE events and process alarms.
- Support for standard alarming, 'run to one side of mean', 'run ascending/descending', 'n' samples outside limits, etc.
- Alerts operators to the instability of the process or a digression from target operating regimes.

Process characterisation

- This extremely valuable tool aids the process engineer in setting up alarm/warning limits on the process parameters.
- Iterative refinement of calculations based on a period of 'good' production, allowing 'out of control' data to be identified, explained and then removed from the valid data used by calculations.
- Once characterised, the process capabilities can be derived based on production tolerances.

Environmental Management

Ever more stringent environmental regulations have increased the statutory historisation and reporting burdens on refinery management. Emissions values are a direct and major component of a typical refinery's Key Performance Indicators.

Emissions Monitoring

- Continuous monitoring and computation of key energy, gaseous, particulate and liquid emission values, highlighting current and predicted future violations of statutory limits so as to allow timely intervention.
- Extensive reporting capabilities to comply with governmental and internal requirements.
- Includes full customisation of measurement source, emission component, method and frequency of measurement, responsibility, and reporting details.

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