

WE MAKE EVERY DROP COUNT

**TFMS**  
Fluid Logistic System





## Fluid Logistics is an easy task ?

The operation of pipelines, storages, tank-farms and loading terminals for liquids and gases is a challenge.

Not a single drop must be lost or routed to a wrong destination. Every drop must be metered and accounted for and shall arrive at the destination in time.

Stringent quality rules are to be followed, inadvertent mixing of products could be very expensive, even dangerous. Safety is a must.

Batch or product reception from a pipeline or a tanker must work without shut down or relief valve operation and with minimized transmix.

Quantities must be tracked from source to final destination with maximum accuracy. Loading as well as unloading operations have to run with no waiting time for the vehicles.

Legislation must be strictly followed, fiscal requirements must be fulfilled, changes in business procedures must be implemented quickly. Adaptation is daily business.

All data required for accounting and possible litigations must be stored securely and available immediately upon request, documenting every step.

And this all has to take place in real-time.



# TFMS



## Our answer: PACOS-TFMS

TFMS upgrades the PACOS SCADA/DCS system to a powerful tool for process control with integrated fluid logistic application software for

- Pipelines
- Tank Farms, Storages
- Product Distribution Terminals

PACOS-TFMS means seamless integration and automation of process and business. It means online and historical information in real-time, non-stop 24x7, everywhere. Due to its unique architecture of PACOS makes information accessible where required, across geographical and organizational boundaries, well secured with granular access control. Logistic systems from the well to the consumer can be handled in one single system having all data consolidated in real time. The horizon of PACOS-TFMS does not end at the fence of a single plant, it is limited by your definition of networked technical and

business processes only. Groups of pipelines, tank farms and distribution terminals, process, business, maintenance data can be managed in one integrated system.

PACOS TFMS provides powerful functions like

- Client Portal
- Credits, Allocations, Nominations
- Order Processing
- Fiscal Documents
- Invoicing
- Railcar routing
- Identification and Access Control
- Traffic & Vehicle Management
- Batch Reception, Product Routing
- Blending, Metering, Tank Gauging
- Inventory Management
- Standard Volume & Mass Calculation
- Transmix Calculation & Management
- Automatic Loading & Unloading
- Leak Detection



## Human Interface

PACOS-TFMS makes information easy to find and easy to understand because it is user-centric.

The virtual representation of dynamic process and business information in PACOS-TFMS has been optimized in close collaboration with our clients.

A hierarchical organization of all views available gives fast and context driven information access. No scrolling and panning is required even in highly complex systems to get system overview as well as detailed information required at a glance. Intuitive design of the HMI ensures that also sporadic users will use it productively. Like all PACOS based applications TFMS is multi-lingual, up to 4 languages can be used simultaneously within one system.

Trends on any information are accessible by simple pointer click. All trends are updated in real time.

Standard reports like event report, alarm report, transaction reports are

available as well as free format reports. Number and size of reports is limited by hardware resources only. Alarms and events may be grouped. On-the-fly and /or user-bound filtering turns standard reports into powerful interactive tools for process and business analysis. Workflows allow collaboration as well as documented procedures with human interaction.

Information as well as control access is protected against unauthorized usage.

Optimum usage of modern visualization methods has been designed into the system.

Multimedia functions are built into PACOS-TFMS. Dedicated CCTV-systems are not necessary, PACOS-TFMS can also manage this part, for surveillance of remote plants or for machine monitoring.

One tool to access the world, from everywhere.



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## Process and Business always in Sync

The unique architecture of PACOS makes it possible to have business and process data synchronized for any point in time. Just imagine a loading bay scheduled for maintenance work is excluded automatically from truck queuing during this time window or your monthly inventory automatically is up to date when the clock strikes midnight.

The PACOS Network Database is the core element of this system, it is optimized for high performance, non-stop operation in an networked, distributed environment handling real time and historical process data. It is fully event driven and supports both push and pull data access.

The dynamic data required for Business Transaction are generated automatically by high performance snapshot technology. Triggered by event, the data required is transferred into a relational database. This is done automatically

by PACOS-TFMS based upon the dependencies defined in the world model database.

The world model database is the abstraction of the real world as it looks to PACOS-TFMS. It follows a hierarchical model from the global world view down to data object level in a tree-like structure. Plant and process structures and views are defined in this model as well as business procedures, staff roles, and access rights. This approach enforces security and consistency and eliminates duplication of data.

Of course the redundancy features provided by PACOS cover the relational database and the world model database as well. All data are secured by access control.



## Functionality

The basic concept behind the functionality of PACOS-TFMS is to have everything in your supply chain from the order received from a customer to the final invoice organized and documented in an electronic workflow according to the business and process model defined in the world model database.

Business-to-Business **B2B** links accept and confirm orders based upon real-time data for credit limits, accounting status, product inventory, vehicle availability, etc. Nominations and allocations are managed.

The **IDENTIFICATION /AUTHORIZATION /VERIFICATION** module automatically links data received from various identification sensors to transactions. This may include automatic contact-free vehicle, container and person identification. Each identification signal is automatically checked against the order and access database, gates and barriers are controlled accordingly. No chance for blacklisted drivers or vehicles or for customers without valid orders to enter your plant. Using Web-enabled terminals, the drivers can enter their loading requirements.

**VEHICLE AND TRAFFIC MANAGEMENT** is an important function when tankers, railcars and trucks get involved. The queuing module ensures that the waiting time is minimized and the vehicles are directed to the right loading bay by traffic signs. For railcars, the maximum loading is calculated automatically depending on the rating for the rail track to the desired destination. The vessel/vehicle database knows where the

vehicles are and whether inspections are required.

The **LOADING/UNLOADING** module is responsible for automatic loading/unloading. Only a minimal set of functionality is expected from the field devices. Calibration procedures are supported. Compliance to traffic rules, like maximum load, is checked. A check against the tare weight of the vehicle stored in the database ensures that it is empty before the filling begins. **ADDITIVES** are selected and injected automatically. The loading papers, including safety instructions, dangerous goods papers, etc., are produced automatically.

Both inline and tank **BLENDING** is supported.

**FLOW PATH ROUTING** takes care of product reception, interface separation, collision detection in the manifolds etc. Batches received are routed automatically to the destination tank. This includes transmix cut depending on quality rules, as well as on-the-fly tank switches for minimum interference with pipeline operation.

**INVENTORIES** are calculated and consolidated across all plants and systems in real time, the results may be accessed for any point in time. No need to define the calculations. The plant structure defined in the world model database knows how to calculate the inventory for each product.

If you add a tank, a product, a pipeline or a flow meter in the world model, the inventory calculations are updated automatically. The volumetric balance

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over all tanks and flow meters is done automatically.

Routine **CALCULATIONS** are done by PACOS-TFMS automatically. Tank volume calculation with strapping tables, special routines for floating roof tanks are available as well as blending calculation, volumetric contraction calculations etc. Density and volume calculations are implemented in full accordance with ASTM-D-1250, IP200 and API 2540, so accuracy of these calculation results are completely independent of the hardware. Most of the calculations operate in real time.

These calculations also can be accessed by the user for on-demand calculations or what-if scenarios.

Statistical calculation methods can be applied to tank gauging under difficult conditions. By means of statistical error compensation, the effects of movements of floating roofs can be minimized.

For even more productivity, the functionality of TFMS can be extended by other powerful products like BACS, SAFEPIPE, CUBE, and PROG.

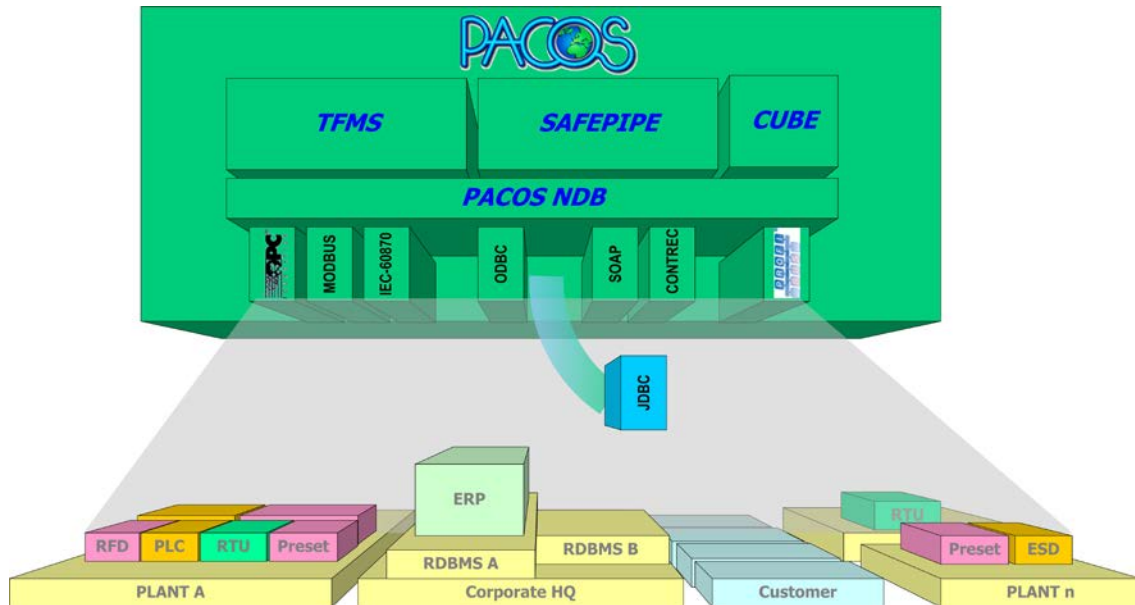
For maximum productivity in pipeline and tank farm applications, TFMS is combined with **BACS**. BACS provides batch and pig tracking for pipelines with interface calculation and seamlessly integrates to TFMS.

**CUBE** is a powerful tool for interactive as well as automatic scheduling of continuous and batched processes. The scheduling process docks to the PACOS-TFMS workflow manager allowing easy integration of B2B links to your partners. Schedules for batches and deliveries are calculated automatically or interactively.

**PROG** is recommended for extension of the time axis into the future. In water and gas distribution networks, PROG provides demand forecast using two advanced prediction algorithms simultaneously in addition to regression. With future demand known, survival time calculations, bottleneck analysis, and schedule optimization changes from vision to reality.

**SAFEPIPE** is a modular Leak Detection System. It combines maximum sensitivity with unsurpassed reliability.





## Connectivity

Connection to the outside world in PACOS-TFMS is handled by software plug-in modules. These plug-in modules are available for many PLC, database, controllers and other systems and devices supporting industry standard communication like SOAP, XML, ODBC, JDBC, OPC™, MODBUS™, IEC 60870-interfaces, LAN-interfaces with TCP/IP, Profibus™, etc. For ERP Software packages like SAP™, connectors using the interface technology provided by the ERP system are available.

For a wide range of legacy equipment and field controllers that only support custom protocols dedicated driver modules are available. This makes it easy to install a PACOS TFMS system within an existing infrastructure and later to migrate to new field equipment step by step.

Multiple modules may co-exist in parallel on one system. All modules are

linked into the system monitoring and diagnostics package.

An open framework allows easy integration of new protocols. Some examples of standard driver modules available are listed below:

- PLCs: ABB™, Modicon™, SAT, S5™, S7™....
- Presets: Accuload™, Contrec™, MFX™, ISOIL Vega™ ....
- Tank Gauging Systems Enraf™, Saab™, Varec™ ....
- Flow Computers, Pipeline Meters
- Weighscales
- Access Control Systems, RFID
- Driver Interface Terminals

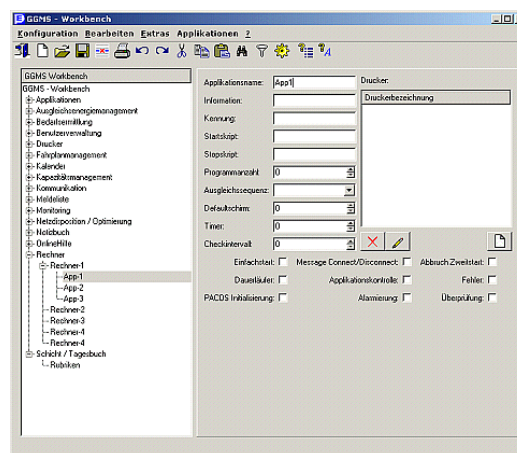
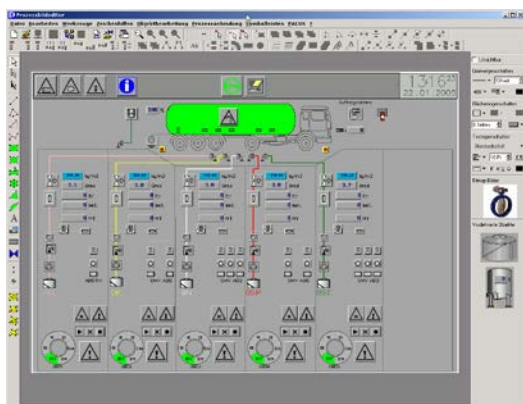
All data receive a time tag of reception in addition to a time tag possibly received from the peripheral device.

Most of the modules can be installed during runtime.





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## Powerful Configuration and Test Tools

The bigger the system the more the changes to be administered. That is why the multi-site/multi-plant features of PACOS-TFMS are complemented by a single-point-administration workbench. Configuration is no longer a question of being at a specific site but only a question of access rights.

Most of the configuration modifications may be done online without disruption of process control.

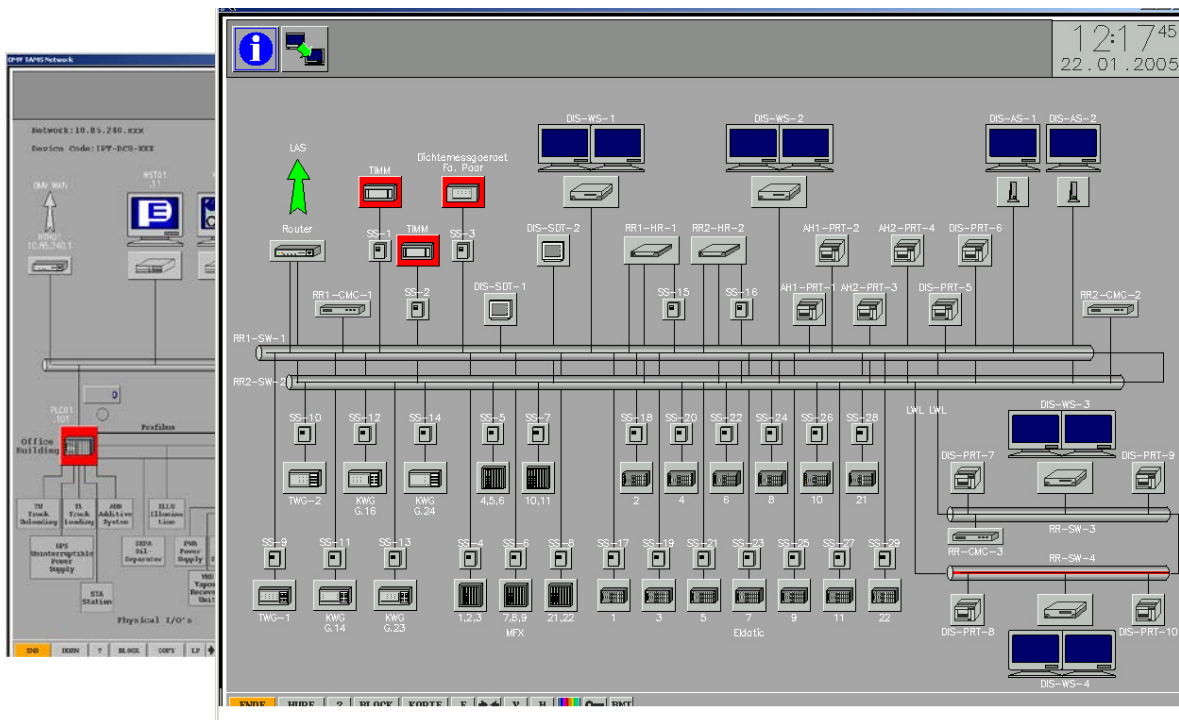
A powerful graphical editor is backed up by a library of symbols, menus, buttons etc..

Workflows can be edited graphically, a real time scripting language is available.

A dynamic data generator provides on-screen communication monitoring and testing with live data.

The tank strapping tables can be edited with a TFMS-tool or uploaded from your EXCEL™-spreadsheet.

And in case you find out that you and your staff are busy doing things more important than TFMS configuration, we will be glad to do the job with all the experience gathered in a long row of projects. With remote configuration we can reach your plant at any location of the globe as long as you grant us access.



## Hardware and Operating System Flexibility

Like all other members of the PACOS-family, TFMS is built to meet your present and future needs. Its scalability gives you unprecedented flexibility when it comes to expanding or upgrading your system.

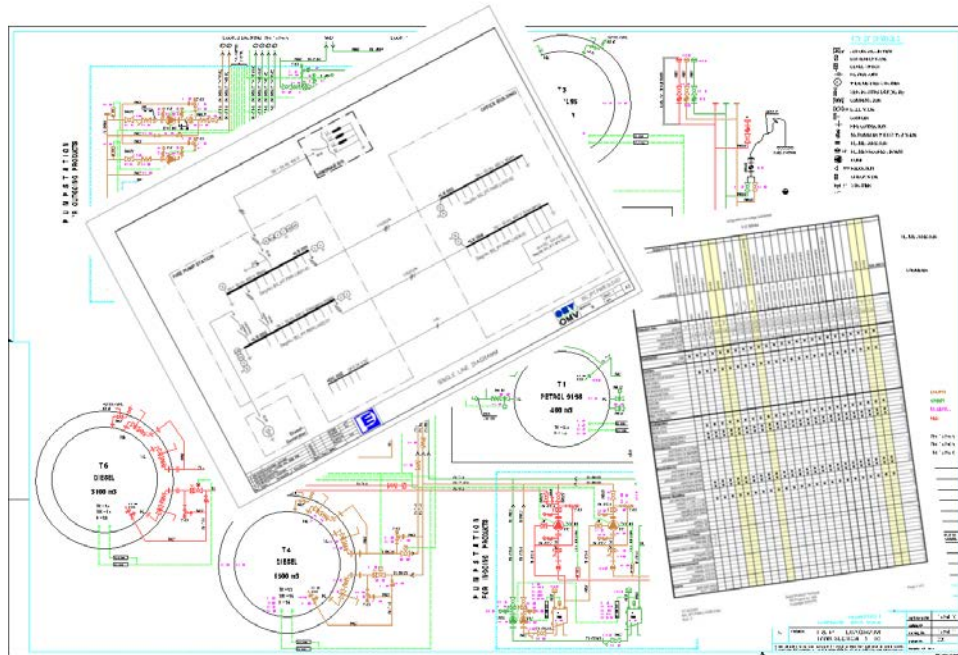
Availability and performance can be tailored to your requirements. Redundancy may be placed where necessary.

Portability makes PACOS-TFMS independent from hardware and operating systems. Built upon well established standards it is available for various platforms like Windows™, Linux and UNIX™. So simply the best platform for your requirements can be selected. And if your requirements change, you can change the hardware and operating

system platform without losing valuable data or shutting down operations. Portability is the key to have your data readable now, and in 20 years as well.

PACOS-TFMS is built upon a truly distributed and open architecture.

Any location you can reach by a communication link may be equipped with an active PACOS-TFMS-node. Communication links supported are Local Area Networks like ATM, FDDI, Ethernet, Wide Area Networks like X.25, Frame Relay, ATM, as well as WLAN.



## Fully Supported by PE Engineering Services

Our focus on fluid logistics is your guarantee for professional engineering support in pipeline, tank farm, and terminal design, construction, and operation. We firmly believe that broad experience and diversity of capabilities must be concentrated to provide the technical and management solutions expected by our clients who want to take advantage of advances in technology, reduce risk profiles and operate more productively.

Engineers of various disciplines are networked within PE and trained to understand the needs of our clients. A culture of close relationships with our clients, the best in the business, continuously enhances our expertise.

Our services in this area include:

- Basic Design
- Detailed Design
- Business Process Engineering
- Authority Engineering
- Training
- Operator Qualification Courses
- Project Management
- Start-up and Tuning Services
- Maintenance



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