UCOS®
User-Configurable Open System

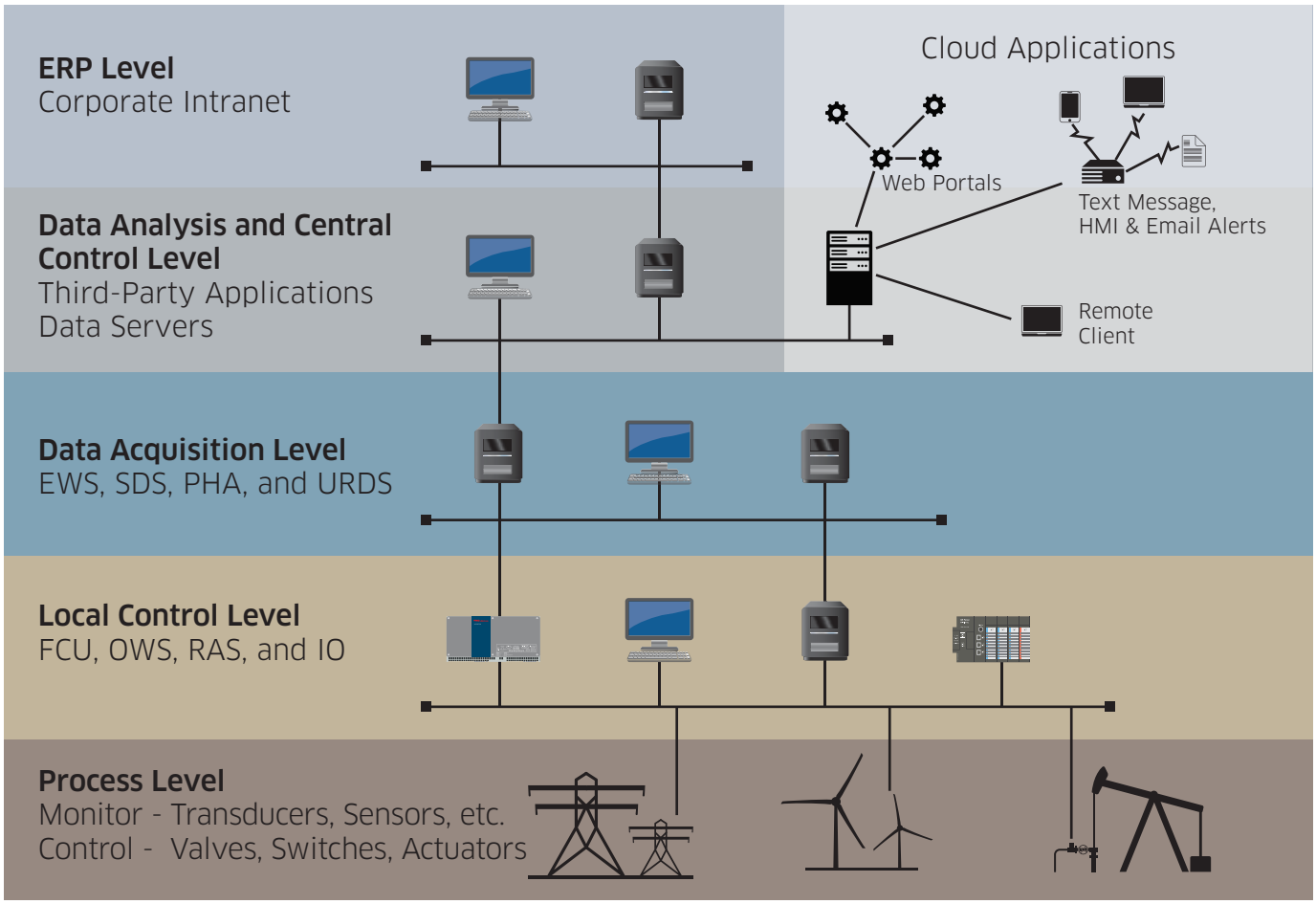
TechnipFMC

User-Configurable Open System (UCOS)

UCOS is a complete control system solution. It includes graphical development software, a graphical human machine interface (HMI), and a logic processor, all based on user-configurable, open system standards.

UCOS is not an HMI stacked on a PLC. It's a tightly coupled project development and run-time software product that lets you graphically configure object-oriented control logic and simultaneously generate HMI graphics. An object-oriented database stores both the control logic and graphics data for each project.

The UCOS development and run-time environments turn any PC into a scalable workstation. Our Field Control Unit (FCU) directly scans and controls multiple brands of industry-standard IO. An extensive gateway library allows the system to exchange data with most other software and hardware.



The UCOS Advantage

Lower Cost of Ownership

- Low cost of entry
- Immune to hardware obsolescence
- Reduce number of personnel performing manual intervention
- Eliminate costly, error-prone custom coding

Simplify Your Business

- Templates automatically enforce company standards and methodologies
- Customer requirements can be integrated into the product
- Graphical intuitive user interface and programming

Rapid Deployment and Reconfiguration

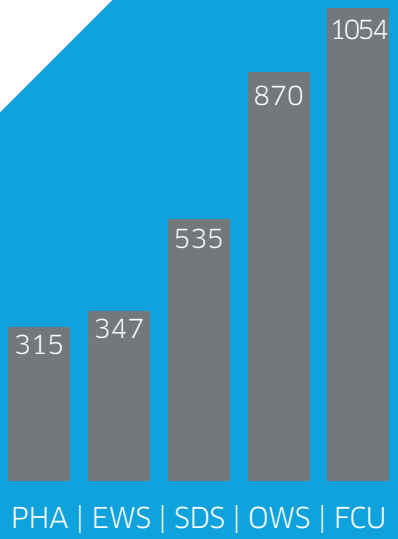
- Template-based programming
- Automate tasks
- Implement specialized customer needs
- Software updates

Industries Currently Using UCOS

- Oil Production
- Water delivery and processing
- Transportation and infrastructure

UCOS Installed Base (2016)

- Over 2,700 Installed Nodes
- Over 200 Customers
- Over 350 Sites



UCOS Components In the Field

Key Features

- Works with any traditional control system architecture, such as DCS, SCADA, and PLC/HMI
- Highly configurable yet low cost, and easy to maintain
- Provides regulatory, discrete, and sequential control
- Uses industry-standard hardware available from numerous suppliers
- Provides connectivity to Windows applications
- Helps you design, configure, test, and document projects faster and easier using patented, award-winning techniques

User-Configurable Features

UCOS creates regulatory, discrete, and sequential control schemes using one integrated development tool. This single tool addresses every aspect of the project.

- Configure all system hardware, including IO cards and tag assignment to points on cards
- Develop control logic
- Build HMI graphics and other displays for operators
- Document the entire project

UCOS eliminates the need to piece together a control system from multiple software packages that may or may not be designed to work together.

For example, device objects are dropped into logical relationships using graphical tool bars and menus.

Open System Features

UCOS is designed around open systems standards from top to bottom.

- Engineering and operator workstations can operate on widely-available PCs
- FCUs directly scan and control industry-standard IO.
- Runs on a POSIX-compliant operating system
- FCUs operate on a variety of platforms including cost-efficient ruggedized industrial controllers
- An extensive gateway library allows UCOS to communicate with virtually any IO protocol

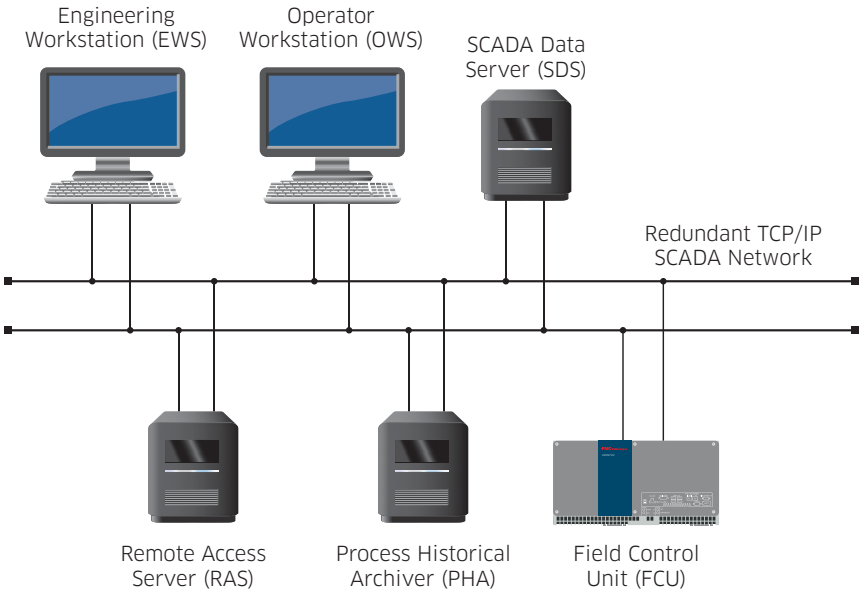
With UCOS, hardware requirements are dictated by the requirements of your project, not by the control software.

UCOS Component Overview

UCOS components integrate seamlessly using a common language and intuitive graphical user interfaces.

Unlike other industrial control components built on proprietary hardware, UCOS is software based and runs on hardware you already own.

Redundant architecture ensures that no single point of failure will impact production.



UCOS Components

Engineering Workstation (EWS)

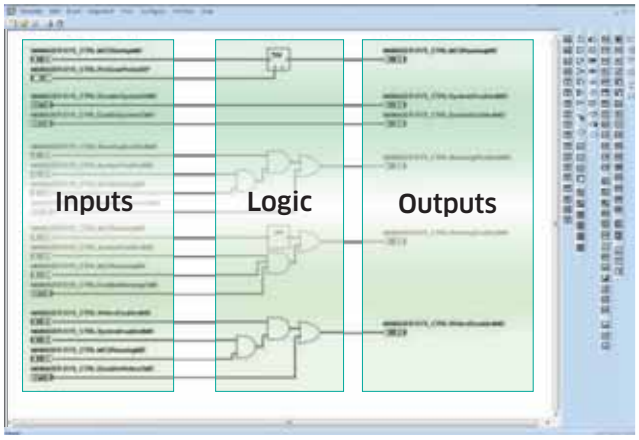
The EWS is the development tool where control schemes are configured then downloaded to the OWS, FCU, and SDS. The entire project is configured using a single integrated tool based on graphical Windows standards.

The highest security level allows definition of all of the system nodes and network structure. Graphical techniques are also used to define the logical relationships among the devices in a process area.

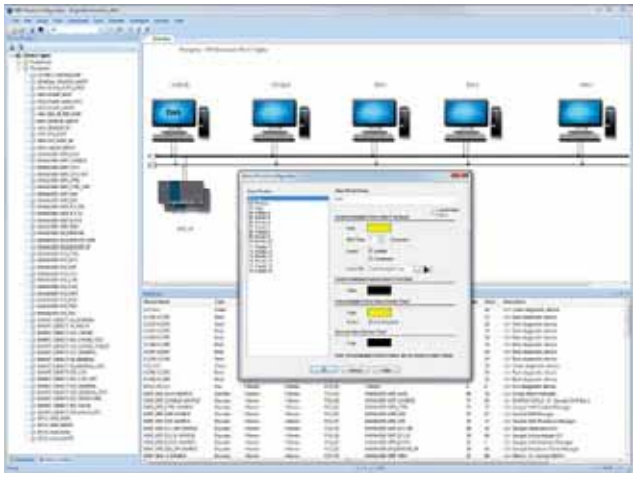
Project configuration begins by defining the system architecture: workstations, field control units, IO, networking, etc. Simply select a component for insertion into a graphical representation of the system architecture.

The EWS provides:

- Device development
- Logic configuration
- HMI graphic and operator interface
- Tag, alarm, and event log assignment
- System documentation and security



Logic Editor



Project Configuration Screen

Operator Workstation (OWS)

The OWS is used to monitor and control the process. It uses the project screens created during project development and animates them based on real-time data received from field control units and field data servers.

Authorized operators can monitor detailed activities for many types of devices and send commands using standard faceplate command windows and group displays.

The OWS provides:

- Graphical monitoring and control screens
- Command windows and group displays
- Alarms, logging, and reports
- Trending and archiving
- Device status and diagnostics
- Real-time data exporting
- Operates on Windows for secure, reliable interoperability
- High-resolution color monitor feed
- System communication via single, dual, or wireless TCP/IP Ethernet connection

Alarm Status

OWS interface

Field Control Unit (FCU)

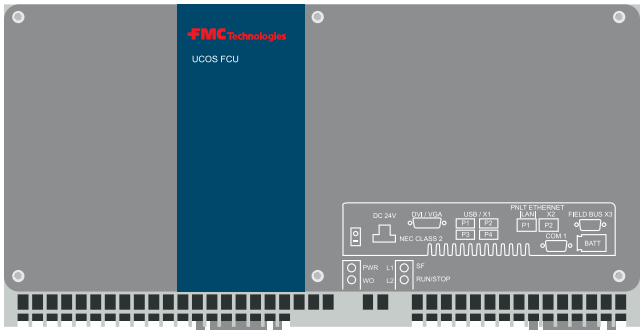
The FCU is a logic engine that executes the control scheme configured on the EWS.

It monitors and controls IO across standard networks and data highways.

Exception-based reporting and data compression allow data to be widely distributed without placing excessive demands on the network's bandwidth.

Many alarms and faults are automatically configured. Example include IO chain, rack, point, and various system level alarms and faults. Logic within the FCU can be configured to detect alarms and report them to the OWS.

The FCU features direct Ethernet network connections and provides standard interfaces to many specialized intelligent subsystems.



Typical FMC ruggedized industrial controller

The FCU features:

- FCUs operate on a variety of platforms including cost-efficient ruggedized industrial controllers
- Runs on a POSIX-compliant operating system

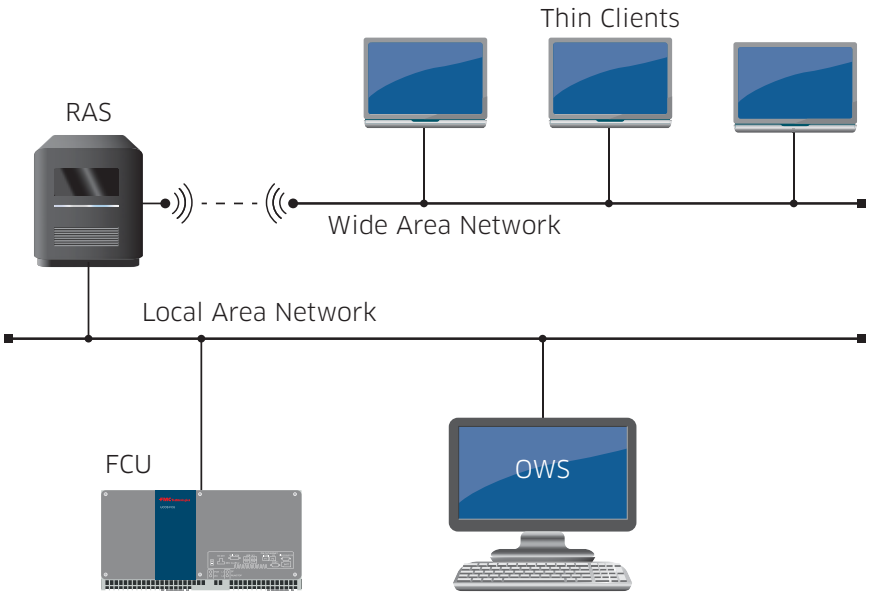
Remote Access Server (RAS)

The UCOS RAS supports secure, remote, browser-based access to the SCADA System. It can support varying numbers of remote users based on the capabilities of the underlying server. Remote users connect to the SCADA System using a browser and by providing a user name and password.

Connections to the RAS may be limited to view-only or may be given full operating capabilities. Security may be defined to limit access by any and all remote users, or it may be configured on a per-user basis.

The RAS features:

- Can be configured for view-only access
- Same graphics available on OWS & RAS
- Provides filtered controls data from a remote site over a public network



Using RAS to connect thin clients.

SCADA Data Server (SDS)

The SDS is a controller and data concentrator in one unit. It runs processes logic and directly scans supported IO.

The data exchanged with the external devices or other software systems is then “served” to the control system database so the data can be used by logic, graphics, and other applications executing in the control system environment. SDS functions include:

- Interface software communicates with: PLCs, RTUs, intelligent devices (flow computers, etc.)
- Runs supervisory logic
- Modbus, and many standard serial protocols, OPC, and ActiveX, ODBC interfaces, IP, satellite, dial out/in, serial radio
- SCProxy functionality allows high speed data collection even in low bandwidth applications

Process Historical Archive (PHA)

Historical archiving involves copying the values of tags and other pertinent associated data, while a project is running, to an ODBC-compliant database. The values in the database can then be manipulated, examined, queried, used for rule-based decision making, and many other data analysis tasks. PHA features include:

- Stores real-time data to any ODBC-compliant database (Microsoft SQL Server, Oracle)
- Stores data based on time, alarm, or event
- Redundant configuration (optional)
- Receives store and forward data via IP, Serial, or manual retrievals

UCOS Vs. Traditional Control Systems

UCOS	Traditional Control Systems
Allows regulatory, discrete, and sequential control to be created with a single tool through graphical and object oriented software techniques.	Regulatory, discrete, and sequential control are often configured using multiple, separate tools.
Includes standard device objects and the ability to create user-definable device objects, all of which are reusable, yet unique.	Most systems do not have inherent support for templating or starter libraries of control logic. Any reuse of logic typically requires significant manual customization.
Encompasses all project components, from control logic to graphical symbols, in a single database.	Multiple development tools require multiple files to store various types of configuration information, such as tags, graphics, and logic.
Performs all addressing via structured tag names. No direct memory addresses are used.	PLC-based systems require you to manage and coordinate multiple configuration databases.
Uses off-the-shelf components for workstations, controllers, and IO, available from multiple vendors.	Proprietary single-source components are often required. Non-competitive sourcing makes for higher costs at all levels.
Components can be added or deleted to meet changing control system and business requirements. Multiple facilities can be connected to provide area-wide control.	Typically, the controller is a closed unit with no place to add cards. Sometimes minimal expansion is possible by adding other cards in the rack holding the controller.
Standard memory chips in the EWS, OWS, FCU, and data server provide low-cost expandability.	A new controller may need to be purchased to gain additional memory to hold new control programs or functionality.
The EWS and OWS run industry-standard Windows OS, which offers security along with connectivity to thousands of other software applications.	Engineering and operator workstations in DCS systems often run some form of UNIX.
The FCU runs on a POSIX-compliant operating system, allowing it to run other software, and to exchange data with other software using OPC, DDE, ODBC, and other data sharing protocols.	Proprietary operating system is typically embedded and not accessible. It has one purpose: to execute the proprietary control logic of that vendor's system. Connectivity to third-party or custom applications is limited or nonexistent.
Communications based on non-proprietary TCP/IP that can operate over affordable, off-the-shelf communications equipment.	Frequently based on proprietary protocols that require expensive proprietary hardware.
Automatically incorporates report-by-exception communications that maximizes network throughput.	No pre-configured communications. Engineers must carefully program PLCs and the HMI to manage network traffic.

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