Chemical Industrial Solutions
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CHALLENGES IN THE CHEMICAL INDUSTRY

In recent years, end users of process industry are facing more challenges. With the continuous growth of energy demand, the chemical industry has been expanding its process capacity constantly. This results in a correspondingly increase in requirements of control system for chemical plants. The development of chemical industry will be advanced by transforming development pattern, optimizing the allocation of resources and innovating technology continuously. Challenges of the end users are mainly reflected in the following aspects:

Cost
- Rising of plant operation due to the increase in costs of raw materials and manpower
- Extending the operation time of equipment while reduce maintenance cost
- Addressing the challenges in energy conservation and improving energy efficiency

Competition
- Dealing with complexity of technology and lack of experienced staff
- Addressing the technological and manpower related challenges
- Adapting to the ever-changing market demands quickly
- Continuously improving the adaptability for complex and refines processes
- Maximizing production profits in the entire plant life cycle of an enterprise
- Staying competitive in chemical industry

Health, Safety and Environment
- Meeting strict requirements specified in codes related to health, safety and environmental protection

“With an unprecedented rise in value-added service needs, end users have become more and more dependent on their suppliers to cope with limited human resources and a looming wave of retirements of engineers and technical staff, especially the service needs related to maintenance and performance.”

Mark Sen Gupta, Senior Analyst from ARC

“The features of production process in chemical industry are high temperature, high pressure, inflammability and explosion. Modern petrochemical plants investment are increasing on a large scale, process units have been highly concentrated, we are demanding more operational control & management, safety and environmental protection.”

Huang Buyu, Chief Engineer from SEI
FACING CHALLENGES WITH OPERATIONAL EXCELLENCE

Achieving Operational Excellence at Different Levels

| Management level | At the decision-making level, real-time production information can be obtained easily. This allows prompt decisions making by means of efficient planning & scheduling, data statistics and data analysis. Thus, greatly improving the operation efficiency. It can also cut down costs of plant life-cycle and gain more economic and social benefits. |
| Operation level | The operator can operate more efficiently and cope with process alarms in an orderly way. It also predicts process changes correctly and makes decision as quickly as possible, ensuring a the continuous and stable plant operation. |
| Maintenance level | The maintenance staff can conduct remote instruments diagnostics and maintenance, as well as get alarms of field instruments immediately and perform measurements efficiently. It can set up a pre-maintenance schedule for instruments, thus reducing unnecessary checking and inspection. This reduces unscheduled process shutdown caused by instrument failure. |

Demands of End Users to Achieve Operational Excellence

| Reliable & stable system | • Implementing process measurement and control with high quality.  
| Efficient operating interface | • Preventing unscheduled process shutdown.  
| | • Meeting the application requirements while minimizing the total cost of ownership.  
| Optimized safety management | • Achieving more efficient operation through friendly HMI and “single window” approach.  
| Optimized asset management | • Ensuring stable and “non-stop” plant operation by effective alarm management and appropriate operation guide in case of accident.  
| Optimized control | • Implementing predictive maintenance and improving the performance of field instruments.  
| Optimized production management | • Cutting down maintenance costs by reducing occurrences of unscheduled overhaul.  
| | • Further increasing profit by stabilizing and effective production process.  
| | • Supporting seamless integration of real-time and historical data accurately  
| | • Responding to market changes rapidly by improving management efficiency of production planning and scheduling.  
| | • Ensuring compliance with regulations of health, safety and environment protection. |
End user of process industry is now facing challenges due to technical complexity, lack of experienced staffs and rising cost of plant operation. In order to help end users adapt to the ever-changing market demands, HollySys’ total solution is the best choice for end users to address these challenges.

HollySys’ total solution helps end users to achieve Operational Excellence. The solution achieves production optimization, asset management and safety throughout the entire plant life cycle with long-term focus on improvement of safety, availability and productivity.

HollySys’ solution is embodied with advanced technology, reliable product platform, strong capability of project execution and services. By devoting to innovative technology, high-quality products and services, HollySys guarantees a reliable and durable optimizing solution. Serving customers with sincerity and dedication remain as the utmost commitment of HollySys.
Advanced Technology & Reliable Platform

**Fully Redundant System**
A range of full redundancy techniques is utilized to enhance the system availability and fault-tolerance. The redundancy design maximizes the system uptime and is used in control network, controller, I/O bus, communication module and I/O modules.

**Safety and Reliability**
- Numerous designs verified by high requirements of nuclear safety level are implemented in the system design. For instance, signal quality is verified before logic operation. The output switches to the pre-set safety value automatically in case of failure.
- Production lines for high-speed railway products with SIL4 safety level are used to manufacture DCS products in order to make DCS more reliable.

**Minimizing System Failure**
- The system adopts multiple-isolation design to ensure isolation of failure from other parts of system.
- The system adopts dedicated secured network switch to avoid “cyber storms” and prevent virus attacks.
- The online diagnostics and alarm system conforming to EEMUA191 standards can detect potential hazards and errors in advance to prevent failures.
- The high-precision simulation verifies logic before being put into operation.

**Fault-tolerant Design**
- The protection for incorrect wiring to analog I/O module is up to 220 V AC.
- Different operation authority can be set based on the operation level and process area, so as to reduce the occurrences of wrong operation in process monitoring.
- The unique system bus design and error-proof design greatly reduce assembly time.
- The simulation system can provide training to operators before putting into operation and minimize failures.

**Maximizing System Uptime**
- All the graphics, control logic and configuration can be modified online without shutting down or restarting of the system.
- All the modules can be available to hot plugging without stopping system to replace them.
- All the software and firmware are downward compatible and also able to be updated online without shutdown. Hence, it can achieve maximum uptime for the system.

**Safety System Seamlessly Integrated with DCS**
HollySys provides a safety instrumented system with SIL3 level, which can be used in the application of ESD, FGS and BMS. Once an accident occurs, safety system will shut down the process immediately to provide additional protection for the whole plant and avoid economic loss. The system can be integrated with DCS seamlessly.

**Supporting Fieldbus Technology**
The MACS DCS supports the field bus technology. It greatly reduces the laying of signal cables as well as accelerates the progress of site installation and operation.

**Strong Environmental Adaptability**
- HollySys reliability testing laboratory has been certified by TÜV, so that its products comply with CE, UL, ISA S71.04.G3 standards, which are able to adapt harsh environment of high-temperature, damp and hot, and corrosive for a long time.
- The module implements a unique titled-insert design, resulting in low power consumption. This also forms a natural air channel to allow efficient heat dissipation between modules.
Professional industrial knowledge base
HollySys has specialized in the chemical industry for over 20 years, accumulating rich industry experiences and having a professional understanding of industry demands. HollySys provides Front End Engineering Design (FEED) services required for mega MAV projects, which offers optimizing system designs while reducing project risks. Customers can benefit from sharing of HollySys’ resources such as industrial configuration template and standard algorithms libraries.

Optimizing Integrated Solutions
HollySys follows customer’s demands and complements with its industrial experience, to offer an optimal integrated solution, which minimizes costs and risks. The solution achieves effective information integration between the host system and each subsystem. This helps to improve the operating efficiency while cutting down the system maintenance cost at the ground level to the management level.

Efficient Engineering Delivery Capability
HollySys has a team of professionals, specialized in refinery & chemical industry. Even with a tight schedule, this team is able to deliver projects with uncompromised quality.

Customized Service
With its rich experience in industrial know-how and control solutions, HollySys provides customized service by developing an optimal and suitable solution which meets customer’s demands.

Plant Life-cycle Service
HollySys provides plant life-cycle service ranging from system design, installation, operation, maintenance, revamping and upgrading.

Hence, it is able to reduce the total cost of ownership (TCO) for the system whilst ensuring optimal system performance.

HollySys’ plant life-cycle service does not only focus on ensuring the system operation on a long run, but also offer a solution to help users improve the operational efficiency and control quality of field equipment.

Thus, it further enhances production profit. For example, it can provide statistical analysis, failure alarm and lifetime prediction on the intelligent instrument. Therefore, the maintenance staff can schedule the instrument maintenance in advance to avoid unexpected failure.

High Capability in Project Execution and Service
HollySys provides total solution and value-added services for customers in the chemical industry to achieve operational excellence by optimizing process operation, reducing production risks and cutting down the total cost of ownership. This results in an increase in plant efficiency and profit.

HollySys' total solution is an ideal automation strategy derived from customer's standpoints. It aims to establish an integrated decision-making and operating environment for the end users. HollySys' solution is able to monitor the production process closely, promptly and effectively cope with the demands of market change. In the meantime, it helps end users achieve stable production for long periods and expand process capacity in a continuous and effective manner, thus achieving operational excellence.

HollySys' total solution helps end users eliminate the blind spot of production process, avoid occurrence of accidents, eliminate bottlenecks in production and quickly respond to the market changes. It is a target-oriented solution which improves the plant performance unceasingly, achieving in:

- Providing correct information to the right staff at the right time.
- Predicting market changes and making a decision promptly and correctly.
- Optimizing the production quickly and efficiently.

HollySys' total solution covers every aspects of achieving the operational excellence, including production control, safety management, asset management, operation optimization, control optimization and production management. The modular structure is adopted for customer selecting an optimal cost performance solution according to their respective demands. Each module supports “plug and play” function, which enables customer to increase system function and expand system capacity easily without many changes to the system.
HollySys’ total solution adopts the most advanced cutting edge technology, which allows integration of DCS, SIS, AMS, APC and MES seamlessly through unified control network. It optimizes control and operation, information management, safety management and asset management, with its advantages highlighted in the schematic design, system engineering, project execution, maintenance, revamping and updating. This results in cutting down total cost for end users and simultaneously improving the overall system performance. The total solution unifies the following four aspects and realizes seamless integration.

**Common HMI**
The operators in central control room can control and monitor all data from production process, DCS and subsystem through common HMI.

**Single global database**
All the real-time and historical data coming from production process, DCS, SIS and subsystem are stored in a single global database.

**Unified alarm management**
All the alarms, including process alarm, control system alarm and field instrument alarm, are gathered and processed in a unified approach. It is also managed through a single interface by plant operators.

**All-purpose asset management**
The signal of on-site intelligent instruments can be integrated into the asset management system directly through DCS controller and HART multiplexer. It is able to implement efficient and fast instrument diagnostics and remote maintenance.
INTEGRATED PRODUCTION CONTROL PLATFORM
MACS-K HARDWARE

From a general control platform point of view, the basis for guaranteed long-term operation of process unit can be measured based on the high reliability, high availability and maintainability of a system.

As the core of production control and data acquisition for the whole plant, production data, equipment data and even video data can be effectively integrated into the control system by excellent expandability and flexible integration capability. The operator can access all the required information through a “single window”. This results in quick decision making and failure avoidance in operation.

MACS-K is a large-scale distributed control system launched by HollySys for the process automation. The system design fully utilizes the latest achievements in global electronic technology and industrial control technology. It complies with the international standards and meets discrete process and continuous process automation requirements.

The application demands of customers are taken into full consideration in the product design. Examples include, full redundancy mechanism, enhanced isolation measures, distributed power supply and low power consumption component, which have been utilized to ensure good adaptability of system under harsh conditions. This reduces the occurrence of unscheduled process shutdown caused by system failure.
System Feature

Safety and Reliability

- Full redundancy
  Redundancy is available in the controller, I/O modules, power supply, system network (SNET) and control network (CNET) to the fieldbus connection, to protect the system from any single-point failure.

- Multiple isolation (Multilayer Safeguard)
  Channel Layer: Isolation between each I/O channel prevents failure spreading to other channels, and self-recovery fuses are designed to protect each channel from wiring up to 220V AC.
  Module Layer: Module communication and field signal processing are isolated. The fast fuses in each module prevent module power failure from spreading to the column. Communication diagnostics in each interface is designed to prevent failure spreading to the column.
  System Layer: System power, field power and auxiliary power are supplied separately. The system power fuse and field power fuse for each column prevent column power failure from spreading to the system. Communication diagnostics for each column can monitor, indicate and report the communication status. Once a failure comes, the faulty column will be cut off to prevent failure spreading to the system.

- Robust design
  The system is designed based on harsh industrial environment, with anti-electromagnetic interference following IEC61000 and anti-corrosion reaching G3, ISA S71.04.

- Safe network
  The system network adopts a deterministic real-time Ethernet with firewalled switch. The control CPU adopts industrial chips based on a PowerPC structure built-in with components against “cyber storm”.

- Extensive diagnostics
  The controllers and the I/O modules are respectively equipped with intelligent diagnostics units. Each module can conduct perfect self-diagnostics and generate a failure report regarding communication status, lost signal, short circuit and outrange.

- Highly-reliable design philosophy
  The DCS system adopts concepts of safe system, for instance, determination of signal quality and failure-oriented safety.

Flexibility and Openness

- Supporting three types of system network architectures: Peer-to-Peer, Client/Server, and combination of Peer-to-Peer and Client/Server.

- Supporting industrial Ethernet connection based on star, ring, or bus type topology.

- Compatibility with various field buses, supporting protocols such as HART, PROFIBUS-DP.

- Well-functioned configuration tools for HMI and control logic conforming to IEC61131-3 can support various customized function blocks and scripting languages.

- The control logic and hardware configuration can be modified flexibly and can be downloaded without causing process disturbance and shutdown.

- Ease of use, maintenance and replacement are considered in the system design, providing full system status and diagnostics messages.
HMI is the window presented to the operator during production. HMI plays a crucial role in production safety. A user-friendly and efficient HMI can provide correct information to staff at the right time, which can help the operator solve the problems in production efficiently and avoid accidents. The HMI design adopts theory of human factors engineering, with friendly interface and powerful operability.
System Feature

**Easy Operation**

- **One-Click Navigation**
  Each tag is designed with its corresponding faceplate, including all its associated operations, such as alarm, trend, and detailed info. It can be easily navigated by a single click, so that the operators are able to master the most complicated process with simple operations.

- **Comprehensive Diagnostics**
  Complete self-diagnostics is conducted at all times. All system status, such as controller redundancy, network status, communication failure, I/O channel short circuit, open wired, over range, cabinet temperature, power alarm, are detected and reported timely and intuitively.

- **Online Change and Maintenance**
  All the control strategies, graph displays, hardware and other configuration can be modified online without causing any disturbances to the system running. All modules are hot-swappable providing the plug-and-play method for quick installation and maintenance.

**Effective Engineering**

- **Standard Programming Languages and Rich HMI Library**
  The programming languages such as SFC, CFC, LD and ST are fully compliant with IEC 61131-3. Rich graphic library enables engineers to make complex flowcharts, faceplates and other displays. User-defined function blocks, symbols and scripts are supported for easy customization. User-defined graphic library is also supported.

- **Hardware Configuration Automatic Generation**
  Hardware configuration can be generated automatically, which drastically reduces engineering time and potential error.

- **Virtual-plant Simulation**
  The simulation software is fully identical to real control logic and HMI display and the whole process of the plant could be simulated and verified on one PC. This will reduce testing and commissioning costs.

- **Simplified Installation and Maintenance**
  The creative I/O bus cable design combines the system power bus, field power bus and I/O communication bus inside it as the redundant I/O module link. 1:1 redundancy is available for the full series I/O modules. The user only needs to insert two identical I/O modules on one redundant-type terminal base, while without any extra configuration. Advanced structure design and vertical mounting make the wiring easy and fast.
SAFETY MANAGEMENT WITH HIGH AVAILABILITY
HIAGUARD

Only a safe plant can be profitable. With the understanding and acceptance of IEC61508/IEC61511, the international standards on functional safety by end users in process industries, safety awareness has been established. The top management of plants is more concerned about production safety because only safe plant can achieve sustainable development.

HiaGuard has passed SIL3 (Safety Integrity Level-3) certification and CE certification conducted by TÜV Rheinland, which is applicable to safety-related applications of ESD (Emergency Shut Down), FGS (Fire & Gas detection System), BMS (Boiler Management System) and ETS (Emergency Trip System).

The reaction time of HiaGuard is within 30ms (200 I/Os) which meets the high-speed requirements for fast-response applications.

The design principles of achieving both high safety and high availability are adopted to meet the requirements of critical application. High safety ensures the plant safety in case of process unit accident. High availability sustains the “non-stop” production and prevent from unscheduled process shutdown due to the failure in the safety instrumented system.

HiaGuard had been certified as SIL3 by TÜV on 12th July, 2012, and passed the CE certificate.

IEC 61508, Parts1 - 7:2010
IEC 61511: Parts1 - 3:2004
EN 50156-1: 2004
EN 298: 2003
IEC 61326-3-1: 2008
NFPA 72: 2010
NFPA 85: 2011
NFPA 86: 2011
EN 61000-6-2:2005
EN 61000-6-4:2007

The Safety Architecture of HiaGuard
System Feature

Safety enhanced design

- 2 out of 3 voting with diagnostics (2oo3D)
- Diagnostics measures with high DC (diagnostic coverage) and fast alert
- Physical separation reducing common cause failures
- Comprehensive line monitoring with real-time alert
- Communication modules with built-in firewall function ensuring security
- Certified configuration software with security measures ensuring user application integrity

Availability enhanced design

- Degraded mode allowed
- Independent power supply for system side and field side
- 1+1 power supply redundancy
- Redundancy configuration is supported for communication modules and I/O modules
- Multiple failure tolerance for single module
- Safety loop’s availability up to 99.999%

Safety Engineering Station

- Programming Language: FBD, LD, ST* (IEC61131-3)
- On-line Monitoring
- System Maintenance
- Control Logic Simulation
- SOE Viewing

Safety Controller (CPU + I/Os)

- CPU: PowerPC
- RAM: 128MB
- I/O Module: AI/DI/DO
- HART I/O*
- Remote I/O*

*will be supported subsequently

System Configuration and Function of HiaGuard
EFFICIENT ASSET MANAGEMENT
HAMS

With the technical development of intelligent instrument and field bus, efficient asset management is becoming a key part of automation solution in process industry, especially for large plants with complicated production processes and field environment. It is necessary to find an efficient way to manage and maintain the intelligent instruments.

HAMS asset management system is mainly used to implement the remote configuration, diagnostics, online checking, calibration management, dynamic database updating, and maintenance scheduling of intelligent equipment in a plant. It provides initiative maintenance and predicative maintenance for the instruments, maximize the performance of intelligent instruments, and reduce instrument loss to cut down maintenance costs.

HAMS provides a fast, convenient and unified platform for managing the field instruments. In this way, the maintenance workload and operation cost can be reduced greatly while the availability and reliability of plant assets are increased. This helps to improve the quality of product and increase the Return of Investment (ROI).

Changing the Traditional Management Mode of Field Instrument Maintenance
System Feature

- Supporting three field bus protocols such as HART, FF and Profibus.
- Supporting EDDL and FDT/DTM.
- Integration of data acquisition and data analysis.
- Supporting data interface for ERP, ODS, MES and OPC interface.

Customer’s Benefits

- Reducing maintenance costs of plant instrument.
- Effectively reducing instrument failures and improving the availability of existing instrument.
- Reducing process shutdown and economic loss due to instrument failure.
- Optimizing the asset utilization and increasing the economic benefits.
Researches have shown that 50% of chemical accidents originated from human factors. Therefore, it’s important to improve the skills of operators to avoid operation failure and improve emergency response capability during accidents.

On the other hand, many stages in the chemical production process require operator’s intervention. For instance, the production process will be operated manually by operators during the stage of plant startup, shutdown, switching the feed and accidents. The operational skill level of the operator will directly influence the stability of production and product quality. Therefore, the chemical industry relies on operators training.

HollySys’ SimuPlant Operator Training System (OTS) does not only train operators but also validate and adjust the process parameters and control logic.

The MACS configuration file can also be downloaded to the SimuPlant OTS directly. This means that SimuPlant can simulate actual MACS operation and provide the most authentic operational experience for operators.
System Feature

- Utilizes virtual DCS technology that the MACS DCS software is adopted in the OTS system. It makes the virtual environment conforming to that of the actual DCS system.
- Seamlessly connects to the MACS DCS software. Both configuration files can be copied mutually and realize the experimental function practically.
- Stable technology, fast response and suitable for industrial simulation of large-scale process based on the multi-process and distributed computation.
- Builds model automatically and uses graphical model. This makes the software simple, efficient, and easy to maintain.
- Adopts the international database with thousand of physical properties. It can provide accuracy in computation with continuous correction of experimental verification.
- Providing numerous types of material balance equations, which can be selected according to various operating conditions.

User Benefits

- The operators will have a deeper understanding of process technology, improve operational skills, reduce human error and ensure safe operation by training.
- Technical staff can improve the skills of DCS maintenance and guarantee stable DCS operation through automation training.
- Developing an emergency plan and improve problem-solving ability through accident drill. Thus, avoiding personnel casualty and property damage.
- Exploring the optimal operation procedure by adjusting the process parameters. Thus, resulting in the optimal economic benefits.
- Conducting control strategy testing on virtual platform, hence adjusting the control strategy to an optimal status.
- Providing a testing and experimental platform for Advanced Process Control (APC) and optimization, reducing risks of commissioning.
According to statistics, over 80% of the control loops in the process industry can work with PID control, yet 15~20% of the loops are still hard to control. Therefore, satisfied control effect is unattainable in some “key loops” at application site.

This process influences the production stability and product quality, thus resulting in the bottleneck restricting long-term optimal production. The main reason is that these control loops have the dynamic characteristics such as multivariable strong coupling (mutual interference), great inertia and large lag (slow in response), strong interference (huge disturbance), time-varying (characteristic changing in different time intervals) and non-linearity (characteristics varying due to different operating conditions).

HAPC is the advanced process control (APC) and optimization software package developed by HollySys. The aims of HAPC are to solve the issues of controllability and applicability related to the APC technology, simplifying the adjustment and maintenance of complicated control process, improving the production stability and maximizing the economic benefits.

HollySys’ HAPC consists of a set of software package, including HOLLiAS-DataSAP for data acquisition, HOLLiAS-SysID for model identification and HOLLiAS-APC for multi-variable predictive control.
System Feature

- Utilizes technology of multivariable predictive control and intelligent optimizing control, combining with the expert's experience.
- Utilizes the advanced technology of model identification.
- Estimates disturbance of process input and output.
- Strengthens the estimation of feed forward disturbance for unmeasurable variable by auxiliary process variables.
- User-friendly HMI for model generation and modification.
- Design and analysis tools for offline controllers.
- Model testing simulator.
- Online adjustment for models and parameters according to the process conditions.
- Supports client function for operator/engineer HMI.

User Benefits

- Increases production capacity and product yield with high-value added.
- Improves quality of process control.
- Expands profit space.
- Enhances level of operation to satisfy the requirements of safety and environmental-protection.
- Eases wear and tear of equipment.
- Reduces energy consumption.
- Alleviates labor intensity related to the production operation.
- Improves operating efficiency.
Nowadays, more and more plants hope to strengthen management by implementing ERP because the production planning management is usually influenced by the market. The plant top management is challenged to keep up with the market changes in plan.

However, the ERP is mainly targeted for the resource planning, which only supports the analysis of historical data and production prediction. This results in an information gap existing in the real-time production process. In addition, conventional on-site production management is only a “black-box operation”, which no longer meets the needs of the complicated competition today. Therefore, the top management of each plant is more concerned about the issues such as making the “black-box operation” transparent, finding out any problems affecting the product quality and costs, and improving the real-time response and flexibility in plans so as to enhance the operation performance.

HollySys’ HiBridge plant information management system (PIMS) is applicable to applications such as data acquisition, real-time monitoring, production management, trend analysis and web access. It can finally integrate seamlessly with the ERP system of a plant, implementing the data integration and application of plant information based on the needs of various industries.

HiBridge is a model-driven platform for plant application support. Based on such a platform, it can build various applications and industrial models, change with the demands and view to suit different business needs, and offer professional solutions.

HiBridge provides an optimal plant information management platform for top management, which help customers to fully share information resources. This includes improving the adaptability to changes and enhancing the overall competitiveness.
System Feature

• Design based on Service-oriented Architecture (SOA) platform, integrated with modeling system, workflow system, real-time database system and operation system.

• Providing flexible strategies of “changing with the demands”, supporting flexible configuration of business rules and HMI and supporting flexible workflow definition, the system can be restructured according to the changes in business demands.

• Utilizing most advanced technologies such as SOA, WEB, XML, middleware and software component.

• Up to 99.99% of reliability is achieved in system platform based on optimal design in system architecture.

• Integrated with process control systems such as DCS, PLC and SCADA downwards, and application systems such as ERP, CRM and SCM upwards.

• Supporting distributed application deployment, distributed data management and load balancing to meet the management demands of group enterprises.

• Supporting multiple languages.

• User-friendly HMI with a uniform style, for easy of operation and convenience.

User Benefits

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Percentage Reduction</th>
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<tbody>
<tr>
<td>Reducing the data input time</td>
<td>30% - 70% reduction</td>
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<tr>
<td>Improving data integrity</td>
<td>Increased over 95%</td>
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<tr>
<td>Reducing production data statistics</td>
<td>80% reduction</td>
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<tr>
<td>Reducing loss of written work</td>
<td>Average 56% reduction</td>
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<tr>
<td>Shortening manufacturing cycle</td>
<td>25% - 45% reduction</td>
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<tr>
<td>Reducing inventory</td>
<td>12% reduction</td>
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<tr>
<td>Reducing Work-In-Process (WIP)</td>
<td>Average 24% reduction</td>
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<tr>
<td>Reducing product defects</td>
<td>Average 18% reduction</td>
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<tr>
<td>Improving staff performance</td>
<td>Increased 20%</td>
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EXECUTION CAPABILITY OF MAV PROJECTS

With the scale of chemical project getting larger and larger, the risk control of project execution becomes extremely important. The success or failure of a project relies not only on the system platform but also the execution capability and experience of DCS suppliers, which plays a vital role in mega projects.

Practice shows that MAV is an advanced strategy of project execution for mega projects. It can make the control system suppliers and end users cooperate more effectively, achieve optimal integrated solutions with a best cost performance while reducing the risks in project execution and the total cost of ownership.

HollySys has adopted the MAV project execution strategy in many mega projects with rich experience accumulated.

The Execution Procedure of MAV Project

- FDS completion
- Confirmation of system network architecture
- Confirmation of BOM
- Finalization of the project organisation
- Implementation of the prototype test
- Finalization of the I/O distribution
- Confirmation of the control scheme
- Confirmation of HMI design
- Subsystem function design
- Hardware design
- Confirmation of the buyouts and place order
- Configuration of control logic
- HMI configuration
- Hardware drawing
- Assembling & integration
- Procurement completion
- System internal testing
- FAT
- Integrated FAT (IFAT)
- System configuration backup
- Packing & Freight
Characteristics of Mega Projects

- Numerous process units, long process flow and complicated process technology.
- Wide variety of process units (such as main process units, auxiliary process units, storage and package utilities).
- Numerous design institutions and various forms of EPC/PC companies.
- Numerous licenses and proprietary technologies owned by different licensors.
- Cooperation between numerous system suppliers, equipment integrators, and third-party interfaces.
- Distributed control (in Field Electronic Room), centralized management (in Central Control Room), integration of management and control.
- Cooperation and management among the construction companies, the design institutions, the system suppliers and the equipment suppliers.
- Due to tight project duration and burdensome construction tasks, many projects shall be completed as soon as possible. The sooner a project is started, the sooner it becomes profitable.
- Huge and complicated working site with cross operations, highly-random in project execution.
- Numerous applications of new technology on integration, information, intelligentization and automation.
- Complicated control system network architecture ensuring safety, reliability and stability.

Customer’s Benefits

- Saving the project investment by over 30%.
- Covering shortage in automation management and technical staff for mega projects.
- Providing technical management of multiple automation suppliers.
- Early involvement in project execution, providing perfect integrated plant-wide solutions and technical consultation.
- Providing customers with all-round services covering instrument selection, system selection, overall design for central control rooms, plant-wide intelligent network design, functional design specification (FDS), system interface specification, network security design and overall power distribution design.
- Providing comprehensive project management and reducing project risks.
FULL PLANT LIFE-CYCLE SERVICE

HollySys has been committed to provide customers with a full plant life-cycle service, as well as building a long-term and friendly partnership with them. HollySys has a long-standing industrial experience and field proven technologies. HollySys is able to provide ongoing support after the startup of process units. The service scope includes continuous improvement of the control strategy, analysis and improvement of the control loop, ongoing operator training, periodic product upgrading and spare part management.

Services Offered by HollySys in a Plant Life-cycle

- Technical support, drafting FDS, MAV project management
- Remote system monitoring, equipment performance management & improvement, production management
- System configuration, training, SAT, commissioning & startup
- Predictive maintenance based on operation condition of equipments covering field instruments, mechanical & electrical equipments and spare parts
CONTACT US

SINGAPORE (INTERNATIONAL HQ)
HollySys (Asia Pacific) Pte Ltd
1 Changi Business Park Crescent,
#04-01/02/03, Tower A, Plaza 8 @ CBP,
Singapore 486025
Tel : +65 6777 0950
Fax : +65 6777 2730

CHINA
HollySys Group
Di Sheng Middle Road, No 2
Economic-Technological Development Area
100178 Beijing, China
Tel : +86 10 58981000
Fax : +86 10 58981100

INDIA
HollySys Automation India Pvt. Ltd
C-56/45, 5th Floor, Priska Tower,
Gautam Budh Nagar, Sector 62,
Noida, Uttar Pradesh 201309, India
Tel : +91 124 6900705

INDONESIA
PT. HollySys Automation Indonesia
Metropolitan Tower
10th Floor, Unit E, Jl. R. A. Kartini Kav. 14
Jakarta Selatan 12430
Tel : +62 21 2918 2826
Fax : +62 21 2918 2936