

# Safety Systems

## INTRODUCTION

Advanced Control provides turnkey solutions for Safety and Fire & Gas control systems utilised for offshore and mobile drilling and/or production units.

Using the latest commercially available automation hardware and software is the best strategy for reducing both costs and risks in the life cycle of an automation system. This is characterised by the use of Open Safety Systems.

Being an independent system integrator, Advanced Control AS is not committed to any particular equipment suppliers and uses a variety of hardware and software for our MMI and PLC systems. This also entails continually evaluating new products and transferring experience.

We believe that this strategy is beneficial for companies in the oil and gas business in general.



## OBJECTIVES

The prime objective is to reduce lifecycle costs while meeting the design requirements. This applies to the design, development, test and operational phases. The common sense approach for achieving this is to minimise in-house product development and to maximise the use of commercially available hardware and software products. AC prefers to focus on the operators, the system functionality and ergonomics.

## ADVANCED CONTROL'S CAPABILITIES

As well as being an independent system integrator and one of the companies with personnel trained in the use of open systems, AC-personnel has the benefit of an extensive history in offshore production.

For any given system, AC can set its scope and tailor the architecture to suit the client, including the communication network and the redundancy requirements.

AC's solutions are based on open systems such as PCs, MS Windows, TCP-IP, and industrial display software.

The general design philosophy for the equipment is based on safety of personnel, environment, simplicity, and efficient handling. In addition, the equipment shall give easy access for inspection, maintenance and replacement of parts, if required.

Rather than dictating functional possibilities, AC welcomes close interaction with the customer and operators of the system. This would involve introducing the customer to Innovations and may be done in a study phase prior to the design freeze.

## SYSTEM PHILOSOPHY

To minimize operator presence in machine and utility areas, supervision and control of the entire vessel will be performed from a central, continuously manned location.



The user-friendly AC design provides the following important features:

### Increased safety

- Redundant ring communication network
- Stand-alone, redundant, multi-functional operator workstations
- Distributed I/O stations (with the degree of redundancy as required)
- Modular standard hardware
- On-line diagnostics
- Supervision of sensor interfaces and machinery operation
- Well proven concept

### Cost Effectiveness

- Standard "of the shelf" hardware and software
- Reduction of cabling, due to extensive use of remote I/O
- Less hardwired mimic and console instrumentation
- Self-diagnostic features
- Reduction on spare part requirement
- One supplier, fewer interface problems



### Service and support

- Extensive operator training possibilities
- Trained personnel available on short notice
- 24 hour on-line support (via satellite communication if required)



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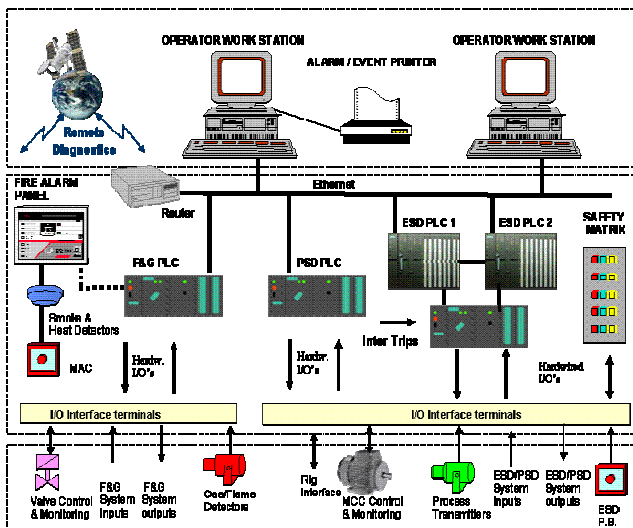
## TYPICAL SAFETY SYSTEM

AC's personnel has been involved in delivery of several PSD, ESD, and F&G, systems using different display software, PLC manufacturers and architectures. These have ranged from simple single systems through dual redundant to special triplicated systems or a combination of these as required.



The following gives a brief overview of the principles for a AC-supplied safety system (The client may select the hardware manufacturers.)

- The design of the control system shall be based on a fail-safe philosophy.
- The operator stations shall be industrially ruggedized or marine approved MS Windows based workstations.
- Highly distributed concept, where each process sub-system may be fully controlled by a dedicated PLC as an autonomous system. Thus the sub-system could be controlled locally in case of a network or supervisory system failure.
- A fully redundant industry standard Fieldbus shall be used as the system's backbone for deterministic transfer of monitoring and control signals. This shall provide good network performance and be expandable to accommodate future modifications.
- Remote I/O units shall be used to optimise cabling. Fibre optic cabling may be used in areas prone to electromagnetic interference.
- The system may be serviced remotely (integrated Operations) via optic fibre cable or satellite link.



## CLASS APPROVAL

Advanced Control delivers systems according to rules of the leading classification authorities, including:

- Det norske Veritas, Lloyds Register of Shipping
- American Bureau of Shipping, Bureau Veritas

We also have broad experience of delivering systems, which meet statutory and governmental regulations, such as NPD, NVE, API, Norsok and Crine

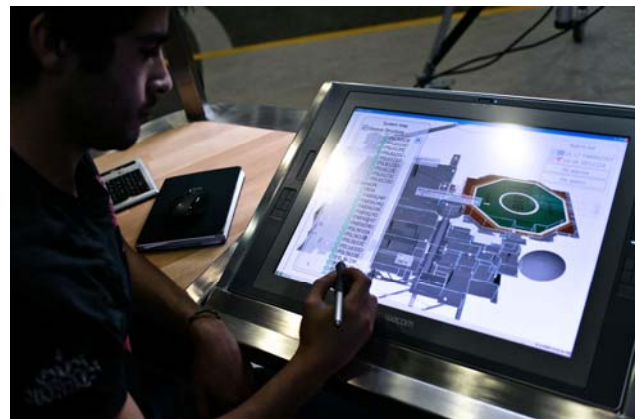
## OPERATOR ENVIRONMENT (HMI)

Daily operation of the process will be from a set of MS Windows based PCs. Operator station architecture will be based on a "server/client" system. A standard Ethernet with redundancy options, shall be used for transfer of large data volumes and co-ordinating tasks between the PCs.

All information is presented via graphical screens. An Interactive 3D visualisation model of the plant is used for dynamic alarm presentation and operator interaction. Pointing and clicking buttons and objects in the screen can reach all functions of the system.

The Operator Screen has the following features:

- Safety Matrix Displays
- 2D & 3D Graphics display
- Display of Alarm & Status conditions
- Logging of Alarms and Events



## Dynamic ALARM Grouping Presentation

RIVOPS™ is a unique technology to deal with the large amounts of alarms that can present a problem at any one time. Based on a dynamic, 3D digital presentation of the installation, the compacted alarm groups are brought to the attention of the operators.

Alarms are grouped according to historical patterns and HAZOP studies. When an alarm pattern is detected, grouping features are activated. The result is a significant drop of the alarm rate, increasing the operator awareness.

## SAFETY SYSTEM REFERENCES

AC's personnel have been involved in delivery of several Systems using different display software, PLC manufacturers and architectures. Our Automation product range comprises:

- Fire and Gas Detection
- Shutdown (PSD)
- Emergency Shutdown (ESD)
- High Integrity Protection Systems (HIPS)

