

Enabling Operational Excellence in FPSO

Patrick Deruytter, General Manager
Emerson Process Management Korea
16-Sep-2008

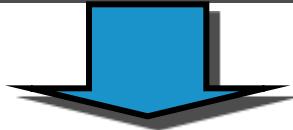


FPSO Challenges/Global Market Trend

- New generation of highly complex vessels/plants
 - New builds and conversions
- End-user Requirement
 - Full Integration of all systems
 - Navigation + IAS + CTS + Other
 - Fast Track delivery
 - Highly reliable and easy to maintain
- Customer Requirement (Shipyard)
 - Integrated engineering and implementation (flexibility)
 - Reduce Manufacturing cost
 - Fast Track delivery

FPSO Project Trends

- One Stop Solution for Project Implementation
- Referenced on preferred vendor list to major shipyard as total solution supplier
 - Deliver tangible project life cycle savings to the shipyards
 - Deliver a total automation integration
 - From Propulsion to Sensors following the latest standards in Automation and Marine
- User Choice System (flexibility)
 - Cargo Part : Cargo handling, Ballast, VRCS, CTS with Transmitter.
 - Mach. Part : Engine, PMS, Machinery control system with Transmitter
 - New Tech. : Re-liquefaction system, Re-Gasification system etc.



- Improve the Operational Excellence of a Ship Operation
 - Efficient, Predictable and Intuitive Operations, Maintenance & Support

Emerson Process Management Total Solutions Strategy



Global Industry Services

PlantWeb

Best-in-class Technologies

Meeting the Challenges in Offshore Production

- Unique enabling technology to maximize production
- Remote monitoring and optimizing of process equipment for health index and remote assistance
- Solution ready for existing challenges and regulatory compliance requirements
- Highly flexible to enable fast track conversion projects
- Onboard manning and qualification requirements
- Intelligent solution to minimize necessary manning

**Enabling
Technology**



AMS
Suite

**Maximum
up-time wherever
in the world**

**Our architecture and application tailor made for FPSO
will bring the onboard crew and the specialists closer together**

Emerson Wide Breadth/Depth of Products, Solutions & Services

Systems & Solutions

- Control Systems
- Turnkey Project Capability
- Engineering Design
- Industry Centers
 - Chemical
 - Oil & Gas
 - Refining
 - Power & Water
 - Life Sciences
 - Metals & Mining
 - Pulp & Paper
 - Marine



Valves & Regulators

- Control Valves
- Regulators
- Valve Actuators
- Valve Instruments

FISHER



Measurement

- Pressure
- Temperature
- Level
- Flow
- pH
- Conductivity
- Gas Composition

ROSEMOUNT



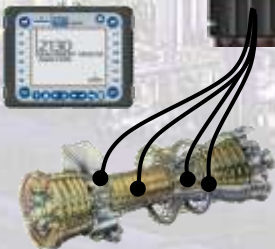
DANIEL



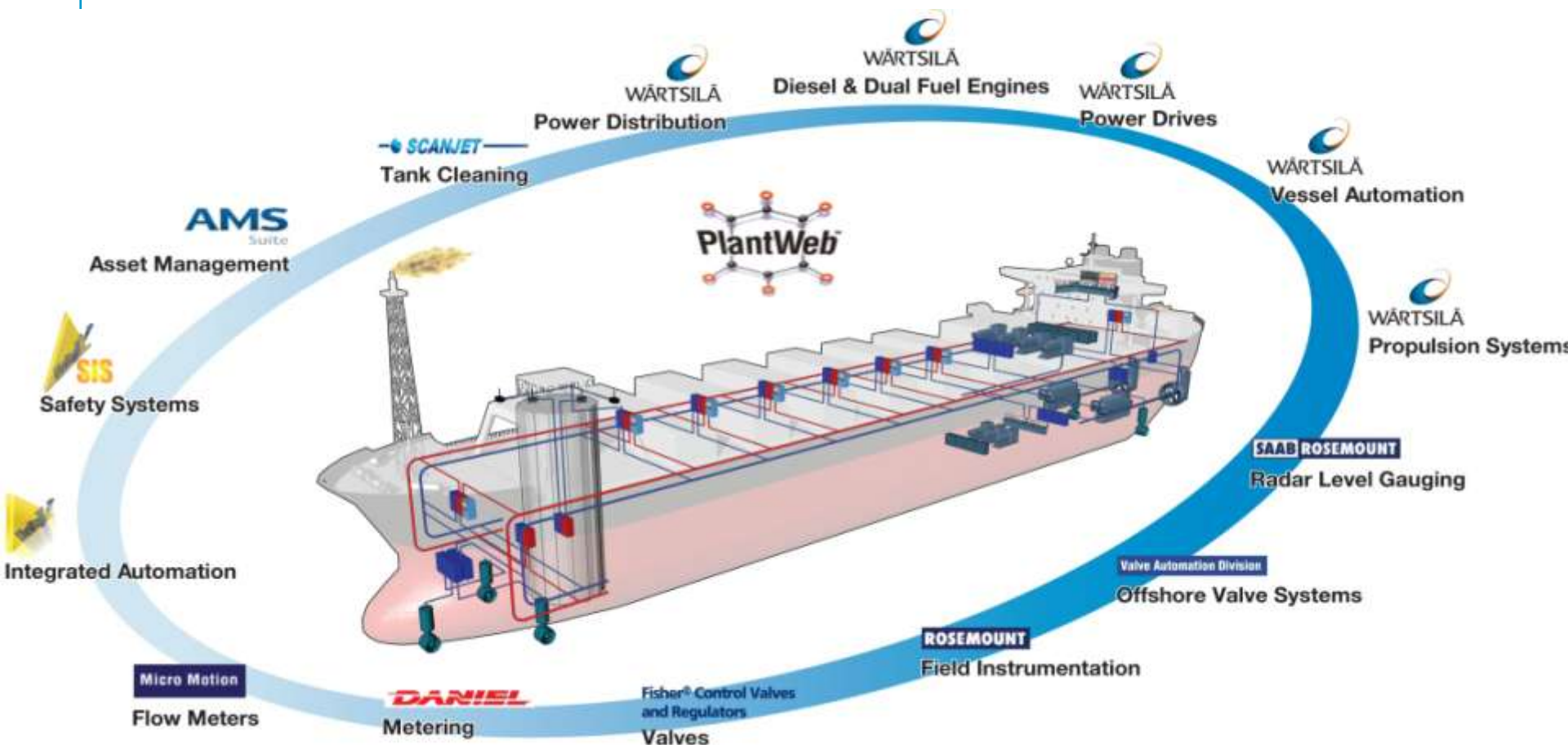
Asset Optimization

- Asset Management Systems
- Instrument and Valve Services
- Equipment and Plant Optimization
- Electrical Reliability Services
- Consulting
- Training

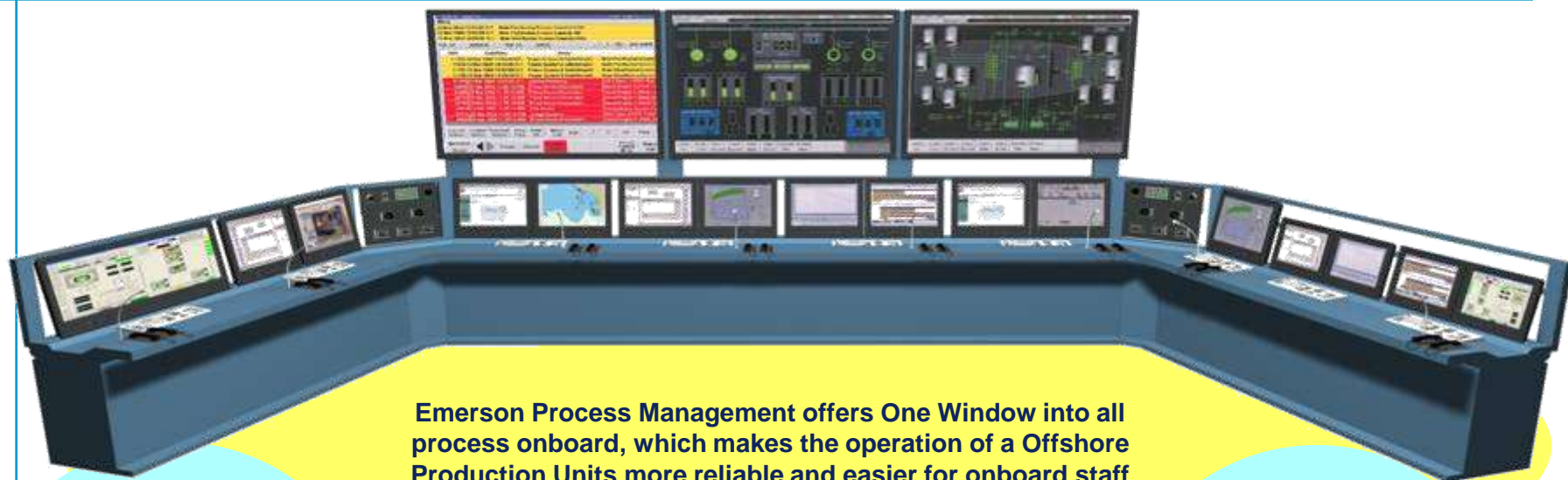
AMS
Suite



Emerson Marine Offshore Solution



One Window into the entire on board processes



Emerson Process Management offers One Window into all process onboard, which makes the operation of a Offshore Production Units more reliable and easier for onboard staff than ever before. Add the AMS™ Suite, and you have predictive diagnostic for detection of potential problems.

Oil/Gas Production

- Generators
- Separators & Treatment
- Reinjections
- Compressors
- Auxilliary Systems
- Oil/Gas Fiscal Metering
- Offloading

Subsea Control

- Manifold & Subsea Valves
- Monitoring & Control

Safety

- Vessel ESD/F & G System
- Oil/Gas ESD/F & G System

AMS

Predictive Maintenance System for Machinery, Equipment and Instrumentation

Vessel Automation

- Ballast/Bunker Control
- Oil Storage Monitoring & Control
- Offloading
- Power Management
- Auxilliary Control
- Tank Washing

FPSO Engine room Integrated Monitoring and Control



Machinery

- Main Boilers monitoring and Control
- Power Management
- Main/AUX Turbine Monitoring
- Auxiliary machinery Monitoring and Control
- Bunkers Machinery and Control
- UMS/EO Monitoring functions

Cargo

- Cargo loading/offloading
- Control
- Boil of Gas (BOG) Control
- LD/HD Gas Compressor Control
- Cargo Monitoring
- Load and Stability Calculator

Project Execution Strategy

Real distribution of Power, Control and Safety functions

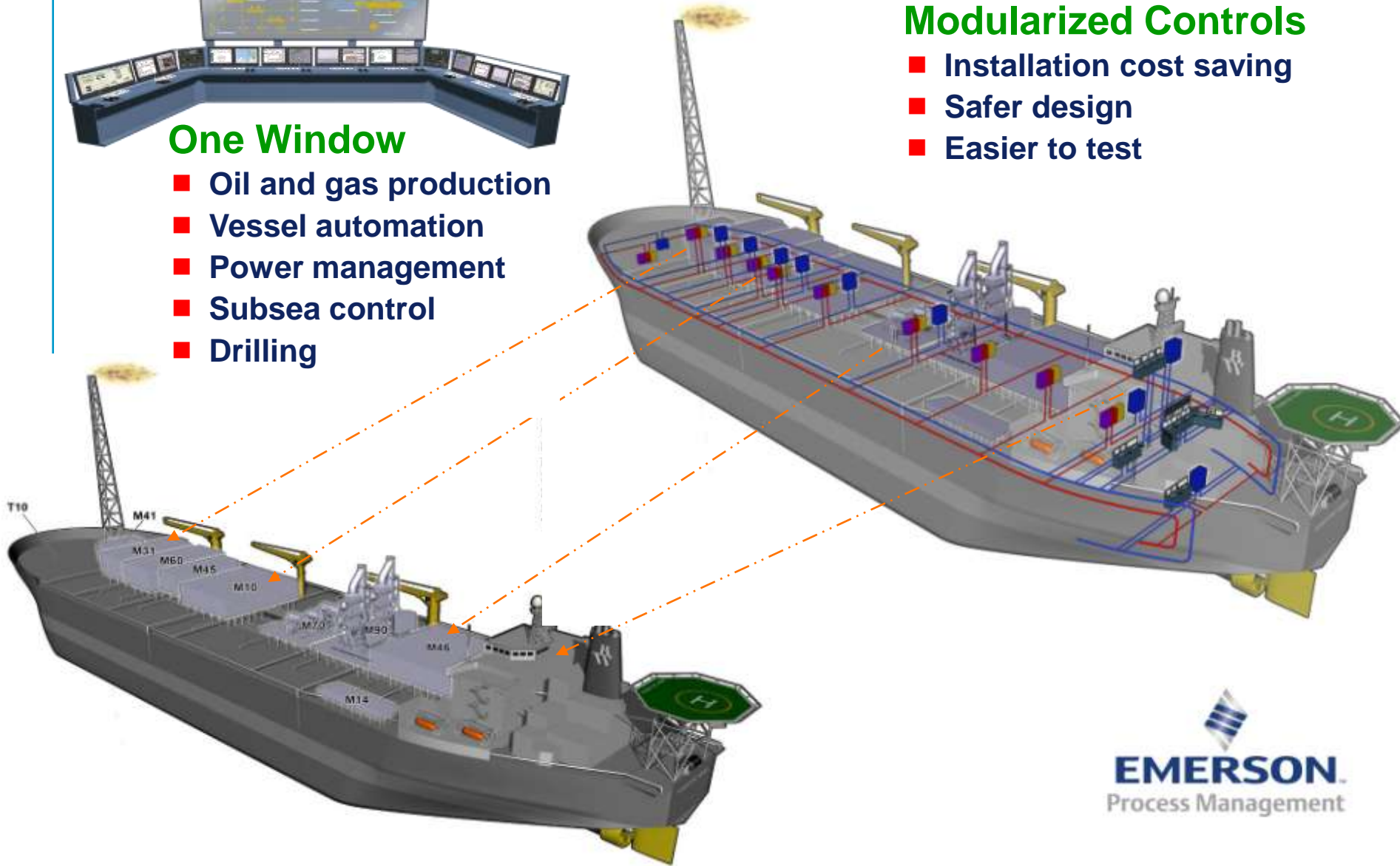


One Window

- Oil and gas production
- Vessel automation
- Power management
- Subsea control
- Drilling

Modularized Controls

- Installation cost saving
- Safer design
- Easier to test



FPSO Module Arrangement, a challenge for Automation, Safety and Instrumentation

17-modules+ hull

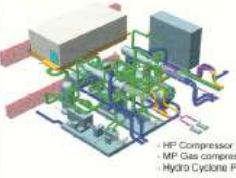
Hyundai Heavy Industries Co. Ltd.
Offshore & Engineering Division
Lumpsum Design & Build Project (LDBP)
DATE: MAY 15, 2005

MODULE - S5



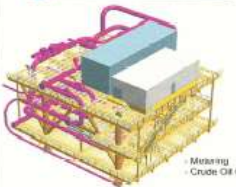
4TH STAGE SEPARATION & ELECTRO DEHYDRATION

MODULE - S6



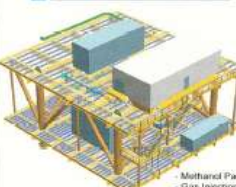
GAS INJECTION & OIL METERING

MODULE - P8



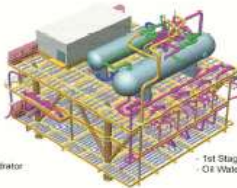
OFFLOADING PUMPS

MODULE - P7



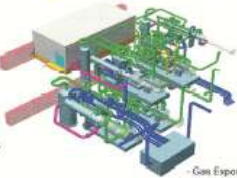
GAS INJECTION & OIL METERING

MODULE - S4



PRODUCTION AND TEST MANIFOLD, PIPING STATION, TEST SEPARATOR & 1st STAGE SEPARATION

MODULE - S7



EXPORT GAS - COMPRESSION TRAIN A/B & METERING

MODULE - P6



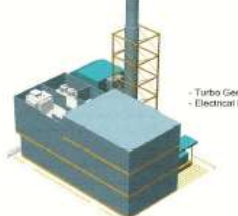
GLYCOL REGENERATION, DEHYDRATION & FUEL GAS SYSTEM

MODULE - P5



GLYCOL REGENERATION, DEHYDRATION & FUEL GAS SYSTEM

MODULE - S3B



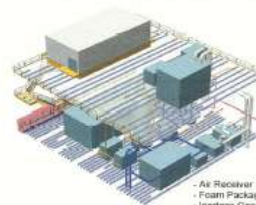
POWER GENERATION STARBOARD & BUILDING

MODULE - S3A



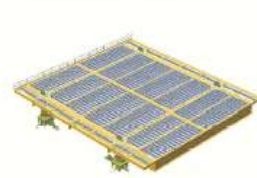
POWER GENERATION STARBOARD

MODULE - S2



UTILITIES

MODULE - S1



WATER INJECTION & FUTURE SEAWATER TREATMENT

MODULE - P1



COOLING WATER

MODULE - P2



SEAWATER TREATMENT & WATER INJECTION

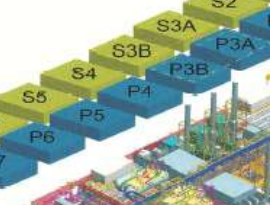
MODULE - P3A



POWER GENERATION PORT

MODULE - P4

MODULE - P3B



POWER GENERATION PORT & BUILDING

MODULE - P3

MODULE - P2



POWER GENERATION PORT

MODULE - P1



COOLING WATER

MODULE - P2



SEAWATER TREATMENT & WATER INJECTION

MODULE - P3



POWER GENERATION PORT

MODULE - P4



POWER GENERATION PORT

MODULE - P5



POWER GENERATION PORT

MODULE - P6



POWER GENERATION PORT

MODULE - P7



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MODULE - P8



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MODULE - P9



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MODULE - P31



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MODULE - P32



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MODULE - P33



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MODULE - P34



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MODULE - P35



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MODULE - P36



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MODULE - P37



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MODULE - P38



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MODULE - P39



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MODULE - P40



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MODULE - P41



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MODULE - P44



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MODULE - P45



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MODULE - P46



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MODULE - P50



POWER GENERATION PORT

MODULE - P51



POWER GENERATION PORT

MODULE - P52



POWER GENERATION PORT

MODULE - P53



POWER GENERATION PORT

MODULE - P54



POWER GENERATION PORT

MODULE - P55



POWER GENERATION PORT

MODULE - P56



POWER GENERATION PORT

MODULE - P57



POWER GENERATION PORT

MODULE - P58



POWER GENERATION PORT

MODULE - P59



POWER GENERATION PORT

MODULE - P60



POWER GENERATION PORT

MODULE - P61



POWER GENERATION PORT

MODULE - P62



POWER GENERATION PORT

MODULE - P63



POWER GENERATION PORT

MODULE - P64



POWER GENERATION PORT

MODULE - P65



POWER GENERATION PORT

MODULE - P66



POWER GENERATION PORT

MODULE - P67



POWER GENERATION PORT

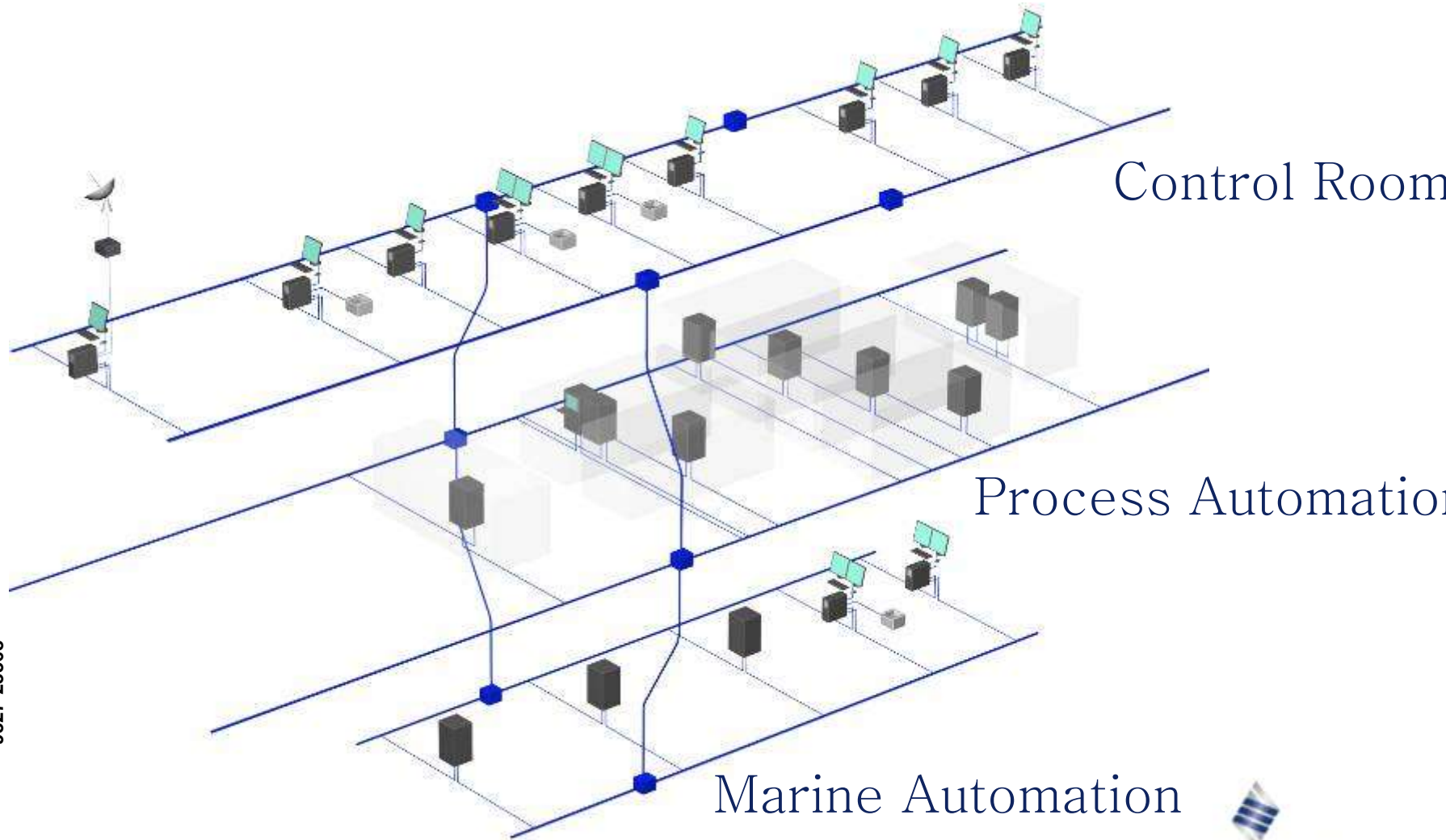
MODULE - P68



POWER GENERATION PORT

MODULE - P69

Distribute the Automation System close to the Process

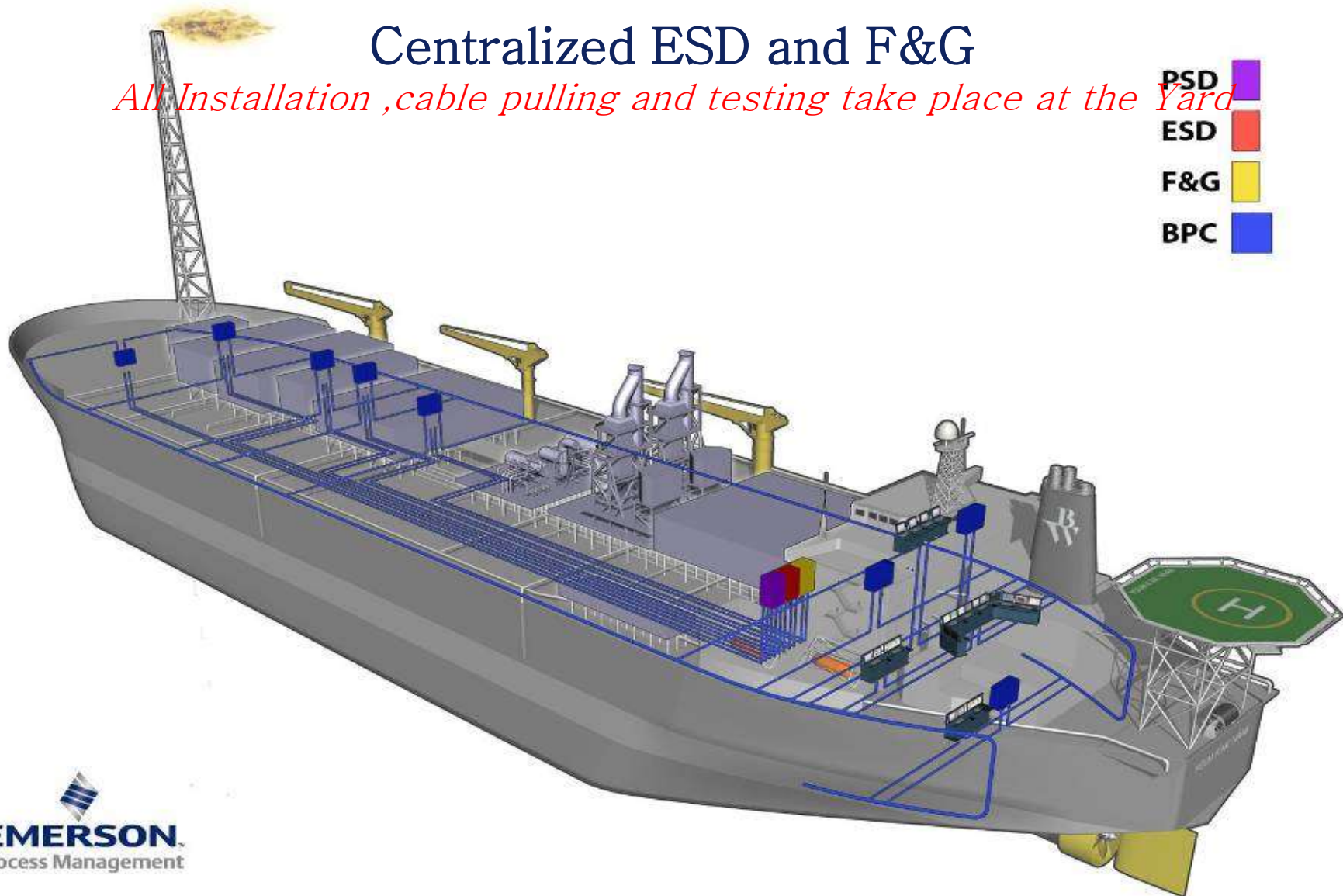


9327-23368

We are lifting the ESD and F&G a step further in Offshore

Centralized ESD and F&G

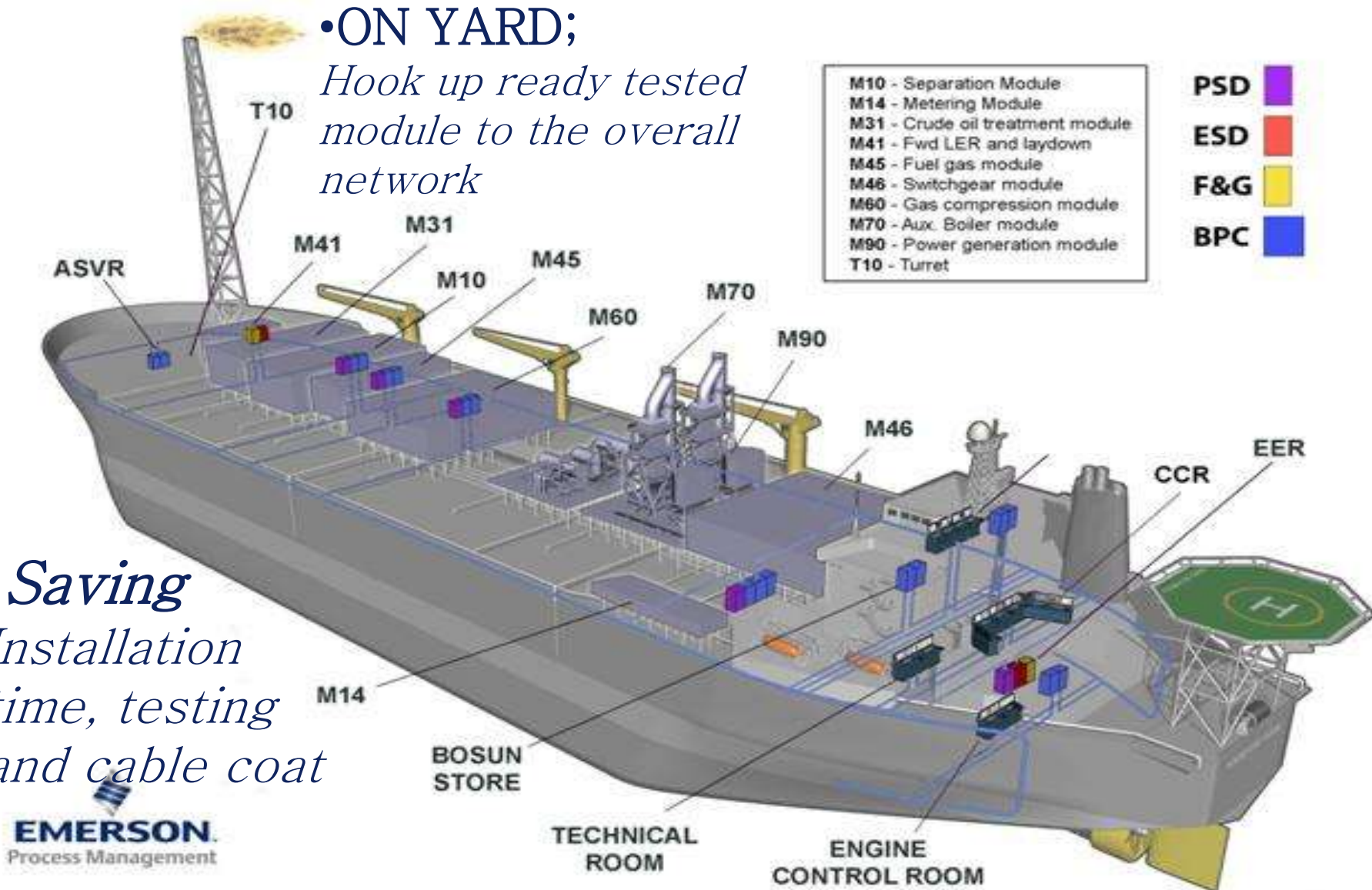
All Installation ,cable pulling and testing take place at the Yard



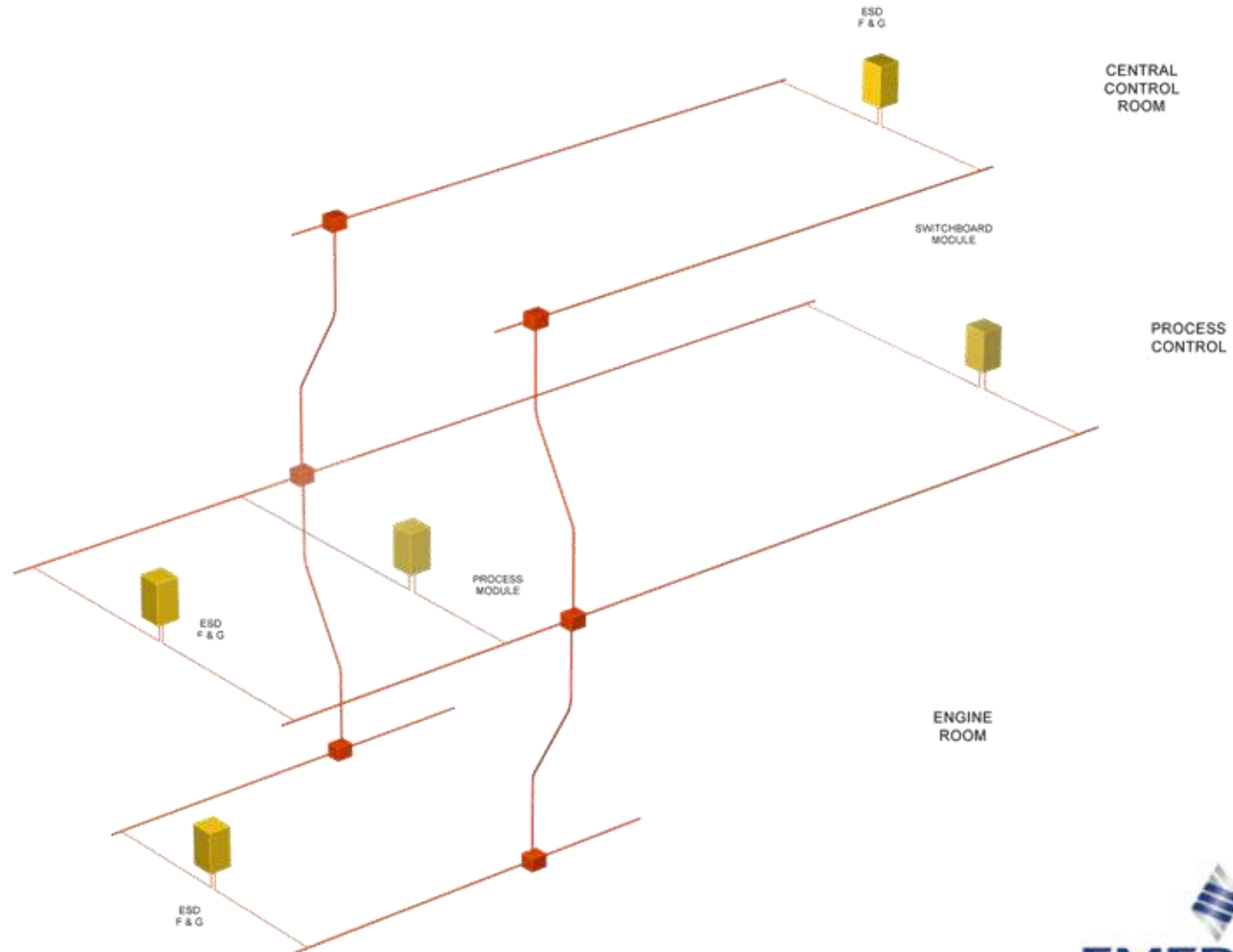
We build equipment into the Skid/ Modules and do commissioning Locally

- **ON YARD;**
Hook up ready tested module to the overall network

- ***Saving**
Installation
time, testing
and cable coat*

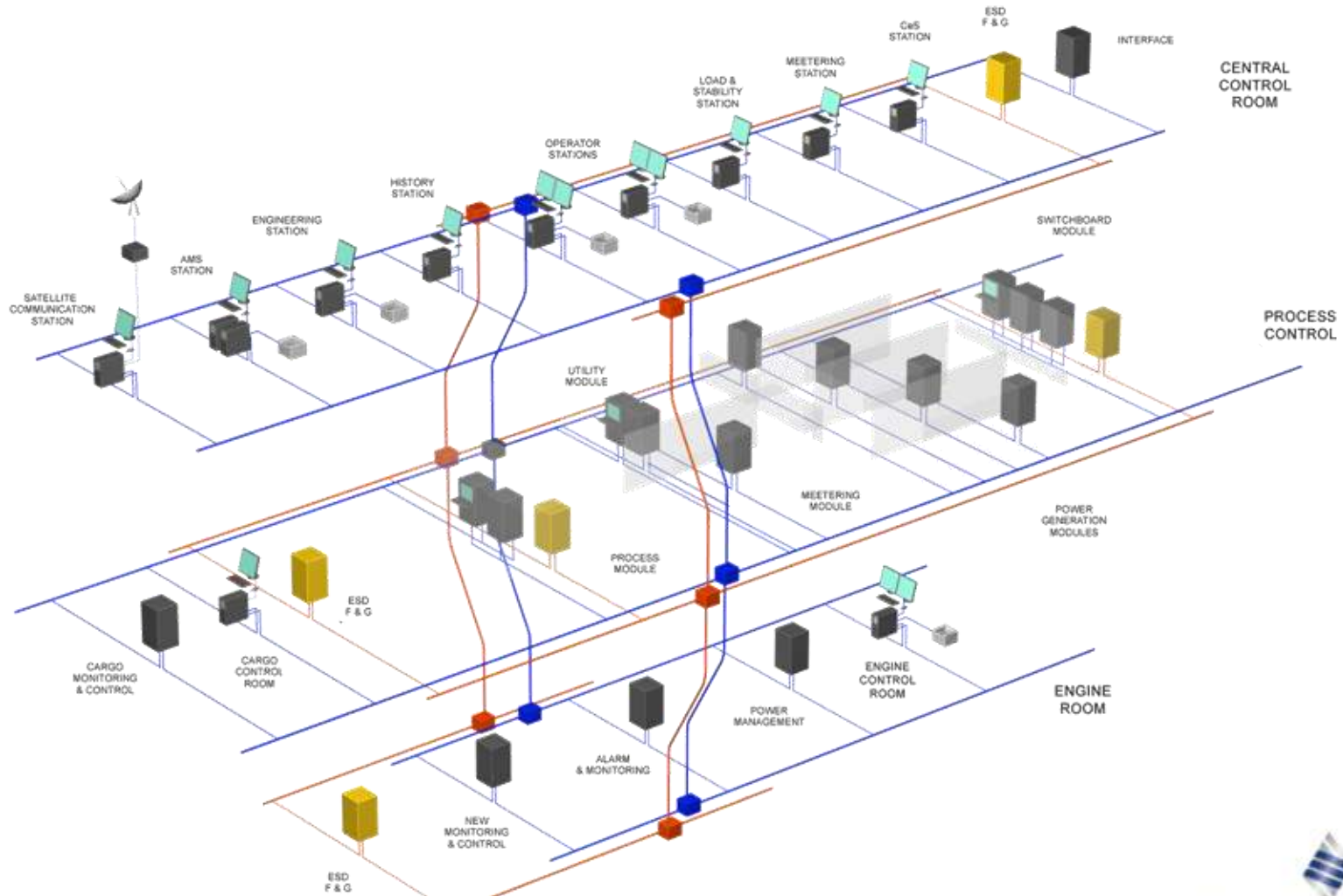


Emerson ESD and Fire & Gas System is approved for Decentralized installation

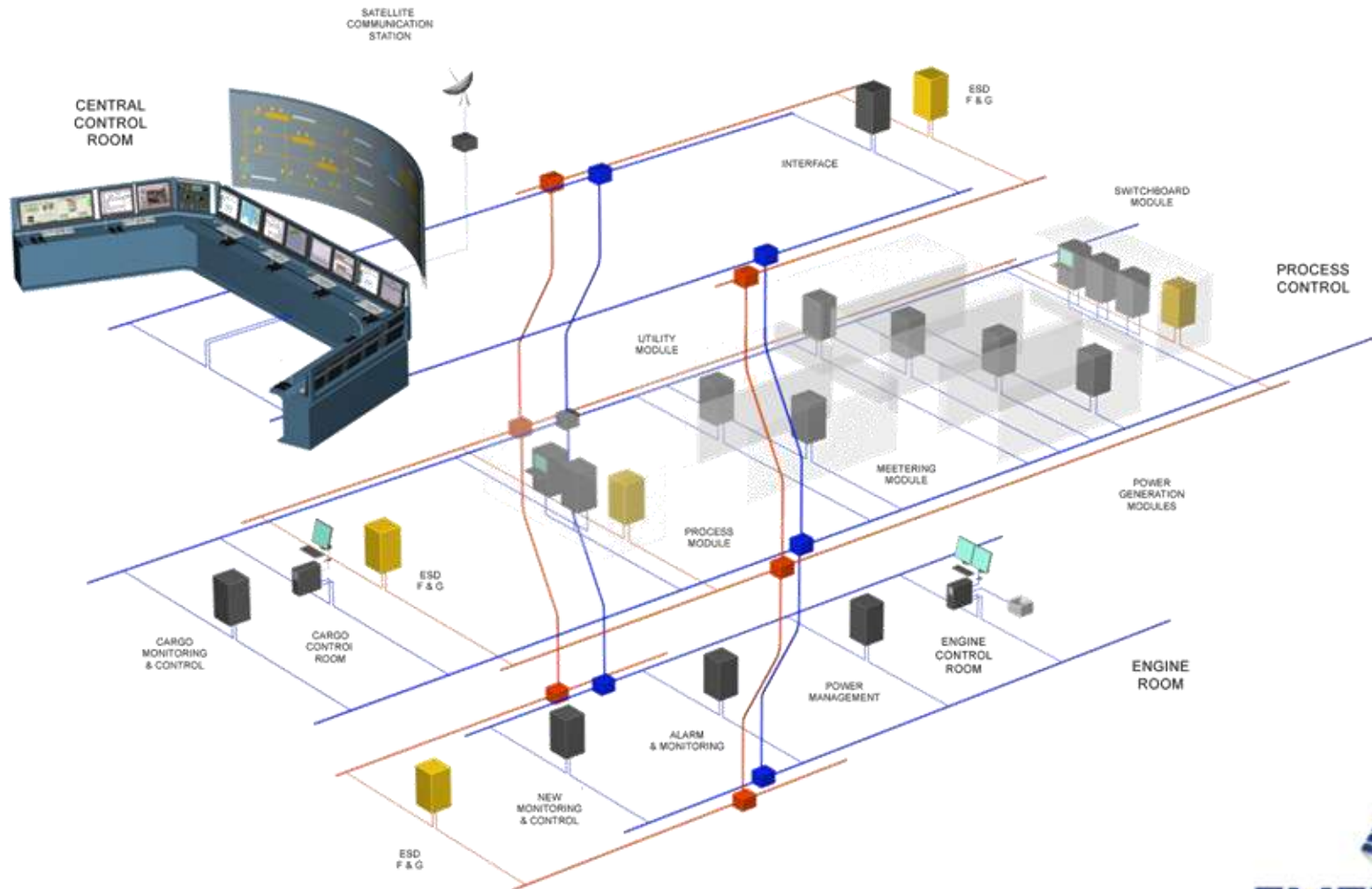


A full distributed safety system on separate net

We provide a real distributed Smart Integrated Control and Safety System onboard



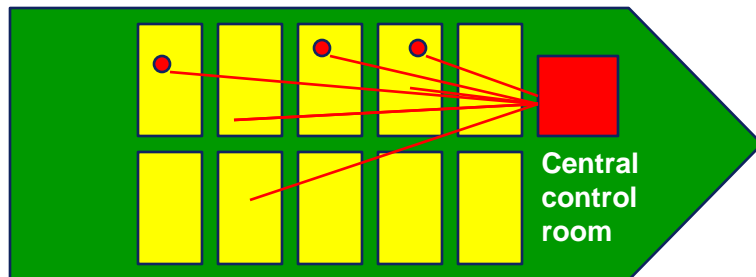
One view into all processes onboard



Comparing the centristic with a distributed modular approach

Central Control Room

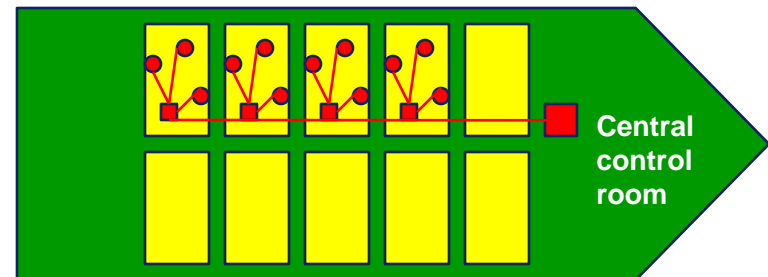
- large control room
- miles of cables
- weight of cables



• field instrument

Remote I/O & Control Stations

- small control room
- short cable runs
- modular design (pre-assemble, pre-test)

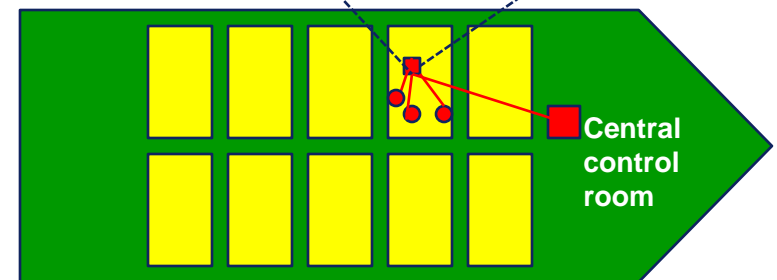


■ remote I/O & control station

Remote I/O & Control Station

One cabinet per process module with

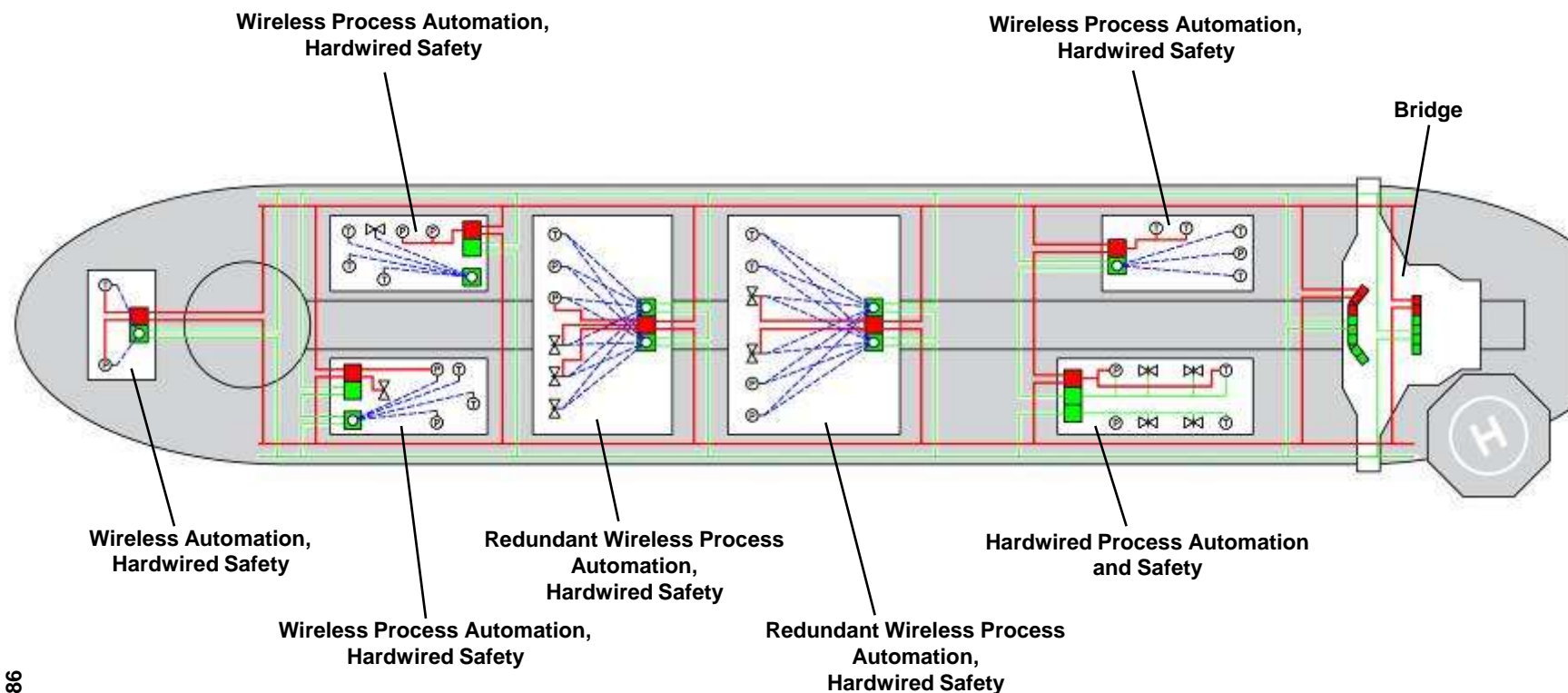
- PCS (DeltaV)
- PSD (DeltaV SIS)
- AC/DC power supplies
 - separate for PCS and PSD
 - circuit breakers
- fiber optic connectivity
 - fiber optic switches
 - patch panel
- illumination for the cabinet



Type Approved Systems and fit for Offshore environments

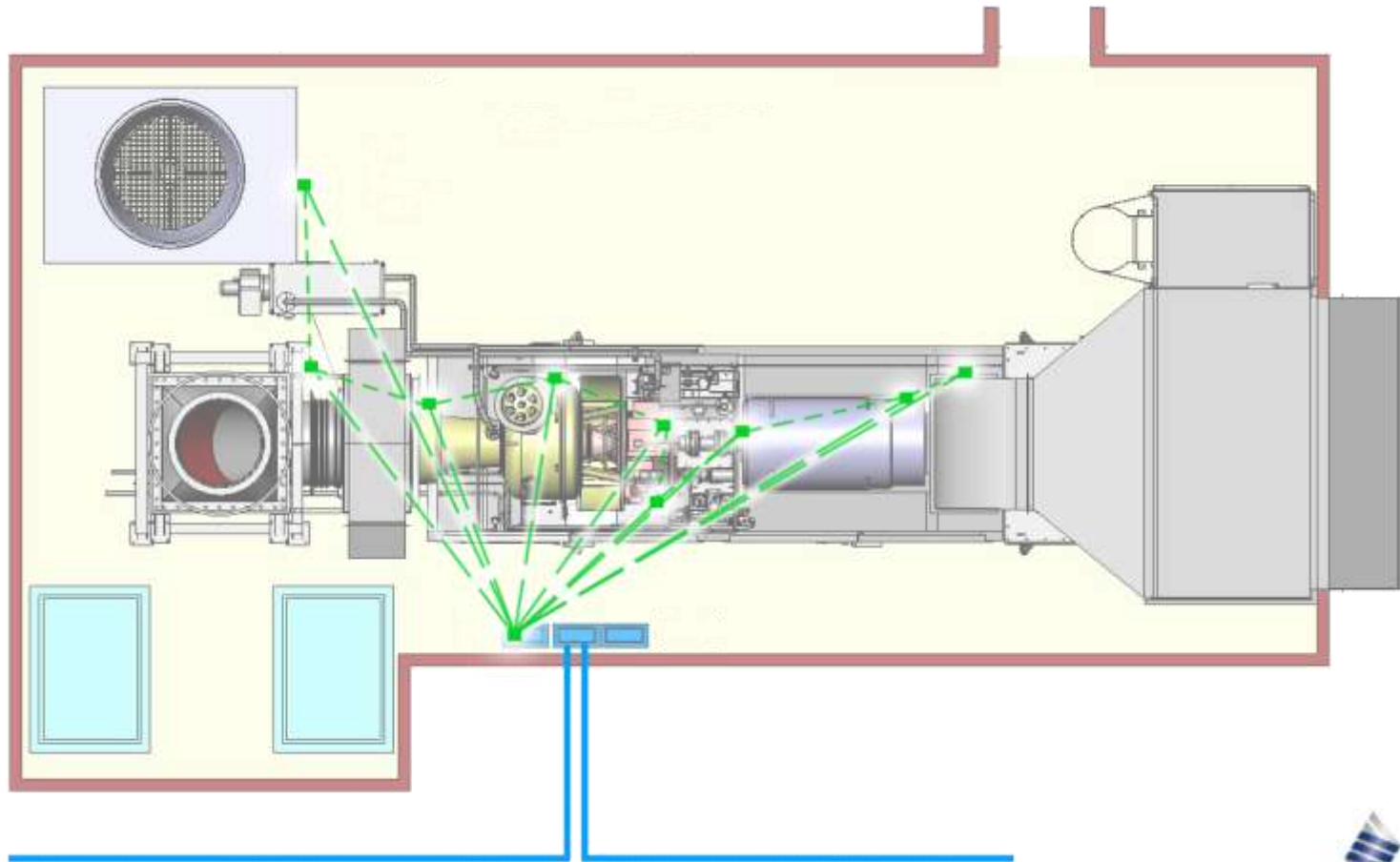


Additional Options for Smart Plants



9375-23586

Wireless Signal Distribution inside Power Module



9375-23642

Customers Are Solving Real Plant Problems: StatoilHydro Grane Platform

- Application: Monitor wellhead annular pressure and heat exchanger pressures
- Smart Wireless delivered 100% reliability & stability in the crowded metal wellhead environment
- Easy integration of wireless data into third party system
- Customer identified operational improvements as a result of increased process visibility
 - Wireless solution eliminates the need for daily visits to the wellhead to manually record gauge readings
 - Continuous monitoring enables unusual readings to be identified earlier

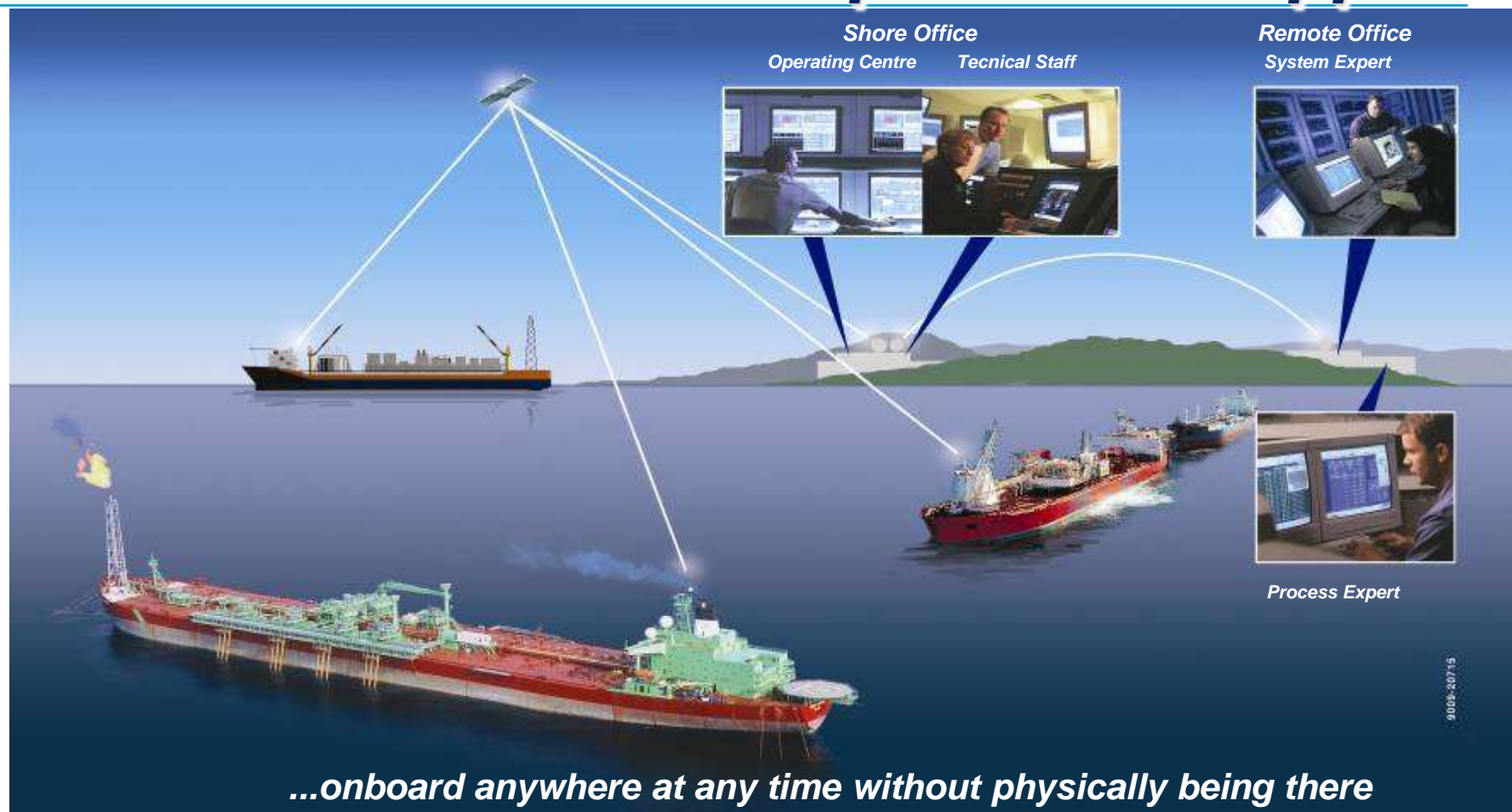
StatoilHydro



*“ We are delighted with the performance of the Emerson Smart Wireless network in these challenging conditions. Following a short training programme, our instrument engineers are very confident about adding more wireless devices to our installation as required. **These typically take around two hours to install compared with up to two days for a conventional wired unit.**”*

— Geir Leon Vadheim, Instrument Lead, Grane Platform

Remote Assistance & Operations Support

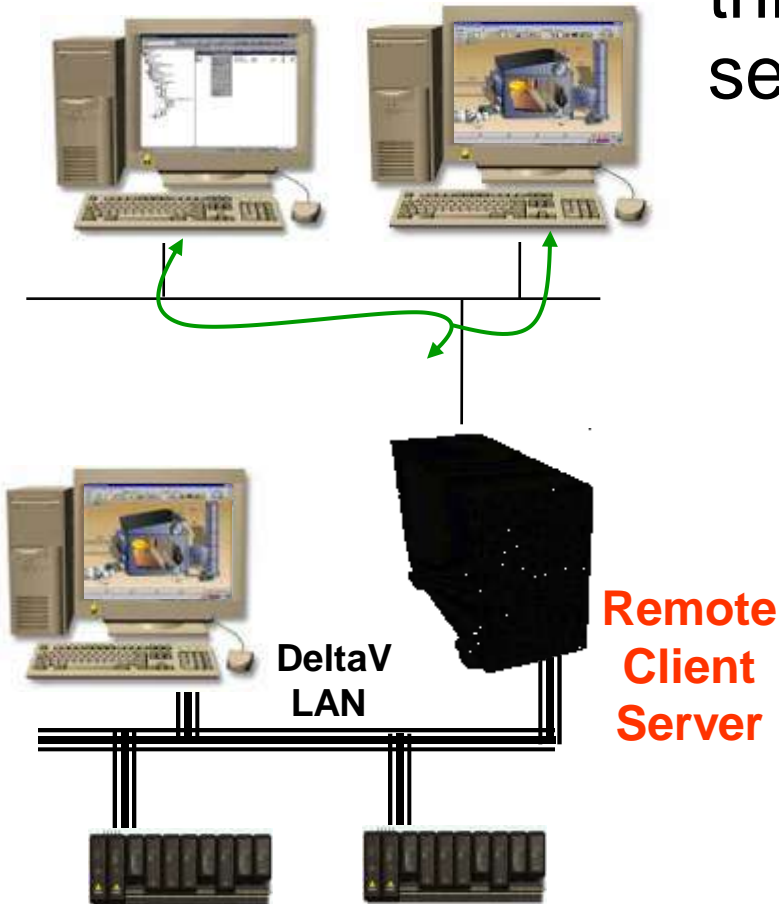


AMS
Suite


EMERSON.
Process Management

DeltaV Remote Client

DeltaV
Remote Client



DeltaV Remote Client makes a thin client connection to a host server on the DeltaV LAN

- Provides fully functional operate and engineering capability
- Supports LAN, Wireless, satellite and dial-up modem communications

Recently Realized FPSO Projects

International Offshore Oil & Gas reference with ICSS (SAS) delivery

Company	Installation	World Area	Category	Engineering	AMS	Control System	Safety system	Inst & Valves
BP	B 18 Greater Plutonio	West Africa	FPSO	YES	YES	YES	YES	YES
Total	Akpo	West Africa	FPSO	YES	YES	YES	YES	YES
ExxonMobil	Kizomba A	West Africa	FPSO	YES	YES	YES	YES	YES
ExxonMobil	Kizomba B	West Africa	FPSO	YES	YES	YES	YES	YES
ExxonMobil	Yoho	West Africa	FSO	YES		YES	YES	YES
Vaalco Gabon	Vaalco	West Africa	FPSO	YES		YES	YES	YES
Dominion	Devil's Tower	Americas	Spar	YES		YES	YES	Unknown
Murphy	Medusa	Americas	Spar	YES		YES	YES	Unknown
Murphy	Front Runner	Americas	Spar	YES		YES	YES	Unknown
BWO / Pemex(Norway)	Yuum k'ak naab	Americas	FPSO	YES		YES	YES	Unknown
Petrojarl / Petrobras (Norway)	Siri	Americas	FPSO	YES		YES	YES	Unknown
Petrobra DPI (Norway)	Pipa2	Americas	Vessel(FPSO)	YES	YES	YES	YES	YES
Murphy	Thunderhorse	Americas	TLP	YES	YES	YES	YES	YES
Bluewater	Uisge GOM	North Sea	FPSO	YES		YES	YES	YES
Bluewater	Glas Dowr	North Sea	FPSO	YES		YES	YES	YES
Amerada Hess	Triton	North Sea	FPSO					YES
ConocoPhillips	Bohai Bay Ph2	Asia	FPSO	YES		YES	YES	
CNOOC	West Nanhai 13-1	Asia	FPSO	YES		YES	YES	
CNOOC	West Nanhai 13-2	Asia	FPSO	YES		YES	YES	
CNOOC	West Nanhai 13-2	Asia	FPSO	YES		YES	YES	
Sea Production (Norway)	Front Puffin	Australia	FPSO	YES	YES	YES	YES	
Global Process System / Tanker Pacific	Coogee Montara	Australia	FPSO	YES	YES	YES	YES	YES
Teekay Petrojarl	Che Guevara FPSO	Europe	FPSO	YES	YES	YES	YES	YES
Petrojarl	Petrojarl 1 FPSO	Europe	FPSO		YES			YES
Bergesen World-Wide Offshore	Berge Enterprise, FPSO	Europe	FPSO	YES	YES	YES	YES	YES
Grenland Group (Topside, BWO)	Berge Enterprise, FPSO	Europe	FPSO	YES	YES	YES	YES	YES
Sea Production (Frontline)	Front Puffin, FPSO	Europe	FPSO	YES	YES	YES	YES	YES
Multi Purpose Floater Corp.	MPF-1 Drill & FPSO	Europe	Vessel (drill)	YES	YES	YES	YES	YES



***A Digital Production
Unit is a Smart
Production Unit***

Thank You