

White Paper

Benefits of Integrated Automation & Power Management

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1 Document Introduction

1.1 Abbreviations

All abbreviations referred to in this document are found underneath in Table 1

Table 1 - Abbreviations

Abbreviation	Description
Høglund	Høglund Marine Automation AS
HSE	Health, Safety and Environment
IACS	Integrated Alarm and Control System
PMS	Power Management System
CCS	Cargo Control System
ESD	Emergency Shutdown System
I/O	Input/Output
OS	Operator Stations
BCU	Bridge Connection Unit
UPS	Uninterruptible Power Supply

1.2 Health, Safety and Environment

Høglund puts the physical and mental health of employees, customers and all other people involved first. All work is carried out in a safe manner to protect our employees, customers and the environment. Høglund sets high standards for the environment and takes responsibility for ensuring that products and services are delivered in an environmentally friendly manner.

1.3 Laws and Property

Høglund Marine Automation AS is a privately held company regulated by applicable Norwegian laws and regulations valid for all companies, such as laws for tax and reporting, shareholder registrations, work environment, vacation law, internal control regulations, HSE-regulations and all others relevant for the type of business we are in. Compliance to these laws are non-negotiable.

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2 Integrated Automation and Power Management

Why it is beneficial

Integrating Power Management System (PMS) into the ship's automation system has for many years lowered the cost for ship owners and shipyards when installing and maintaining these important control systems. However, many ships are still delivered where these systems are segregated instead of integrated.

This document describes some of the disadvantages that segregation of these systems leads to and why integration is the most beneficial solution.

2.1 What are segregated systems?

Segregated systems require control equipment and software from different vendors – an automation supplier and a power management supplier.

Segregated Automation System

The automation system consists of three main components:

1. Control cabinets for conversion of input and output signals (I/O-signals) between the electrical layer and a data format readable by a processor unit.
2. Control cabinets with processor units that process the I/O-signals and execute control functions.
3. Operator stations with graphical monitors that present the system data to the operator and take commands from the operator.

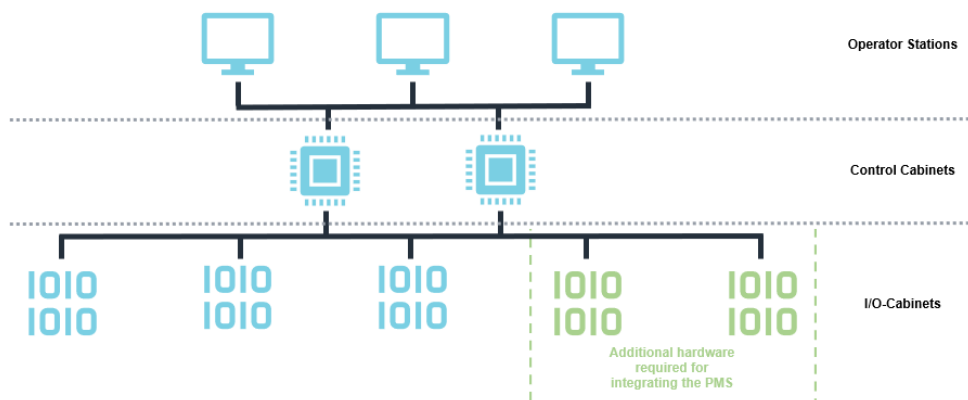
Segregated Power Management System

Stand-alone PMS's are mainly based upon custom designed hardware for segregated systems:

1. Hardware components for each generator that consist of both I/O-connections and a processor unit.
2. A display with command push buttons that presents information to the user.

2.2 What is an integrated system?

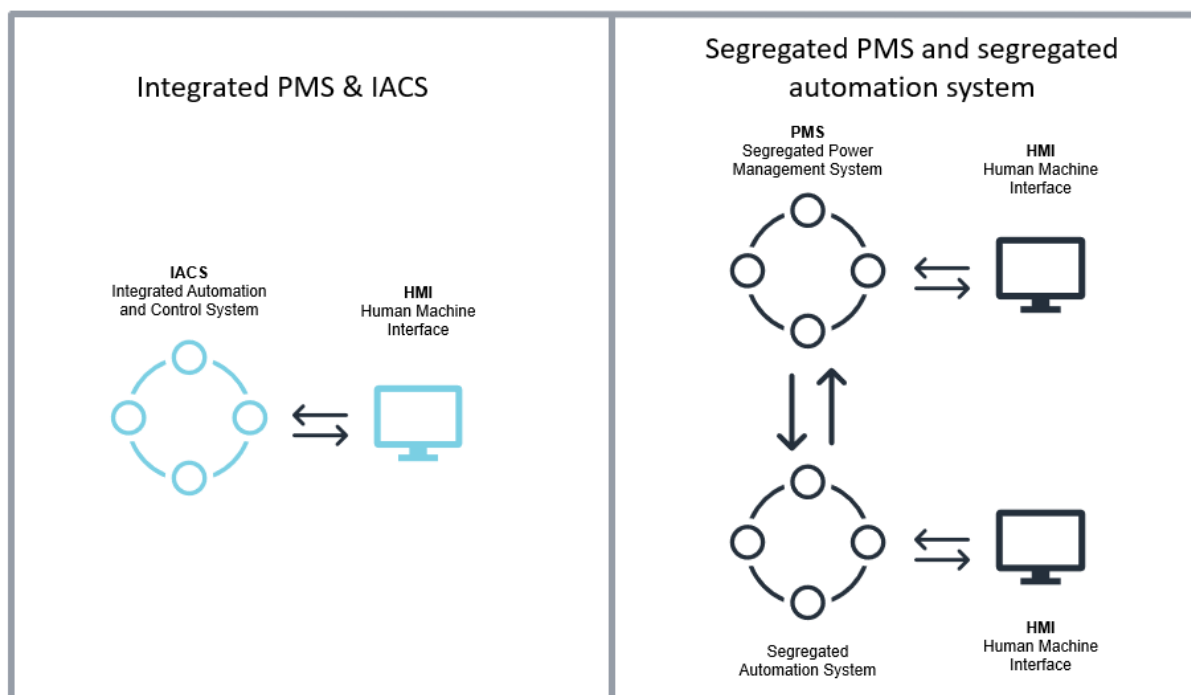
An integrated system is a combination of automation and Power Management System, where PMS hardware no longer is needed. Instead, all PMS signals are connected to the existing automation platform.



Additional building blocks may be required for integrating PMS into existing automation platform

Integrated system platform

Advanced automation systems are easily scaled by adding or removing components. With the I/O and control platform already in place, PMS functionality can easily be integrated into existing automation platform. Additional functions are new I/O-signals to the switchboard and setup of the control functions in software. Components, such as operator stations and processor units are already existing components in the integrated automation & control system.



2.3 Benefits of an Integrated Automation and Power Management

When removing the procurement, engineering, commissioning, training, future service and upgrades for the segregated power management system, the total cost becomes lower.

Less engineering and follow up of suppliers

PMS engineering will be done by the same project engineers who handle the engineering of the automation system. This results in one less supplier to communicate with. The groundwork for the building blocks of the automation system is already in place, so adding PMS functions during the engineering phase will only require a few additional building blocks, not an entirely new foundation. This simplifies the process and lowers the cost.

One less service engineer needed

When customer is in need for service engineer, only one engineer is needed. If automation and PMS are segregated, each system requires their own service engineers. It may result in expensive invoices if the engineer travels for several hours.

Service and commissioning

Integrated Systems

Only one service engineer required



Segregated Systems

Two service engineers are required – one for each system



Automation

PMS

One set of spare parts

An integrated system is based upon a common hardware platform that supports the same hardware building blocks. This means that the entire system only requires one set of spare parts. Segregated systems are based upon two different hardware platforms and require two sets of spare parts – one set for each type of hardware building blocks. This doubles the procurement cost.

Spare Parts

Integrated Systems

One set of spare parts can be used for the entire system



Segregated Systems

One set of spare parts is required for each system



Automation

PMS

One training program

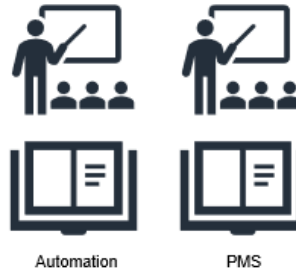
Ship crew, shipyard personnel and other users only have one system platform to learn when the ship has an integrated system. The same functions, principles and manuals apply for the entire system platform. If the ship has segregated systems, each system requires separate training and separate manuals.

Training and Manuals

Integrated Systems
Common training and manuals



Segregated Systems
Separate training and manuals for each system

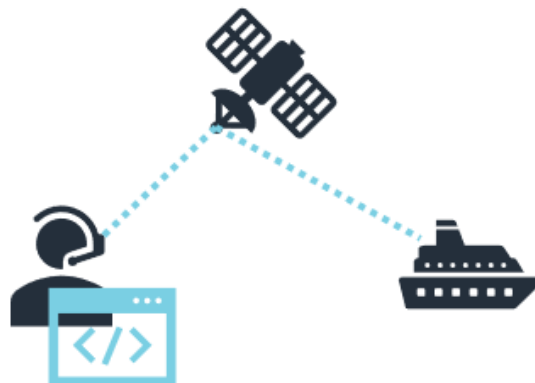


Remote assistance

Professional integrated automation systems have the ability for service engineers to log into the system over a secure remote connection.

The engineer has access to both automation and PMS software. Høglund service engineer can easily troubleshoot and modify both system if needed. Segregated power management systems usually do not have this remote functionality.

Remote Access
For emergency support,
troubleshooting and
software service



Easy data access

Data exchange between segregated systems

The data exchanged between segregated systems is kept to a minimum. Not all data is transmitted to the automation system due to large data amount, extensive implementation work and limited transmission capacity. This often leads to missing information and diagnostic data. Therefore, operators have to switch between the systems to get a complete overview of the situation.

Integrated systems collect and store information in one place

Integrated systems already have the underlying data for all signals connected to the system. This gives a lot of advantages:

- All signals and data are available from the operator station
- Advanced diagnostic data is available for troubleshooting
- All signals are logged to a data backup and are available for future troubleshooting through Høglund playback
- Compare all system signals in one diagnostic analyzing tool
- Manual override and simulation possibilities

Manual input of important signals

One important function is the possibility to override faulty signals (signal/sensor failure). In some segregated PMS solutions, several important signals are mandatory for the system to work. When one of these signals fails, PMS may stop working.

This can be prevented by an integrated PMS. Here, the operator will get direct view of the situation through Høglund operator stations and can easily address the problem. Faulty alarms can be identified and overwritten manually. If PMS is a segregated system, this often results in an elaborate process and long problem-solving time. In worst case a service engineer must be ordered generating delay and travel cost.