

May 2019

Turner ECS Case Study

FPSO Main Engine Control



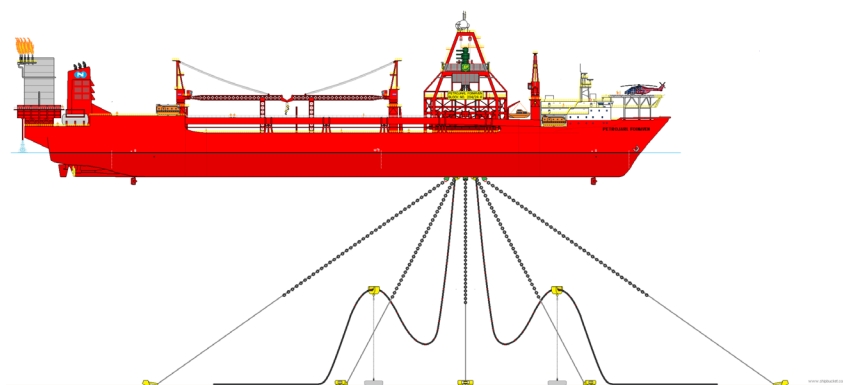


Introduction

The Foinaven is a Floating Production Storage and Offloading (FPSO) vessel operating in the West Shetlands. The vessel is 250 meter long and 34 meter wide and started oil production in 1997 with a max capacity of 140,000 barrels of oil per day. The vessel is powered by four Wartsila 16V32GD and four Wartsila 18V32GD engines. Each engine drives a medium voltage generator with a combined output of approximately 50MW.

The engines are able to run on diesel or high pressure gas (350 bar) up to full load. The engines can also switch between fuel without interruption to the power output. The main engine controls, multipoint injector drivers, high pressure electronic rail valves and main engine governor were originally supplied by Woodward.

After operational contract renewal, the Teekay Shipping Corporation approached Turner ECS to investigate parts obsolescence and field service supportability on the long term (minimum 10 years) to guarantee safe and reliable operation. After conducting a site survey it became clear that the Woodward main engine control (Netcon) and multi point driver modules (EFIC/EFID) would not fall within the new supportability requirement and had to be replaced.



RETROFIT PROJECT

MAIN ENGINE CONTROL

INTERFACING

- Local/remote control
- Local/remote monitoring

FUEL SCHEDULING

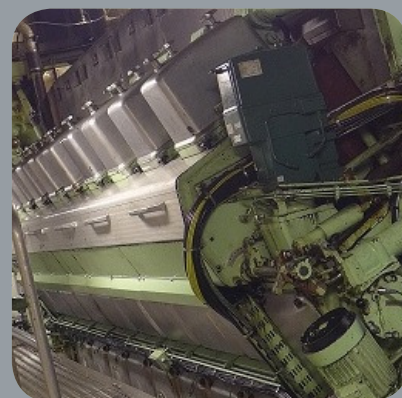
- Loading control
- Fuel selection

SAFETY FUNCTIONS

- Fuel limiting
- Start/stop sequencing
- Gas system sequencing
- Engine protection

FACT SHEET

Engine OEM: Wärtsilä
Engine Type: 4 x 16V32GD
 4 x 18V32GD
Vessel Type: FPSO
Vessel Name: Foinaven
Operator: Teekay



General

After technical meetings, Turner ECS received the order to upgrade the obsolete main engines controls. The scope of work consisted of engineering, delivery and installation of hardware as well as FMEA/Classification meetings and sea trials.

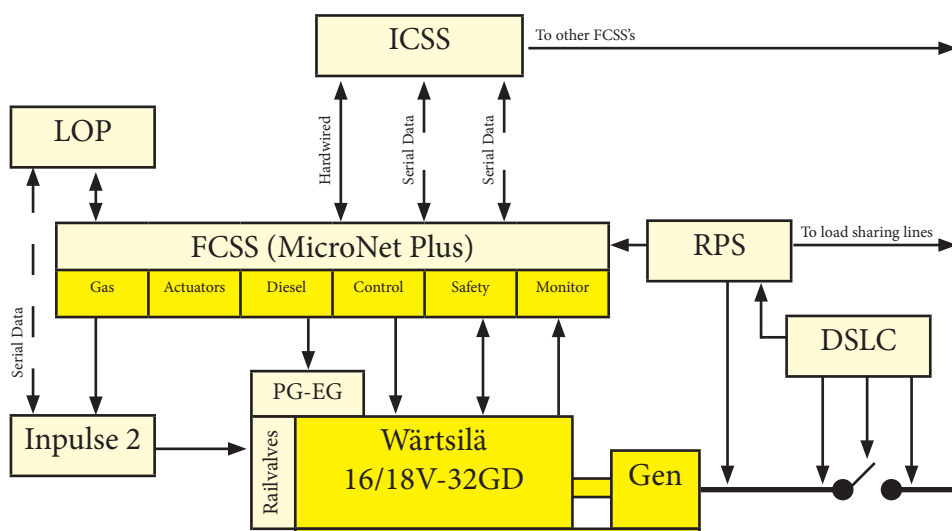
The existing alarm/shutdowns logic was modified to be fail-safe on all eight engines to comply with current safety rules. The main challenge of this project was that the upgrade had to be carried out during vessel operation.

In brief, the upgrade consisted of converting and modifying existing application software, creation of electrical drawings, extensive testing, delivery of hardware, installation of hardware and commissioning of the complete system. Several meetings and finally DP (Dynamic Positioning) trials were held, witnessed and approved by DNV.

System Description

Each engine generator package has an autonomous Fuel Control and Safety System (FCSS). Each FCSS communicates to a higher level Power Management system (ICSS). The ICSS, under normal operating conditions, controls and monitors the status of all engine generator sets. Should communication fail between the FCSS and ICSS, then the engines can be controlled and monitored by means of a Local Operator Panel (LOP). The LOP is an integral part of the FCSS.

System Overview



WOODWARD HARDWARE



MicroNet Plus

- Main controller

Real Power Sensor

- KW transducer



Inpulse 2

- Electronic fuel injection

DSLC

- Digital synchronizer



PG-EG Actuator

- Electro-hydraulic actuator with internal oil pump

Electronic Rail Valve

- Including driver

Turner Range of Services

LSTK Projects, Retrofits & Upgrades
Turner ECS delivers reliable retrofit solutions for a wide range of prime movers and other applications. This includes lump sum turnkey projects on turbines and compressors.

Genuine Parts & Service Exchange
Turner ECS has the largest stock of parts, service exchange governors and electronics in Europe and can provide a fast turnaround service.

Product Training
Turner ECS can provide official Woodward product training covering both theoretical and practical training on a wide range of Woodward products.

Electronic Repair & Mechanical Governor Overhaul Service
Turner ECS provides a comprehensive overhaul and repair service for electronic, mechanical and hydraulic governors.

World Wide Field Service
Turner ECS field service engineers and technicians provide comprehensive solutions for commissioning and on-site repair.

Service Contracts
Turner ECS provides long term service contracts to support users with Woodward governors and/or control products and electronic control systems.

ROTATING EQUIPMENT CONTROL SOLUTIONS DELIVERED ACROSS EUROPE & THE MIDDLE EAST

Turner ECS is an official Woodward Channel Partner with offices located in:

- The Netherlands
- England
- Germany
- Italy
- Abu Dhabi
- Qatar
- Saudi Arabia

Turner ECS also operates and manages an extensive network of official agents throughout Europe & the Middle East

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