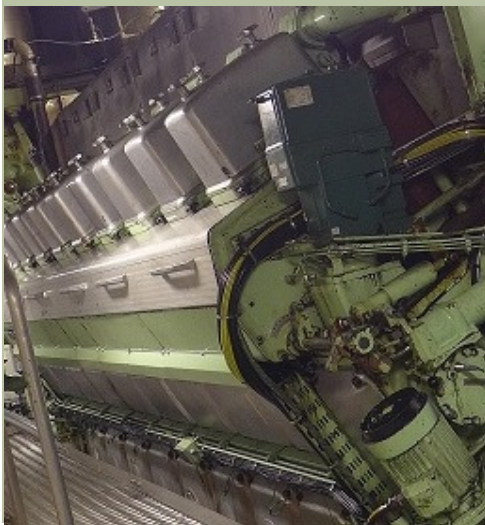


## Solution Provider

## Turner ECS

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

- The Netherlands
- The United Kingdom
- Germany
- Norway
- United Arab Emirates
- Italy



### Introduction

The Foinaven is a Floating Production Storage and Offloading (FPSO) vessel and operating in the West Shetlands.

The vessel is 250 meter long and 34 meter width and started in 1997 with the oil production with a max capacity of 140,000 bopd.. 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 liquid or high pressure gas (350bar) up to full load. The engines can also switch between fuels without interruption to the electrical supply.

The main engine controls, multipoint injector drivers, high pressure electronic rail valves and main engine governor are manufactured by Woodward.

After operational contract renewal, Teekay approached Turner ECS to investigate parts obsolesces issues and field service supportability, minimum 10 years, on long term 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) could not be supported on the long term.

#### WOODWARD HARDWARE

- Micronet Plus system
- In Pulse II multi point driver
- Real power sensor
- Digital Synchroniser and Load Control
- PG-EG main governor



#### General

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

The existing alarm/shutdowns logic to be fail-safe on all eight diesel engines has been modified to comply with current safety rules.

The **main challenge** of this project was that the upgrade was **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 described below. Several meetings and finally DP 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.

Each main engine control provides:

- Fuel Scheduling Functions including:
  - Loading Control
  - Fuel Selection
- Fuel Limiting Functions for engine Protection
- Safety Functions including:
  - Engine start/stop sequencing with engine protection trips
  - Gas system sequencing with engine protection and gas safety system

#### More information?

#### Please contact:

#### Turner Engine Control Solutions

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