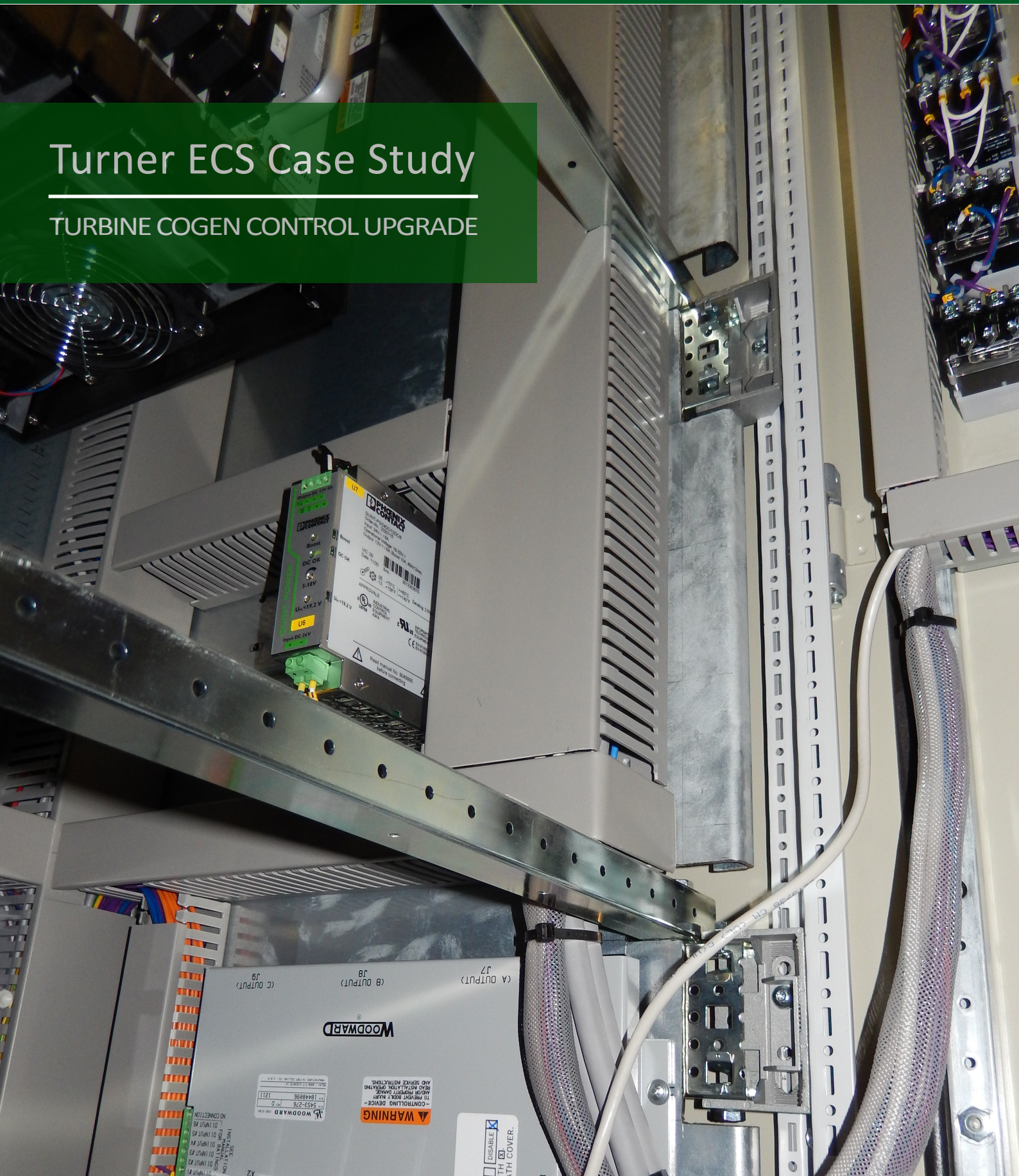
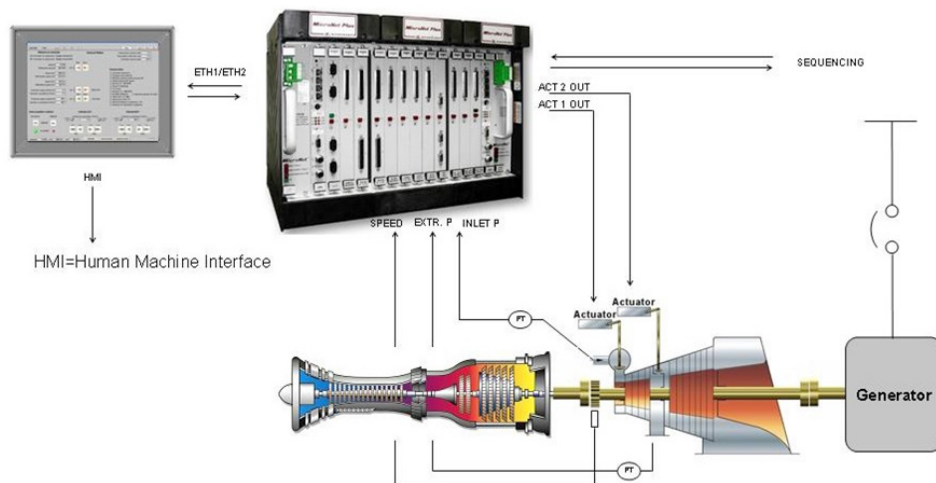


June 2019

Turner ECS Case Study

TURBINE COGEN CONTROL UPGRADE





Introduction

Turner ECS has built two control panels for the Fiat Mirafiori car assembly plant in Italy. Each system controls a 27MW steam turbine mechanically coupled to a 40 MW gas turbine driving a generator. The new panels replace the obsolete Woodward 43027 and 501 controllers by MicroNet Plus with a touch screen HMI. The steam turbine's I/H converters were replaced by Woodward's CPC-II.

Functionality

The steam turbine is started using steam of an auxiliary boiler and acts as a starting motor for the gas turbine. As soon as the gas turbine achieves lite-off, the gas turbine control takes over and synchronizes the generator to the grid. Once synchronized, cogeneration is achieved as steam flow to the turbine transfers from the auxiliary boiler to the waste heat boiler and the steam turbine runs under inlet/extraction control.



RETROFIT PROJECT

PROJECT MILESTONES

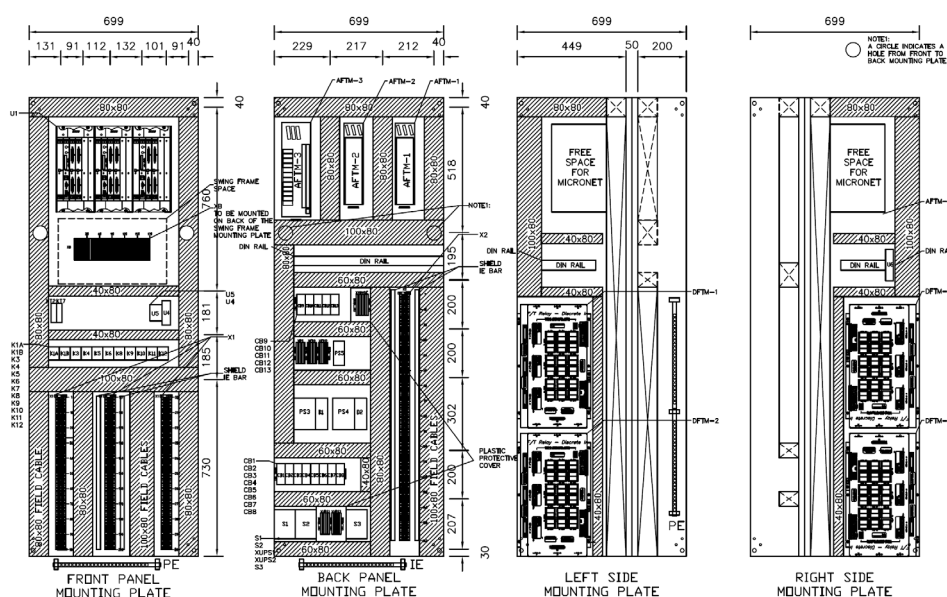
- Specification review
- Site survey
- Proposal
- Order acceptance
- Kick-off meeting
- Project management
- Application engineering
- Cabinet design
- Hardware procurement
- Cabinet assembly
- Documentation
- Shipping
- Delivery
- Removal of old hardware
- Installation
- Wiring
- Loop checks
- Pre-start checks
- Site acceptance test
- Start-up assistance
- Training
- Hand over
- Final documentation

FACT SHEET

Steam Turbine:	Ansaldo
Gas Turbine:	Fiat Avio TG20
Driven Load:	Generator
Customer:	Franco Tosi
Operator:	EDF Fenice
End-user:	Fiat Mirafiori
Location:	Torino, Italia

Control Panels

Each panel is a single bay sheet steel enclosure with front and back door. The front door houses the HMI touch screen panel PC as well as push buttons and grants access to the MicroNet Plus control system, its relay boards and a swing frame for the Bently Nevada vibration monitoring system. The back door grants access to the analogue I/O field termination modules and power supplies.



Automatic Start Sequence

The controller will check if all steam valves are at their starting positions, the rotor is not rotating and no alarms exist. Only then, when receiving a start command with the mode selection switch in the 'auto' position, will the train start. The trip and throttle valve will be signalled to open and upon receiving its status feedback the main steam valve will slowly be ramped up until speed control takes over. When the gas turbine ends its purge cycle and consequently achieves lite-off, the speed is further increased. With the gas turbine at rated speed the generator is synchronized to the grid and the steam turbine transfers from starter motor to steam net controller by regulating inlet and extraction pressure. With the turbines fully loaded the generator is capable of providing plant load as well as exporting excess power to the grid.

Manual Start Sequence

Manual start-up can be done from the HMI screen. The mode selection switch must be set to 'manual' position after which the trip and throttle valve can be commanded to open and the steam valve can be opened manually until the speed control takes over.

HARDWARE USED

WOODWARD MICRONET PLUS

- Speed control
- Inlet pressure control
- Extraction pressure control
- Auto/manual start sequence
- Interface with HMI



WOODWARD CPC-II

- Current to pressure conversion
- High tolerance to dirty oil



HARDWARE REPLACED

WOODWARD 43027 & 501

- Replaced by MicroNet Plus



THIRD PARTY I/H CONVERTERS

- Replaced by CPC-II

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 (Turner MCS)
- Abu Dhabi
- Saudi Arabia

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

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