



## Speed, Load, Extraction Control and HMI System Monitoring

### TYPE OF PLANT

Paper Mill Power House

- 135 psi header control
- 35 psi header control
- Power Generation

### PRIME MOVER

Single Extraction Steam Turbine-Generators

- GE 7.5MW
- 3600rpm
- 2400V delta wired

### CONTROL TECHNOLOGIES

#### Woodward 505DE Digital Control

Redundant Speed control, load-control, Extraction Pressure control, Exhaust pressure control, monitoring and overspeed detection.

#### Woodward Protech 203

An independent overspeed device with two out of three voting architecture to prevent false trips on speed sensor failures.

#### V1 & V2 Valve Actuation

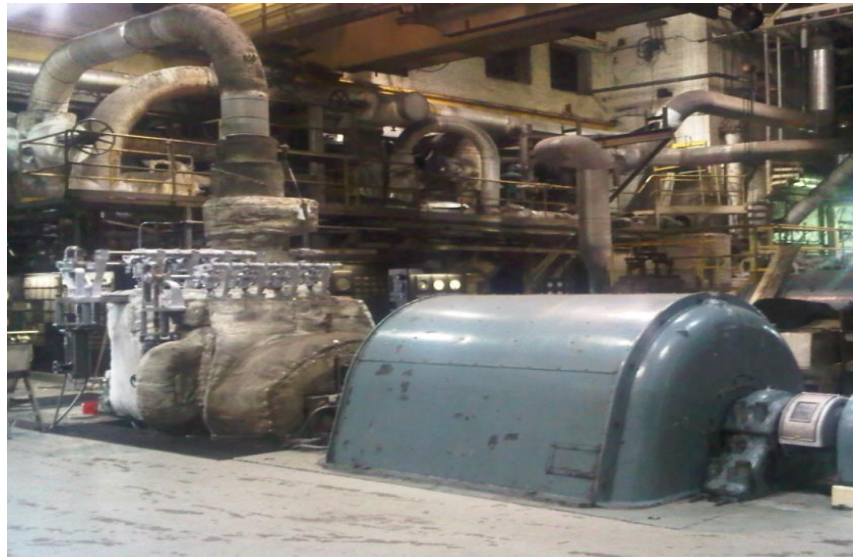
All electric actuation based with an Allen Bradley motor drive controlling an Exlar linear actuator with built in position feedback.

#### Woodward EGCP3-LS

The EGCP3-LS is used to automatically synchronise the generator breaker and to provide a load signal to the 505DE.

#### HMI / SCADA System

Touch-screen terminal in the ECR (Engine Control Room) for control, monitoring, alarming, trending and event logging.



### PROJECT OVERVIEW

GCS custom-designed a digital Woodward Control System for a single extraction non-condensing turbine at a paper mill. The site has multiple turbines in service; some dating back to 1937. The upgraded GE turbine is one of their workhorses that is not only used to generate electricity but also to maintain the 135 psi and 35 psi steam headers required in the mill process. The aim of the new turbine control system is to provide all control and safety function for the turbine to replace and add to the existing system.

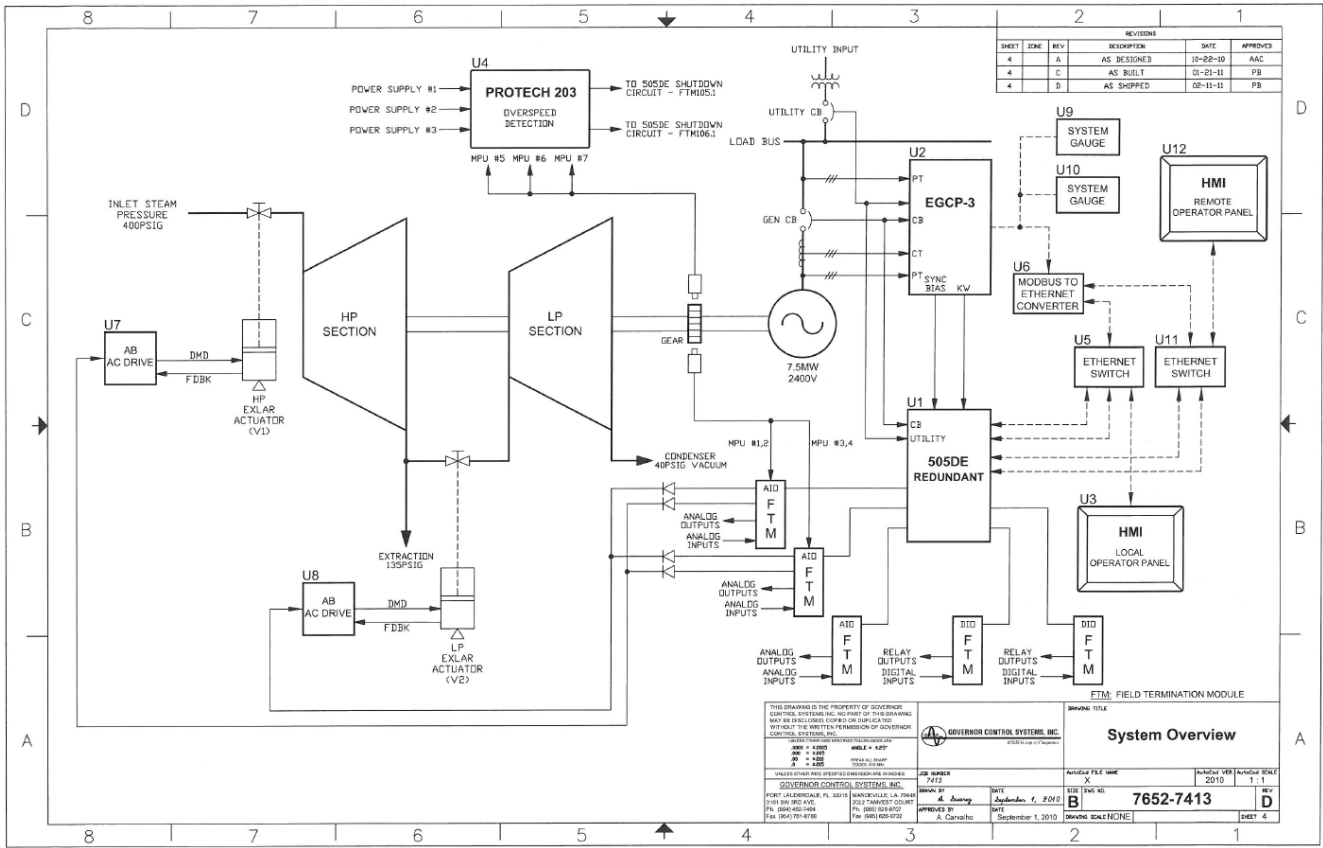


The Woodward 505DE digital control replaced the original GE design mechanical governor. The actuation was converted from hydro-mechanical to an all-electric solution using Exlar actuators that were directly mounted to the steam valve racks. This provided less complexity in the linkage as well as doing away with the hydraulic oil system previously required.

A level of redundancy was incorporated in the design by introducing duplex CPU, power supplies, and HMI's to make sure that a single component failure would not trip the turbine.

The GCS-designed HMI Operator Panel in the switchgear cabinet as well as one in the control room are designed to provide full operator control of the turbine with all start/stop capabilities as well as extraction setpoint adjustments. All alarm and trending data can be viewed from these units to aid in troubleshooting or reporting.

# PROJECT OVERVIEW : WOODWARD 505DE REDUNDANT STEAM TURBINE CONTROL



## CONTROL SYSTEM FEATURES

### Master/Supervisory Control: Woodward 505DE Controls

- Isochronous speed Control
- Isochronous Load Share or Droop Mode
- 135# extraction control
- Cascade 35# exhaust pressure control
- Interface to AB drives and Exlar actuation
- Load limiter

### Master/Supervisory Control: Woodward Protech 203

- Independent electronic overspeed
- Two out of three voting

## HMI / SCADA System

- Touch-screen HMI
- System Monitoring
- Alarm Handling and Performance Data Trending
- Modbus and Direct Ethernet Comm. to Control
- Multiple User Access Levels

## Redundancy

- Triple 120V supply input
- Dual 480Vac supply input for AB drives
- Internal dual 24Vdc supplies
- Dual redundant CPU
- Dual redundant IO

GCS offers comprehensive control system support, from engine and turbine systems integration to turnkey project management for a broad range of marine, power generation and industrial projects. GCS is a member of the MSHS Group. [Learn more at www.govconsys.com](http://www.govconsys.com).

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