

# LARGE STEAM TURBINE

## USE CASE

WEBINAR

**GAËL CORON**

Project Manager / Subject Matter Expert

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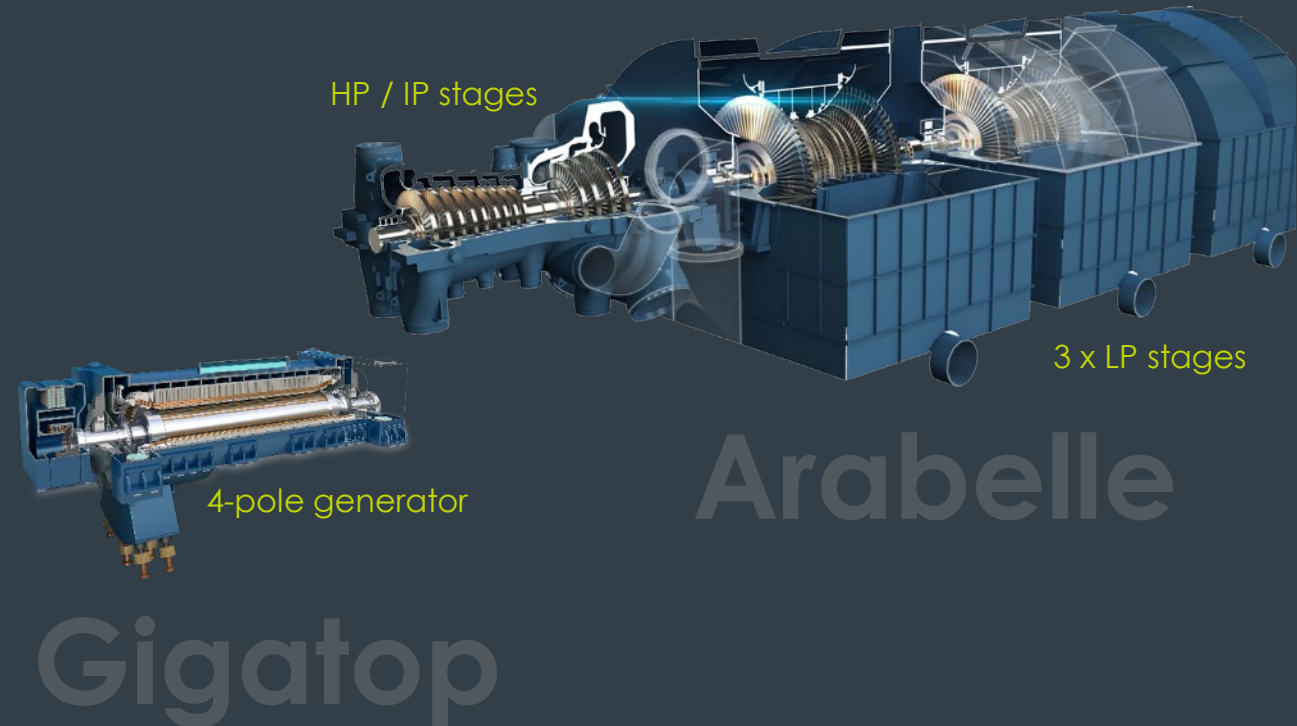
# Application example

## PWR steam turbine-generator

### The world's largest turbine-generator

- 1800MW, 4 stages : HP-IP, 3xLP
- 10 bearings totalling more than 45 measuring pts
- Additional special measuring points: valve condition monitoring
- Analysis of more than 150 pages of customer specifications
- 64 documents, reports, and process to execute to the customer's plan

Customer imperatives for the TSI supplier:  
**flexibility, expertise, professionalism & know-how**



# Application example

## PWR steam turbine-generator

### Customer based in Somerset, UK

- **Expertise & Services**
  - Specific sensors (pendulum, extension probe, transmitter)
  - Special sensor accessories (junction box, cable gland, mounting bracket)
  - SIL2 and ATEX Certification
  - 2oo3 (critical axial position) and 2oo10 (radial bearing vibration) trip functionality
  - Fully-assembled cabinet
  - IT interface with complex customer network and cybersecurity
- **Dedicated team & Customer Support**
  - Project Management, Monthly Progress Report
  - Project documentation management, technical studies, tests and reports
  - Manage and follow process, dedicated quality plan
  - Support after sale, software versioning (VibroSight), software support (commercial aspect).

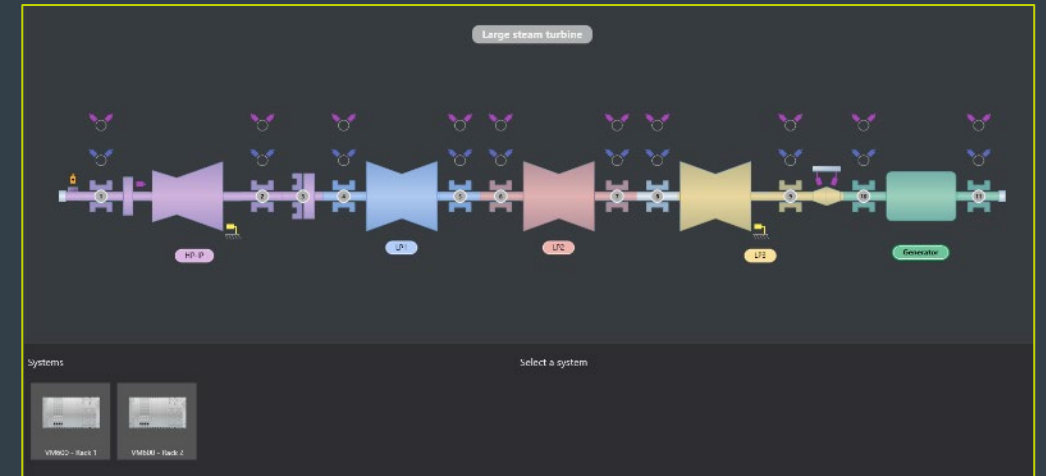


# Application example

## PWR steam turbine-generator

### Machine Train Configuration Example

- **VibroSight Protect**
  - Highly graphical configuration environment for MPS
  - Can now be exported to CM to eliminate tedious manual re-entry of the same data
  - Improved icons in development – will be able to use in slide presentations to eliminate tedious re-drawing of machine elements, measurements, etc.



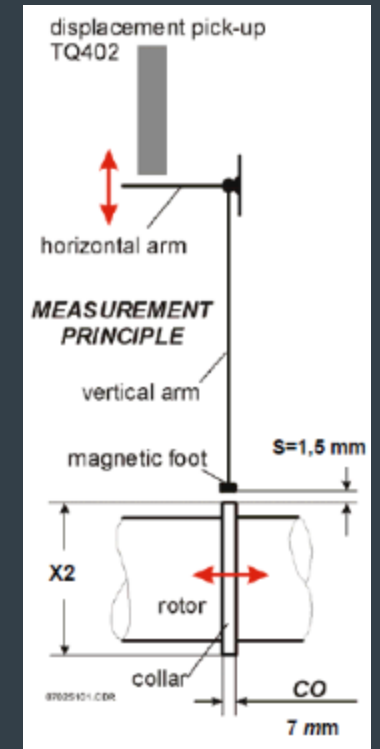
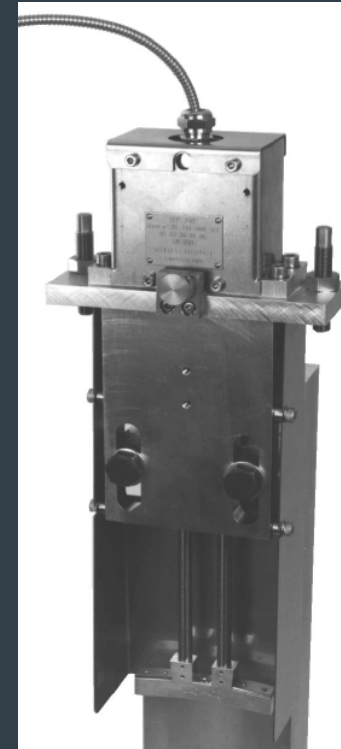
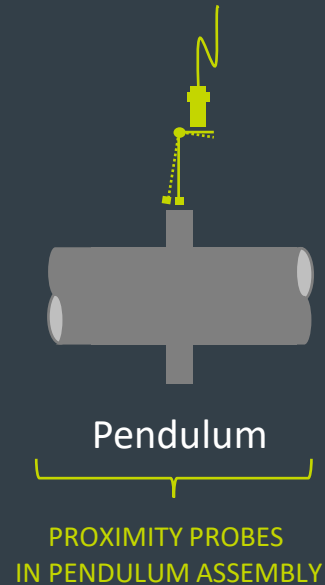


# Application example

## PWR steam turbine-generator

### rotor / casing differential expansion via pendulum probe\*

- A displacement transducer of the TQ family is mounted in the pendulum's head and observes the relative displacement of a target, which is mechanically linked with the pendulum's arm.



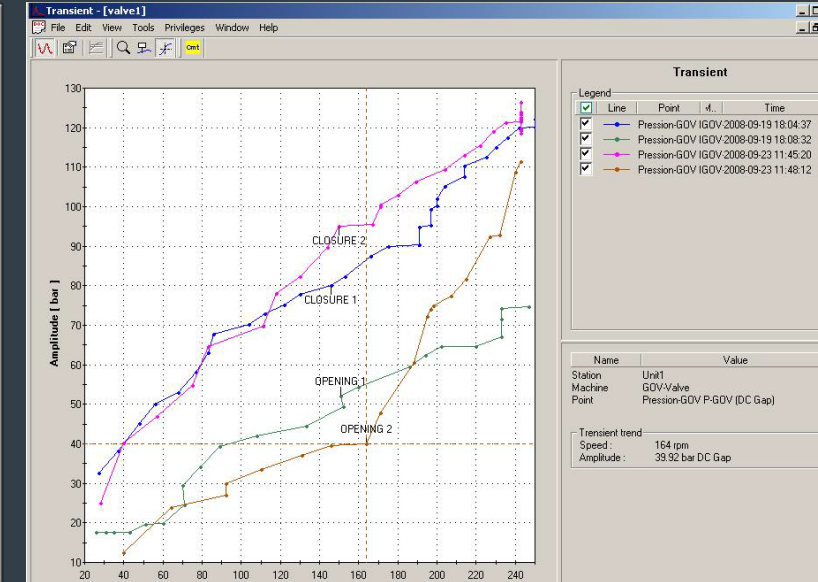
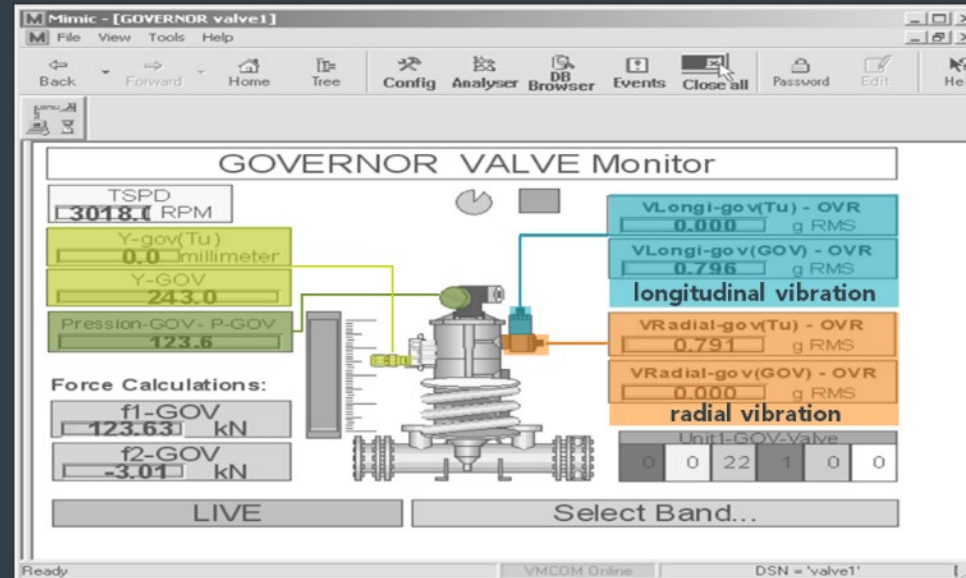
\* customized sensor capabilities

# Application example

## PWR steam turbine-generator

### valve condition monitoring

- Based on **Pressure**, **Stroke**, and **Vibration** Measurements
- Thanks to a long partnership with major turbine manufacturers, Parker-Meggitt is able to provide an innovative solution for monitoring selected non-rotating equipment such as valves

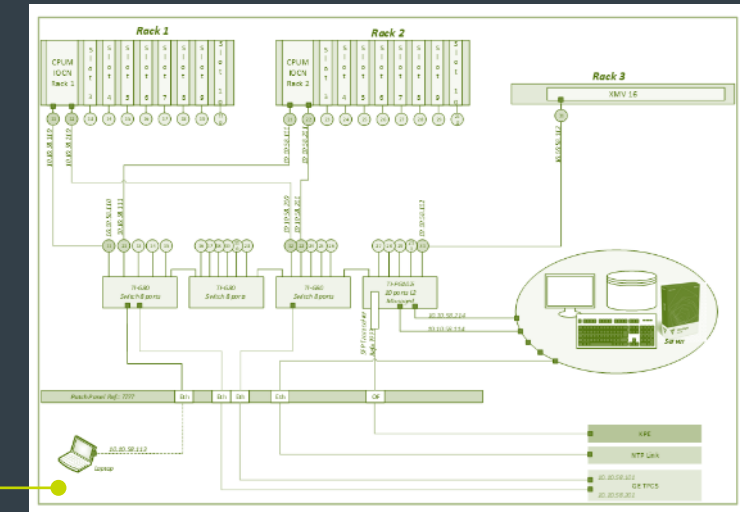
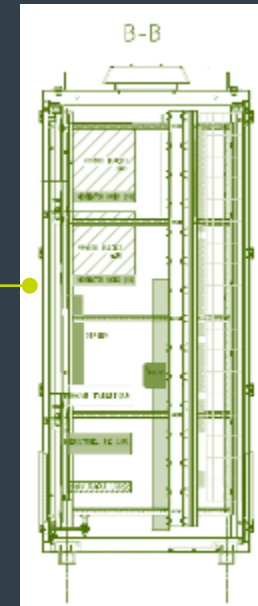


# Application example

## PWR steam turbine-generator

### Turnkey Scope

- Project Management and Project Team
- System Design & Network Design
- Mechanical execution (transducer bracketry and mounting)
- Electrical & Instrument execution (field wiring, cabinet wiring, network cabling)
- IT / OT coordination
- Enclosure / cabinet procurement and fabrication
- Hardware configuration
- Software configuration
- Factory Acceptance Testing (FAT)
- System integration (DCS, turbine control, historian, etc.)
- Sensor calibration
- Site Acceptance Testing (SAT) / Commissioning / Loop checks
- Startup “baseline” data collection and assessment
- Drawings and documentation
- Training



# Application example

## PWR steam turbine-generator

### Specific Studies (internal or external expertise)

- **Thermal balance and sizing of enclosures**

- Meggitt has developed an expertise to calculate

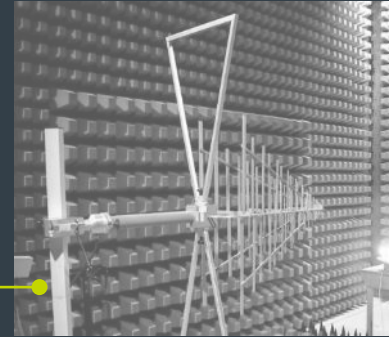
- the effective enclosure surface
- the thermal radiation
- the required cooling output
- the maximum temperature inside
- the required volumetric flow for fans

$$Q_s = k * A * \Delta T$$

$$Q_e = Q_v - Q_s$$

$$Q_e = k * A * \Delta T_{max}$$

$$V = f * Q_v / \Delta T$$

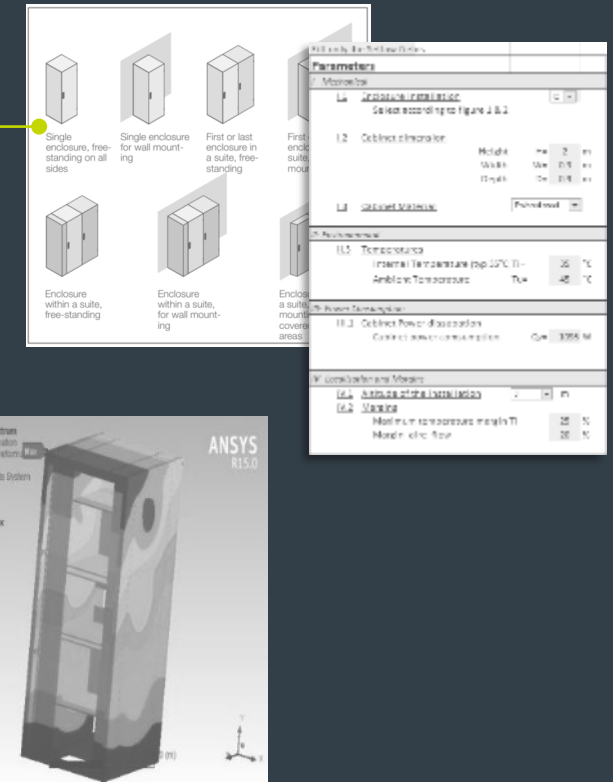


- **EMC Testing and Certification**

- For certain tests and certification, we use external laboratories

- **Seismic Analysis**

- For specific analysis, we subcontract simulation, tests, and detailed analysis





# Application example

## PWR steam turbine-generator

### Cybersecurity

- **At (or near) the #1 concern for many customers**
  - Need secure remote access to data
  - Need to be able to access from business network
  - Need to segregate protection from CM
  - Often using advanced technologies like data diodes and server replication
  - Standards such as IEC 62443 increasing in importance
    - Part 4-1 product development **process** compliance
    - Part 4-2: **product** compliance
    - Part 2-4: **service** provider security program compliance

