Steam Turbine & Generators

Control System Upgrade

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Control System Upgrade

Our service offerings

Applicable for:

- Siemens legacy industrial steam turbines
  (Siemens, DR, AEG, ABB, BBC,GMB, Alstom, AE&E, Stal Laval, ABB Stal, Asea Stal, etc.)
- Non Siemens legacy turbines (CIB competitor installed base)
  (GE, Nuovo Pignone, KK&K, Fuji, Howden, etc.)
- Generator drives as well as mechanical drives for compressors, pumps and fans
- Replacement of obsolete mechanic/hydraulic control systems
  (i.e. Kalb Governor, Jahns Governor, Woodward PG PL, etc.)
- Replacement of obsolete analogue control systems
  (i.e. Voith, Angland, etc.)
- Replacement of obsolete digital control systems
  (i.e. Mitsubishi PLC based Turloop systems, Simadyn, S5, Coros, ABB Master piece, Trisen, ABB Advant, etc.)

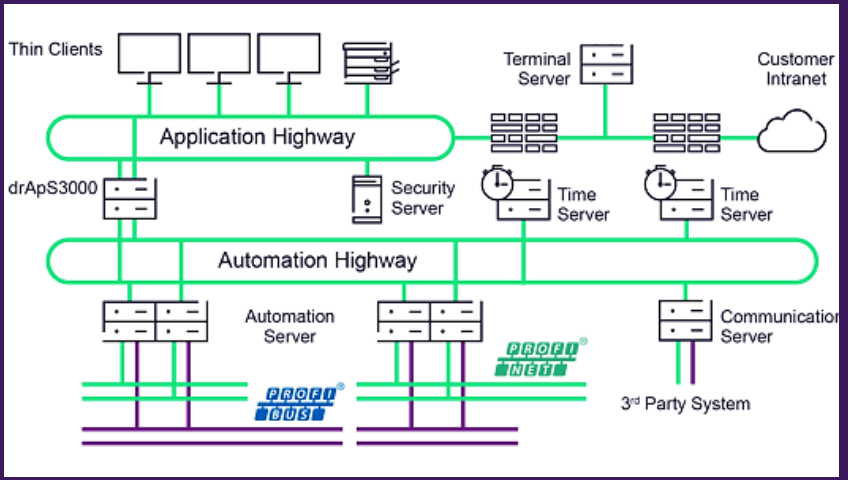
Functions:

- Turbine closed-loop control
  once trough, single and double extraction
  secondary steam admissions
  electronic valve position control
- Turbine open-loop control of all auxiliary drives and motorized valves: lube oil system, control oil system, sealing steam system, condensate system, evacuation system, turning gear2, etc.
- Turbine protection:
  Implementation of 2-out-of-3 electronic protection concept incl. SIL 3 overspeed protection
- Life steam temperature gradient supervision
- Vibration monitoring equipment
- Start up and loading device
- Serial interface for communication with third party systems
- Step sequences

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Why do it?



To maintain reliability and system availability

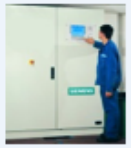
Standard IT components used in modern DCS are subject to fast technological change. Therefore, to maintain reliability and system availability (e.g., spare parts supply) regular control system upgrades are necessary. Our customized upgrades ensure security, performance and availability of your control system over the long term

Customer benefits,

- Clearly defined life cycles (LTS strategy) for long-term planning
- Enhanced system performance through modern hard- & software
- Maximized availability from assured supply of spare parts over long term
- New performance features

Control System Upgrade

Our portfolio

	Solution S7		Solution PCS7	Solution SPPA-T3000	
	Turloop	**Scaut**	**R3000C**	**R3000 CAApS**	**R3000C**
Target Group	IST 5…120+ MW, all Industrial appl. Highly customizable Low/Mid end solution	IST 5…50+ MW, compressor drive appl. Rather standardized Low/Mid end solution	IST 5…250+ MW, all Industrial appl. Highly customizable Mid/High end solution	IST 5…35+ MW, non critical applications Rather standardized Low end solution	IST 5…250+ MW, all Industrial appl. Highly customizable Mid/High end solution
Layout				 	
Technology **SW** **HMI** **HW**	STEP7 Prof. - CFC WinCC or WinCC flexible S7-400	S7 or PCS7 WinCC S7-300/400/1500	PCS7 WinCC S7-400	SPPA-T3000 SPPA-T3000 SIMATIC IPC427E	SPPA-T3000 SPPA-T3000 AS3000, S7-400
Functions	Governor, Protection, Auxiliaries, Vibration, DCS Interface, cRSP, RDS	Governor, Protection, Anti Surge, Auxiliaries, Vibr., DCS Interface, cRSP, RDS	Governor, Protection, Auxiliaries, Vibration, DCS Interface, cRSP, RDS	Governor only, DCS interface, cRSP, RDS	Governor, Protection, Auxiliaries, Vibration, DCS Interface, cRSP, RDS
Scope HW	Variable Cubicle, HMI	Variable Cubicle, HMI	Variable Cubicle, HMI	Wall cabinet	Variable Cubicle, HMI
Options	Geno Interface, HBFA/SLD, Step sequences, ex-proof, SIL, Fail Safe, redundant	Redundancy Step sequences, SIL ex-proof, load sharing	Geno Interface, HBFA/SLD, Step sequences, ex-proof, SIL, Fail safe, redundant	Additional functions may be imbedded non-redundant	Geno Interface, HBFA/SLD, Step sequences, ex-proof, SIL, Fail Safe, redundant

Control System Upgrade

Simatic S7 (300 and 400 series)

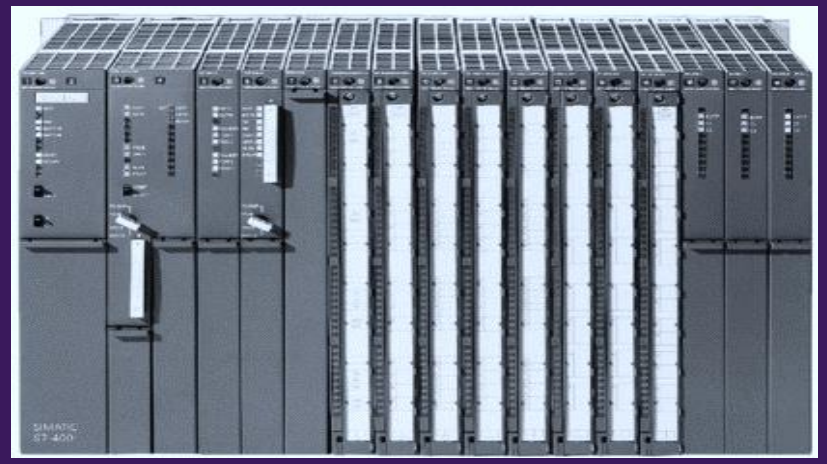


Simatic Hardware

- State-of-the-art open platform automation system
- Developed in the mid 90s
- Spare parts and specialists are available
- CPU and I/O redundancy available
- Not TMR compliant (triple modular redundancy)
- This hardware platform is also used for PCS7

Control System Upgrade

Turloop-S7



Turloop-S7 technological platform

- First fully digital steam turbine governor based on open PLC technology, developed in 1992
- Programming environment: CFC (continuous function chart)
- ~1997: Knowhow was shared with ABB Brno (CZ, today's Siemens Energy Brno) and ABB Sao Paulo (today's Siemens Energy Jundiai)
- 2004/2005: Both locations migrated the TURLOOP SW architecture to Simatic S7-400

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PCS 7



PCS 7 technological platform consists of the following harmonized components,

- Engineering-Station (ES) and WinCC Operator-Station (OS)
- Automation Server (AS) SIMATIC S7-400 with S7-410 CPU
- Distributed Periphery SIMATIC ET200SPHA input / output
- Communication with TCP/IP, Profinet/Profibus DP
- The standard APL software library used and adapted for general instrumentation-and-control and plant-specific functions
- Integrated turbine governor

Control System Upgrade

SPPA-R3000 (T3000)



SPPA-R3000 (T3000)

- The sTCS (scalable Turbine Control System) for industrial steam turbines was particularly designed for use in industrial power plants.
- The use SIMATIC S7 components for adaptation of the system's capabilities to the individual requirements of a given plant.
- Operating and monitoring capabilities are provided by PC-based systems with the WINDOWS operating system.
- The use of SIMATIC components makes available standards used all over the world.
- The turbine control system can carry out any automation functions needed in an industrial steam turbine plant, depending on the scope of the customer
  - Capturing and processing of process data and open- and closed-loop control
  - Event signaling and process operating and monitoring by means of an interactive screen dialog (operating and signaling concept)
  - Information processing for relevant process variables (e.g. graphs of important steam parameters)
  - Defined starts and restarts, access authorization, time synchronization, life beat monitoring
  - User-friendly holistic engineering tool with libraries and preset modules for configuration
  - Coupling with other devices and third-party equipment

Control System Upgrade

I&C and Electrical Mods

Customer Challenge

- Reducing the risk of plant unavailability or unscheduled downtimes due to obsolete or discontinued technologies

Solution

- Control System Upgrade to the latest PCS7 V9.1 for 3 different turbines
- Modernization of the Excitation, Protection and Synchronism Generator Systems

Benefits

- Increasing turbine reliability and plant availability, thus reducing any risk of production losses

Portugal

2023

Power Generation & Others



September 2023