
TMOS
Gas Turbine HMI

TURBINE TECHNOLOGY SERVICES CORPORATION

Over 400 clients, 90 countries, and more than 30 years in the turbine industry.

Since 1983, TTS has provided innovation, high quality solutions and engineering expertise to clients worldwide.

Our offering to the mature gas turbine market includes:

- Parts supply
- Conversions, modifications and upgrades
- Engineering and on site services
- Power plant services
- Combustion and performance services

We know gas turbines.

Why upgrade your operator interface?

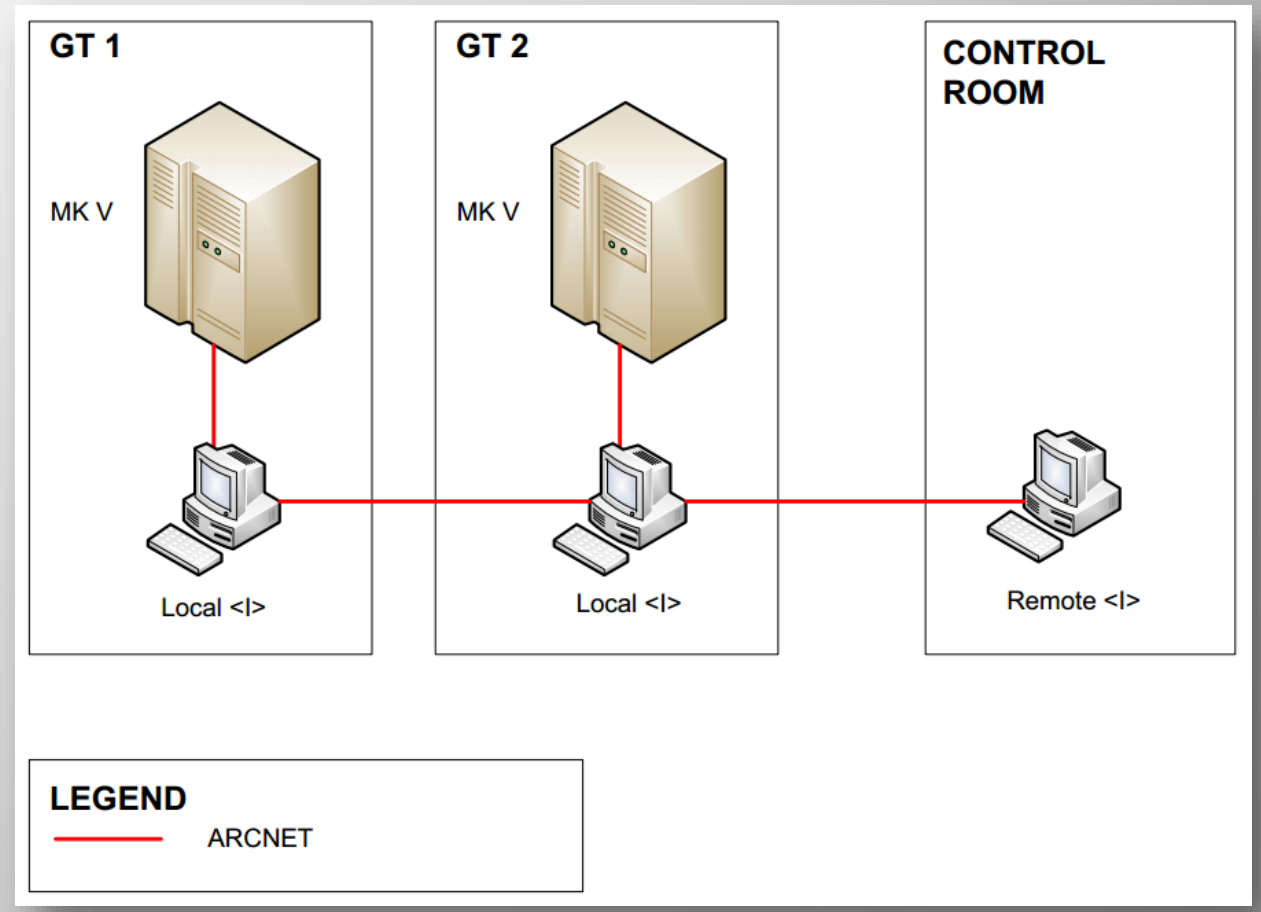
ISSUES WITH ORIGINAL <I> & <HMI> SYSTEMS

- Current system is based on obsolete hardware and software
- Not user friendly
- Difficult to get spares and or support
- Decreasing reliability
- Limited functionality, flexibility and connectivity
- No automatic fail over redundancy
- New plant layout engineering

Outdated Network

ORIGINAL OEM DESIGN

- Point to Point Architecture
- Limited Update Speeds
- Limited Redundancy
- No Auto Failover
- One license per HMI



Introducing TMOS

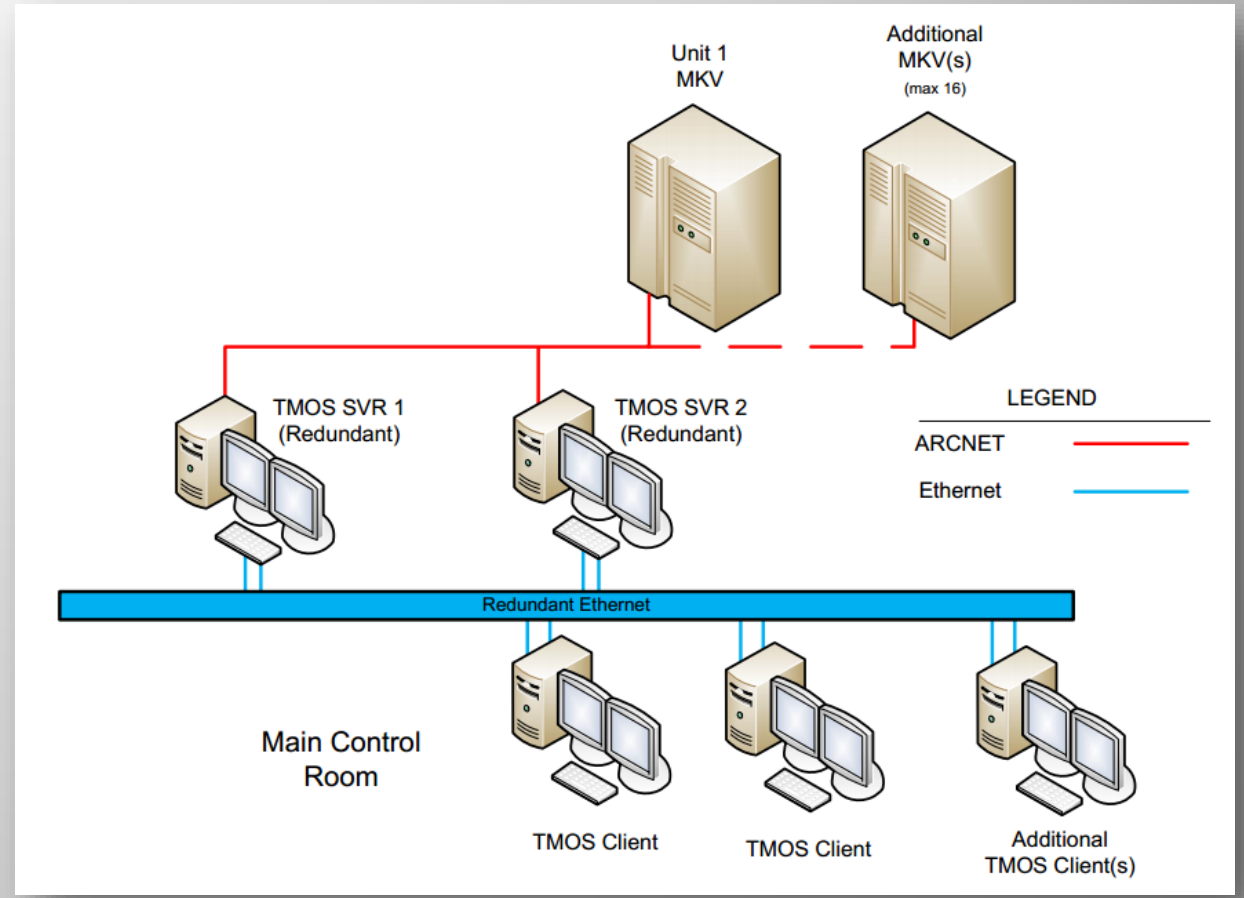
SPECIFICALLY DESIGNED HMI FOR POWER GENERATION INDUSTRY

With its unmatched performance, high reliability and ease of functionality, TMOS is being used on 110+ units with millions of running hours and 4,177 MW at ISO conditions.

Server Client Network

TMOS Redundant Architecture

- Server – Client Architecture
- Redundant Servers Possible
- Redundant Comms Network
- Auto Failover Design
- One License per Server



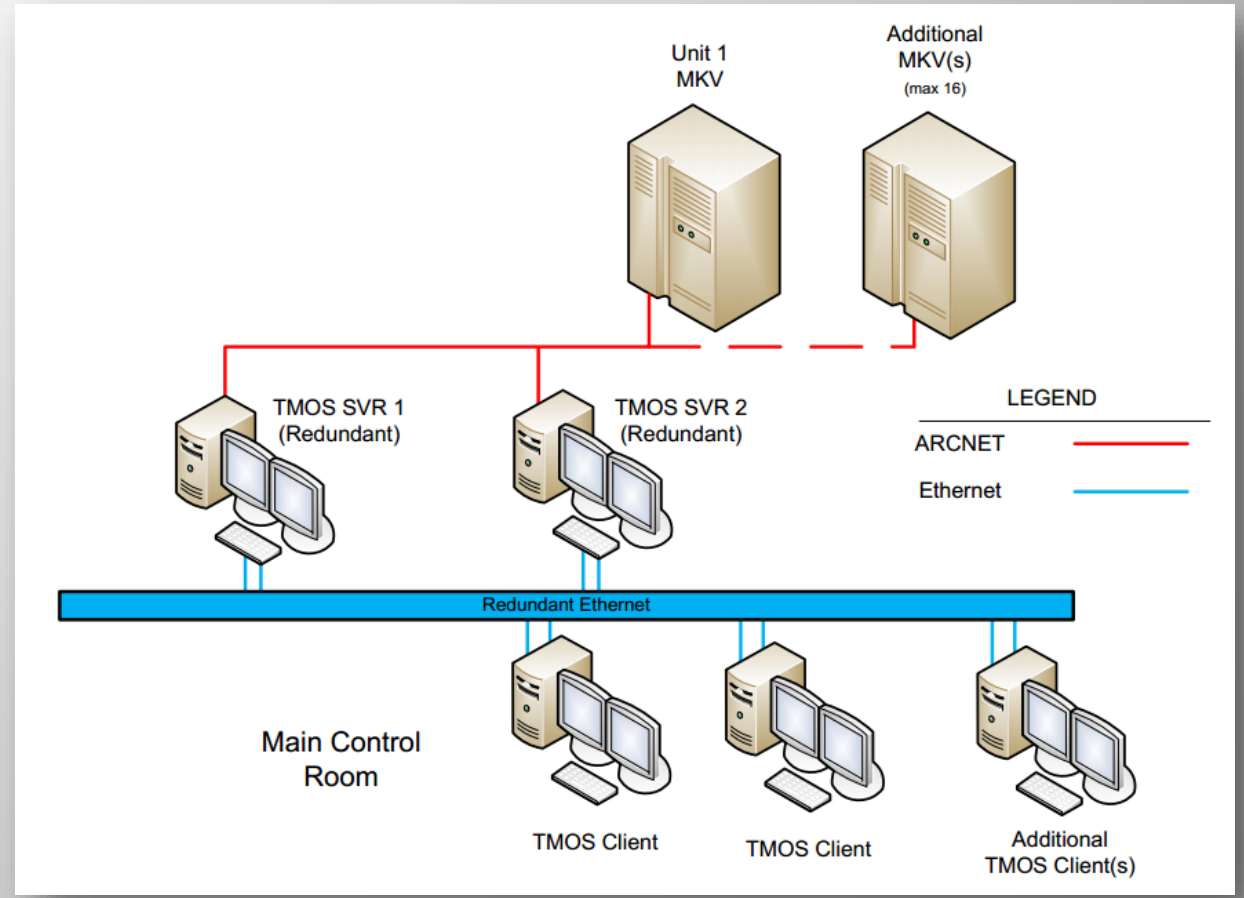
Server Client Network

TMOS REDUNDANT ARCHITECTURE

TMOS Gas Turbine HMI

Benefits

- Optimized Comms
- Can parallel to old system
- No shutdown required
- No PROM change required
- Upgrades provided across network
- Expandable
- Increased reliability/availability
- RAID 5



TMOS Features & Benefits

SPECIFICALLY DESIGNED HMI FOR POWER GENERATION INDUSTRY

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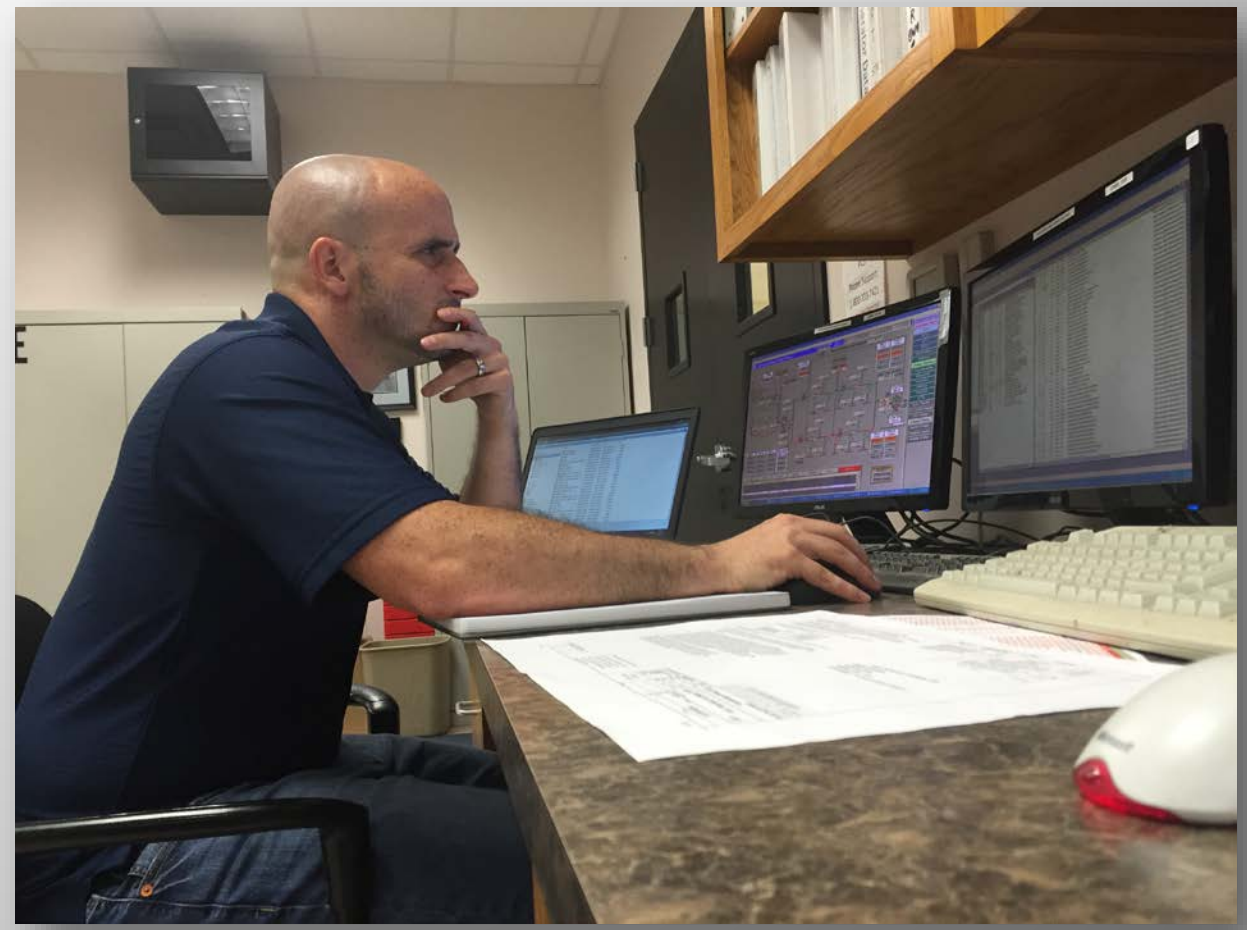
Features Overview

PROVEN & FIELD TESTED

TMOS Gas Turbine HMI

- Signal Information
- Historian
- Alarms Help
- Dynamic Rung Display
- Logic Forcing
- Control Constants Adjust
- SERVO Auto Calibrator
- Pre-vote Data Display
- EEPROM Programmer
- ARCNet Diagnostic
- Mark V Diagnostic Counters
- I/O Config



Historian

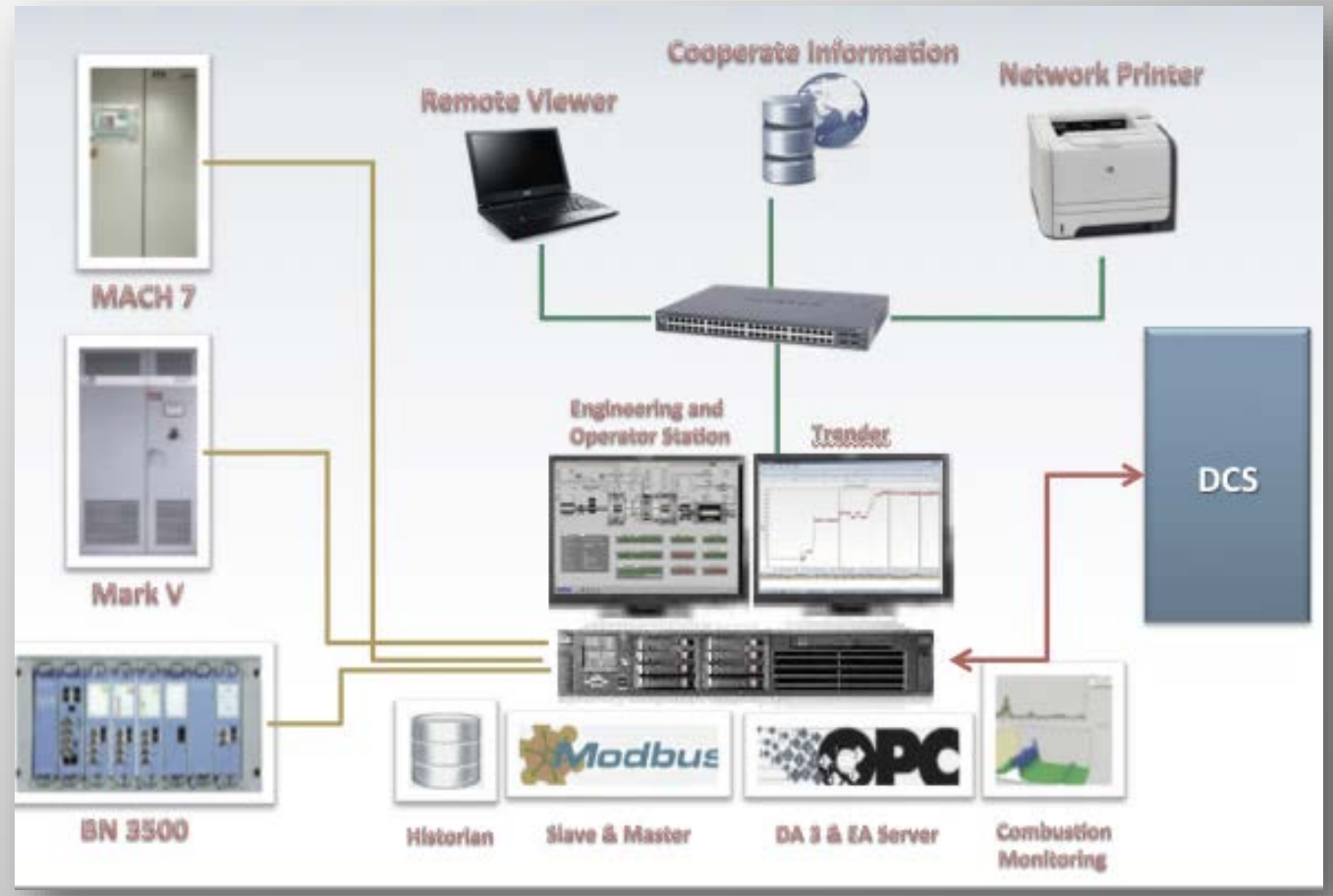
TMOS Gas Turbine HMI

- Historian included in base offering
- Stores desired signals in hard disks (analog and digitals)
- Customizable sampling rates (up to max 62.5 ms/sample)
- Easy to retrieve information for trend analysis
- Log view for Alarms and Events, with printable report style

Interface Options

TMOS Gas Turbine HMI

- STAGELINK
- MODBUS
- OPC DA (3.0)
- OPC EA (1.0)
- GE GSM
- PROFIBUS
- DDUMP
- MAMSP
- EGD
- CUSTOMIZED options



TMOS Key Benefits

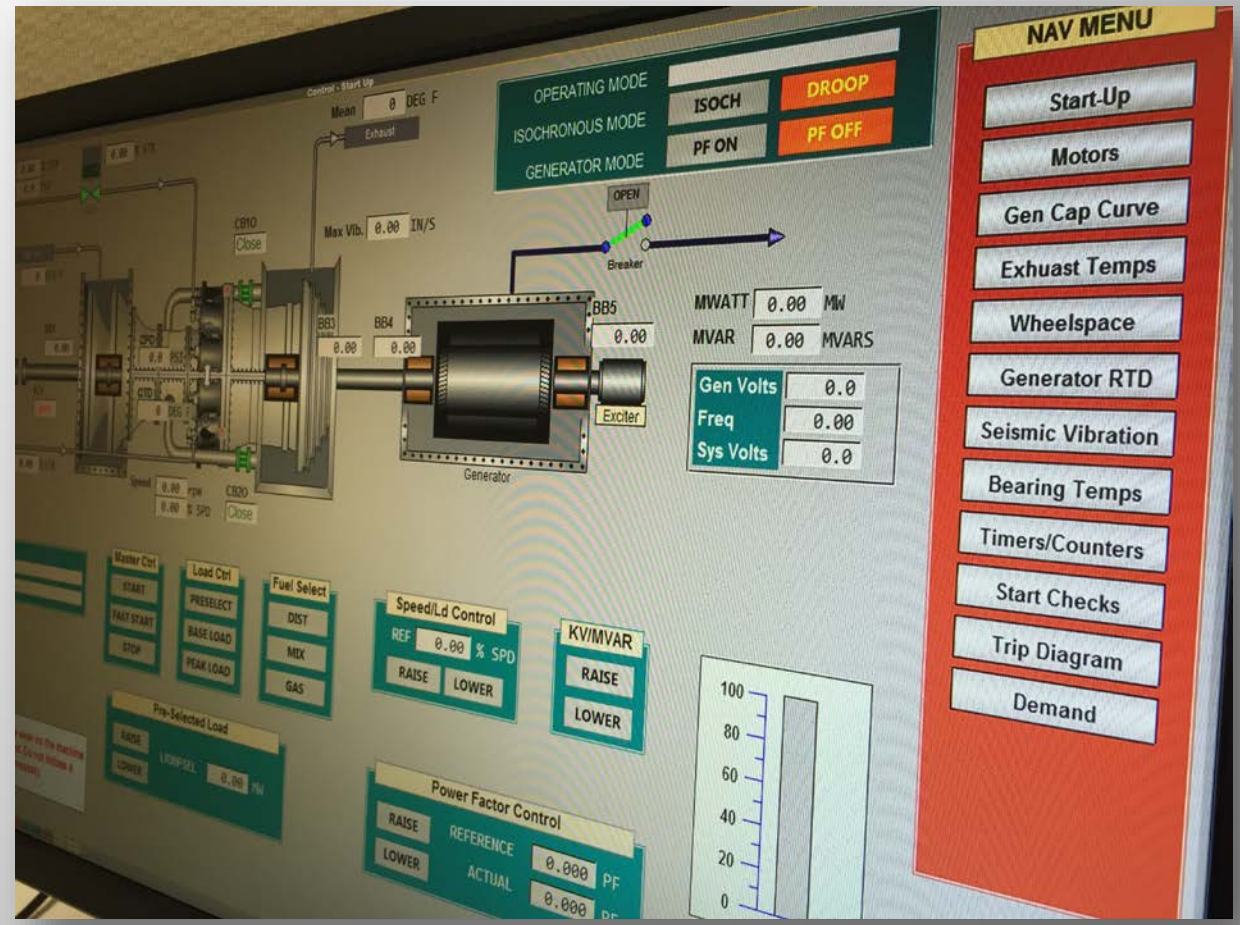
TMOS Gas Turbine HMI

- No shutdown or unit outage required
- No Mark V EEPROM upgrade required
- Works in parallel with existing <HMI> or <I>s
- Customizable Solutions
- Maximized User Experience

Upgrade Considerations

TMOS Gas Turbine HMI

- Important to consider life cycle cost
- Hardware costs
- Software costs
- Installation costs
- Validation costs
- Support costs
- Maintenance costs
- Expansion/Migration costs



Sample Screens

SPECIFICALLY DESIGNED HMI FOR POWER GENERATION INDUSTRY

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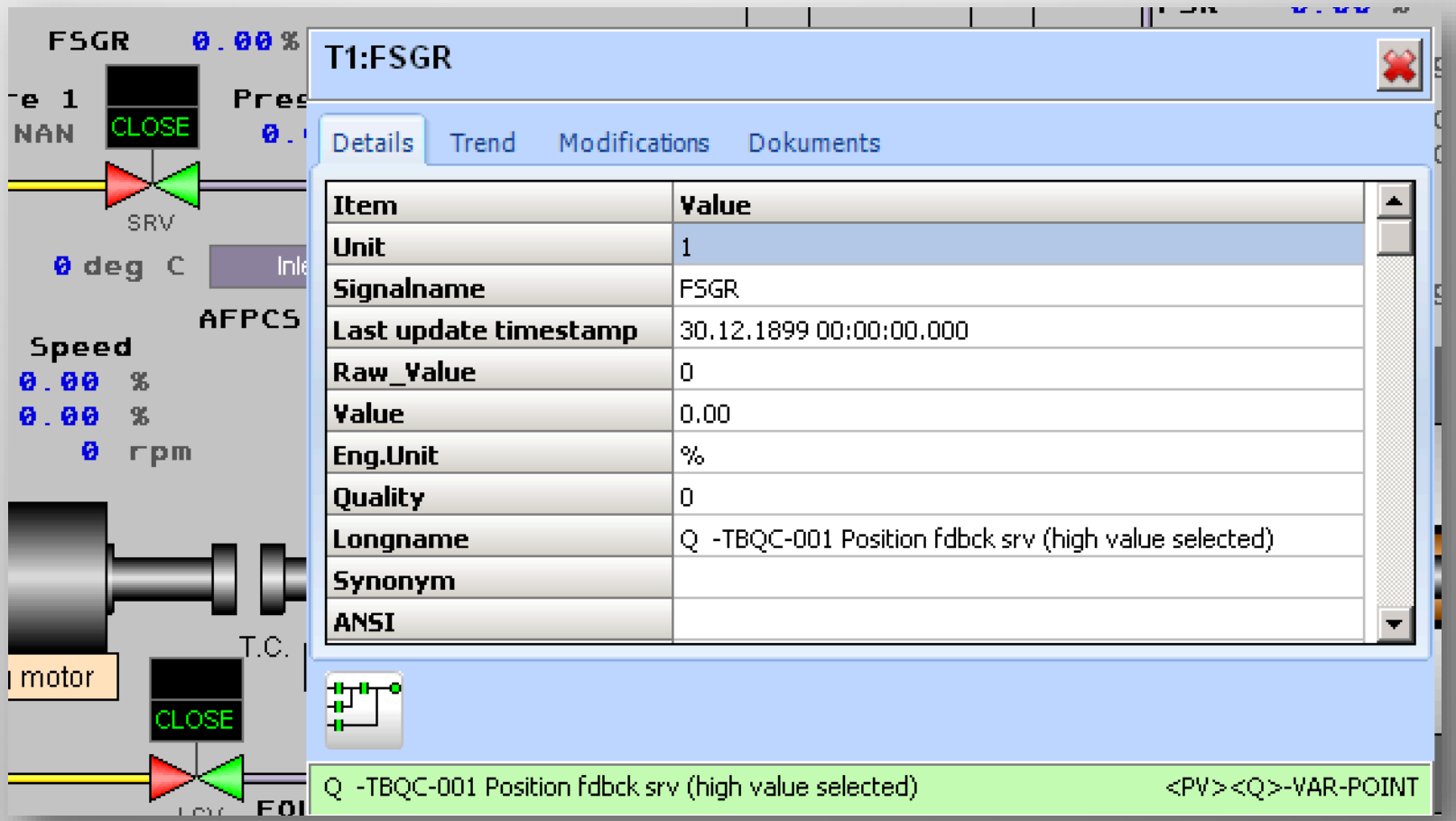
Signal Information

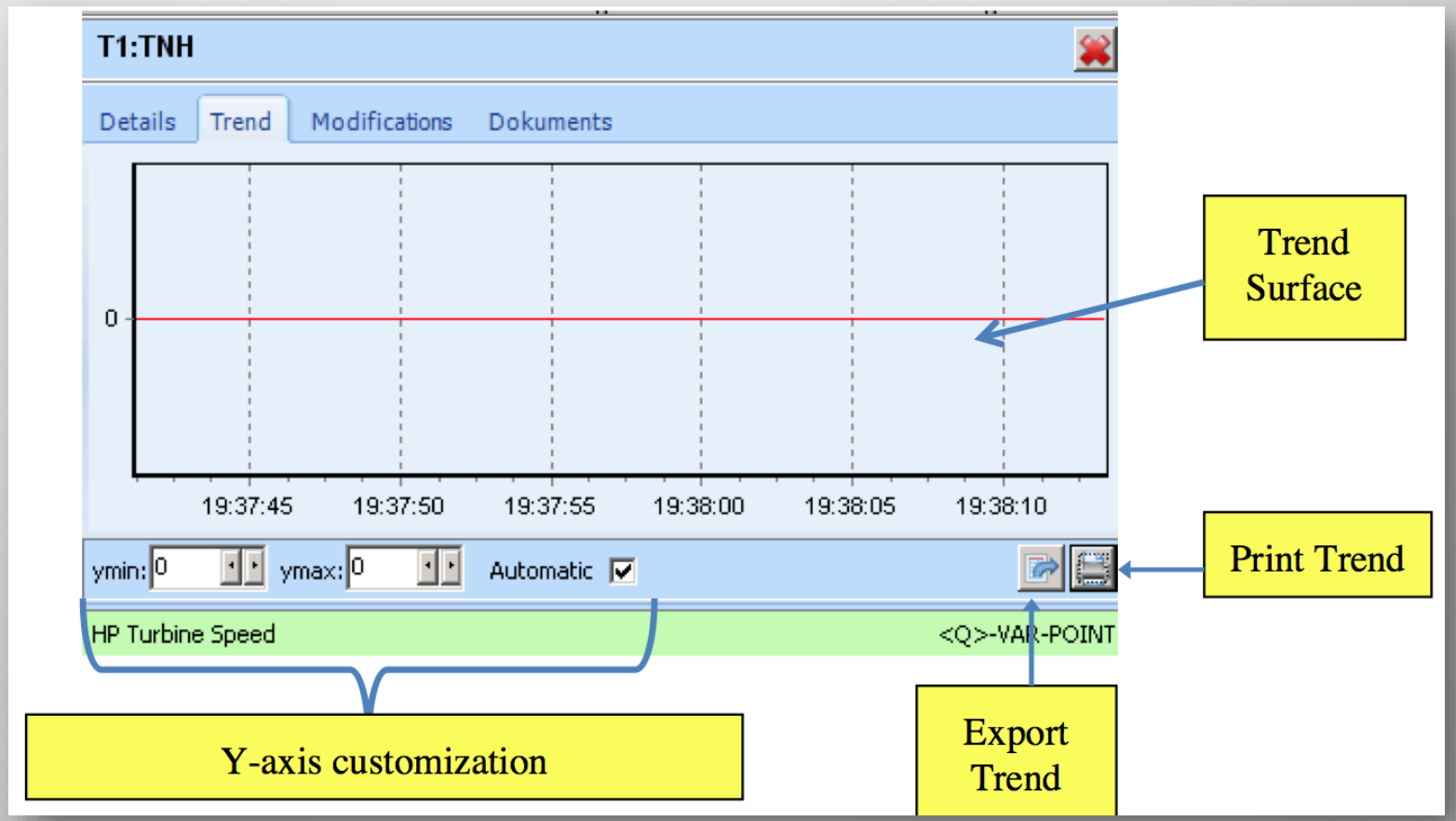
FUNCTION

TMOS Gas Turbine HMI



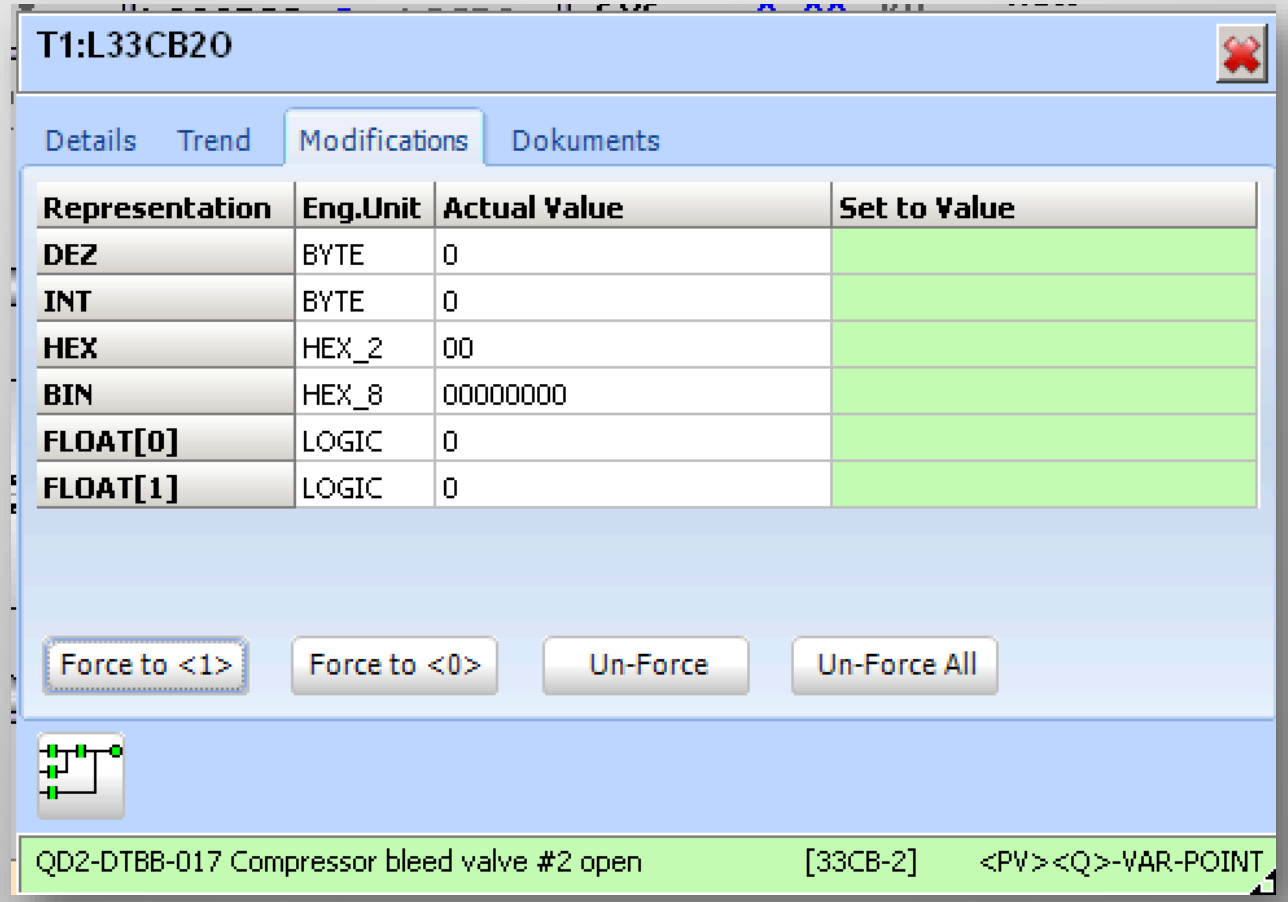
Signal Information

TREND



Signal Information

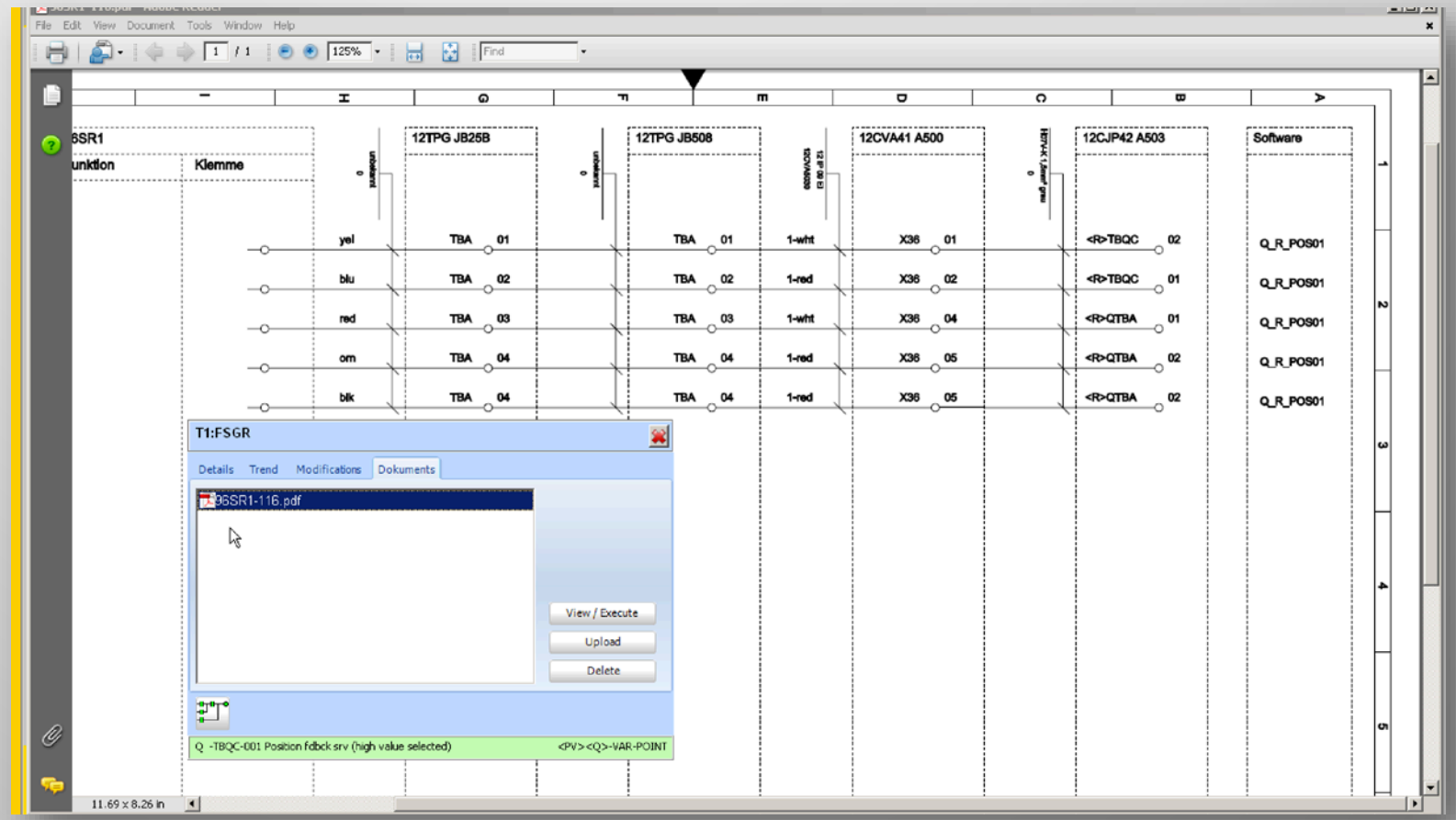
MODIFICATION



Signal Information

DOCUMENTS

TMOS Gas Turbine HMI



TURBINE TECHNOLOGY SERVICES CORPORATION

TurbineTech.com

Historian

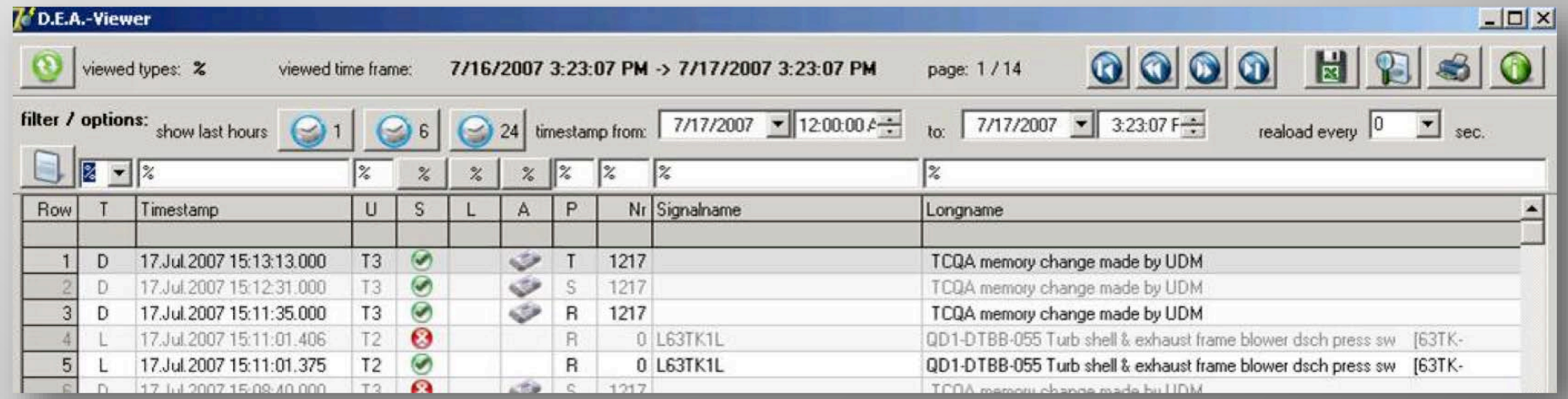
LOGICS & ANALOGS

TMOS Gas Turbine HMI

Historian

ALARMS & EVENTS

TMOS Gas Turbine HMI

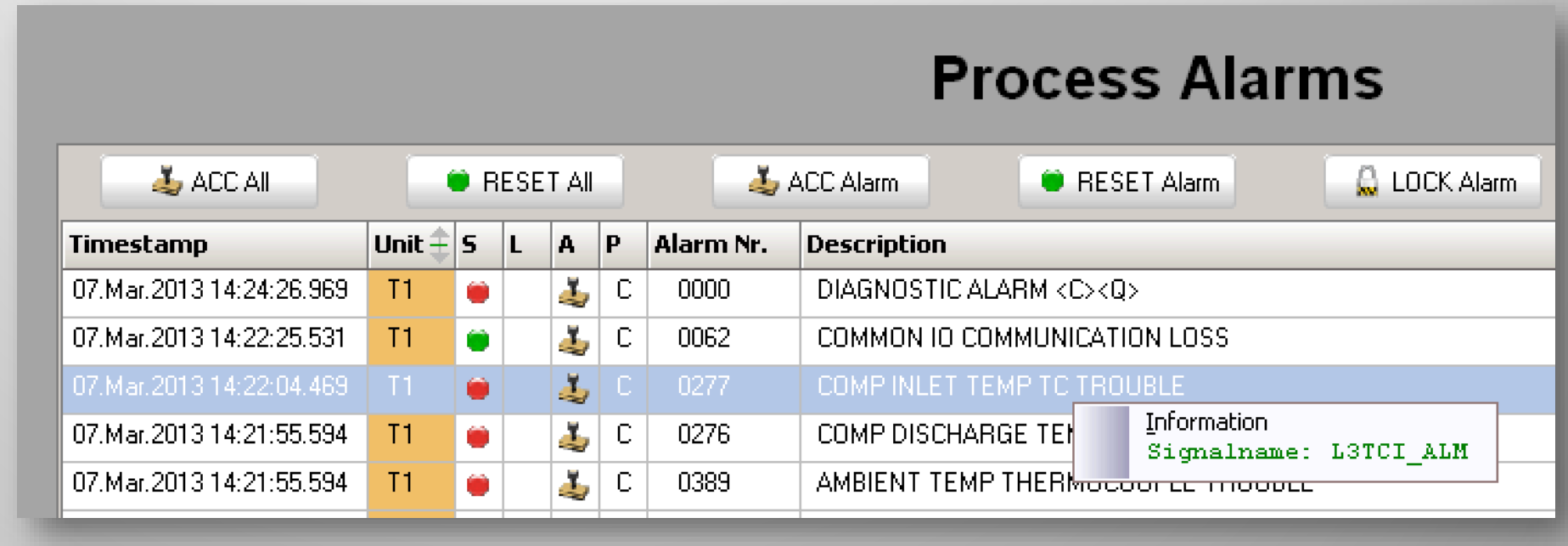


Row	T	Timestamp	U	S	L	A	P	Nr	Signalname	Longname
1	D	17.Jul.2007 15:13:13.000	T3				T	1217		TCQA memory change made by UDM
2	D	17.Jul.2007 15:12:31.000	T3				S	1217		TCQA memory change made by UDM
3	D	17.Jul.2007 15:11:35.000	T3				R	1217		TCQA memory change made by UDM
4	L	17.Jul.2007 15:11:01.406	T2				R	0	L63TK1L	QD1-DTBB-055 Turb shell & exhaust frame blower dsch press sw [63TK-
5	L	17.Jul.2007 15:11:01.375	T2				R	0	L63TK1L	QD1-DTBB-055 Turb shell & exhaust frame blower dsch press sw [63TK-

Alarm Help & Rung Display

QUICK ACCESS SHORTCUT

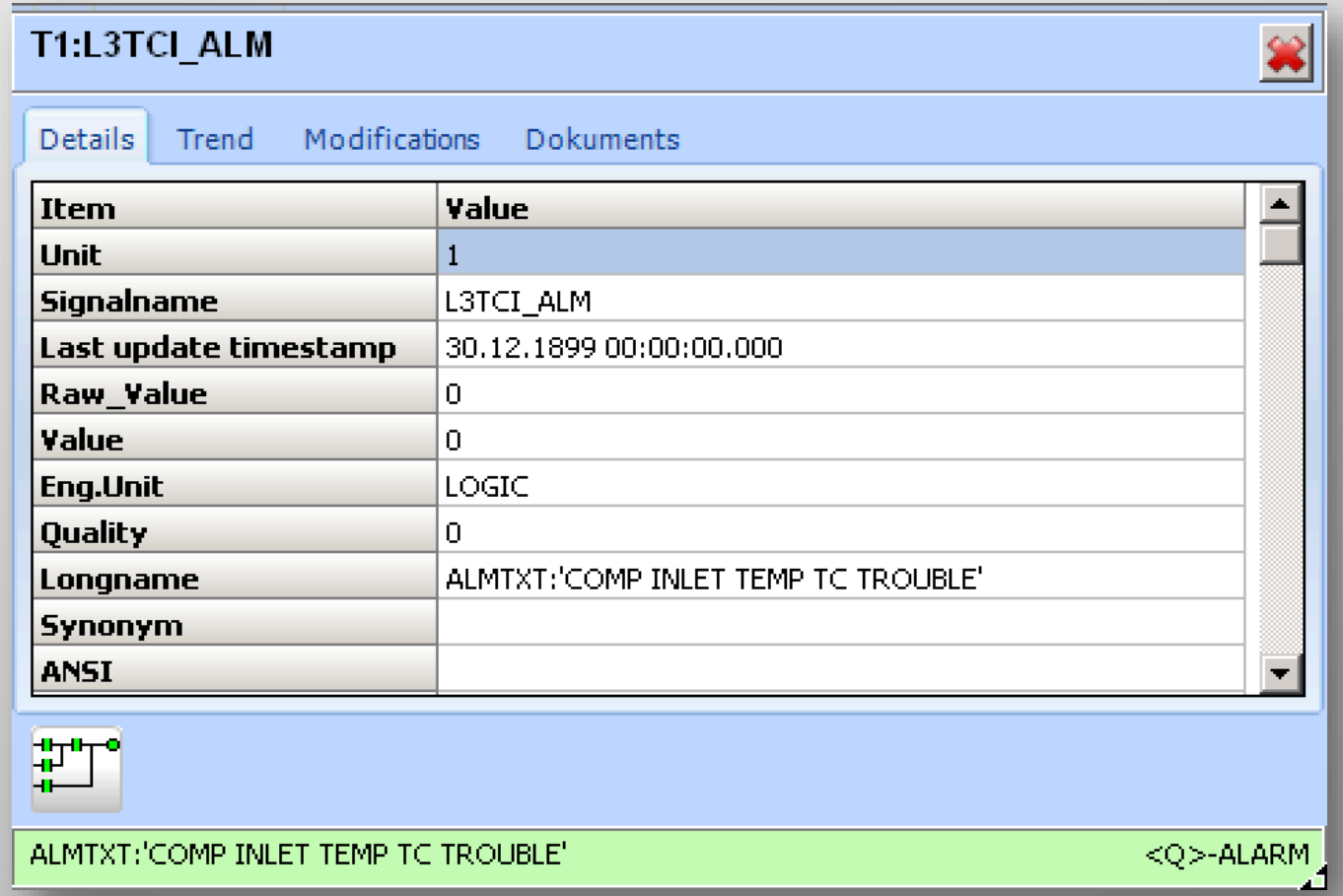
TMOS Gas Turbine HMI



Alarm Help & Rung Display

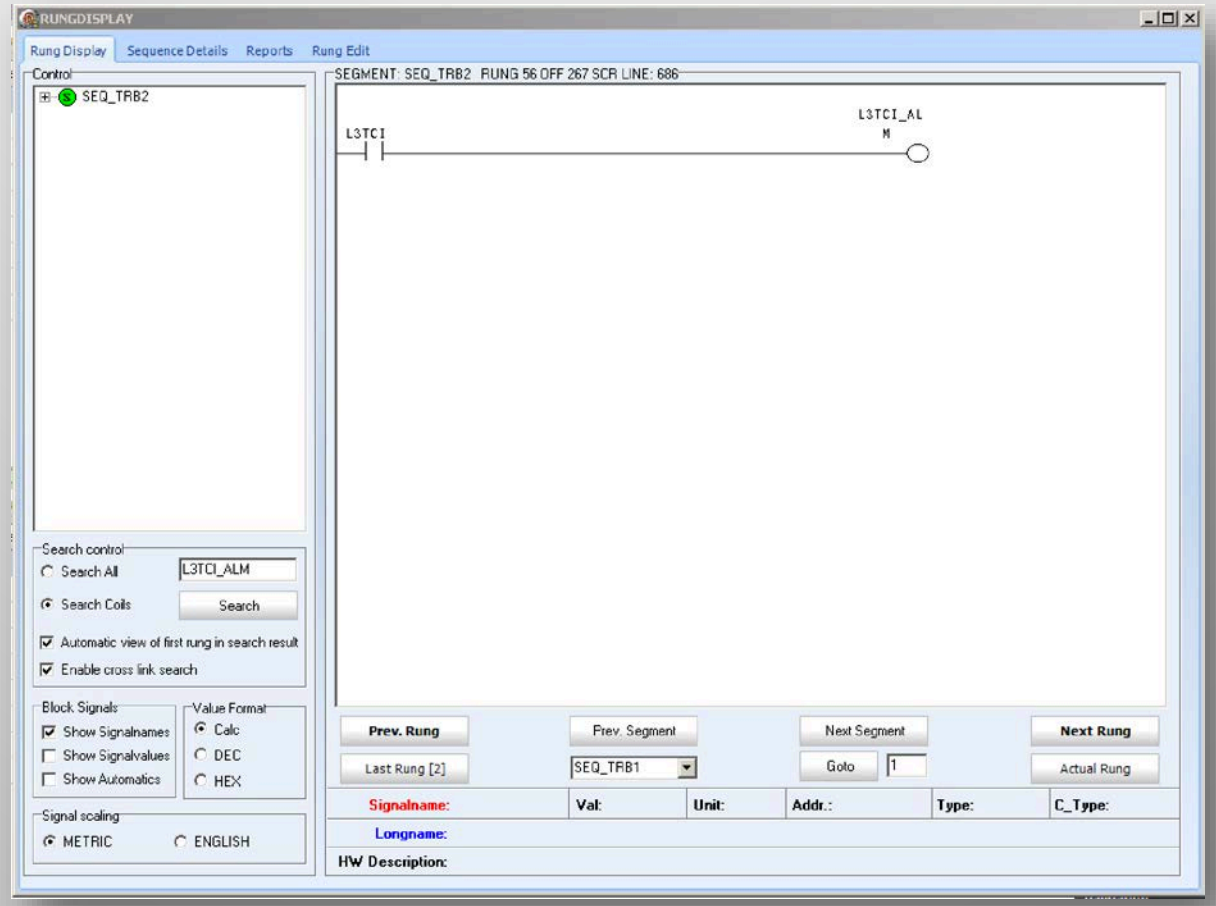
QUICK ACCESS SHORTCUT

TMOS Gas Turbine HMI



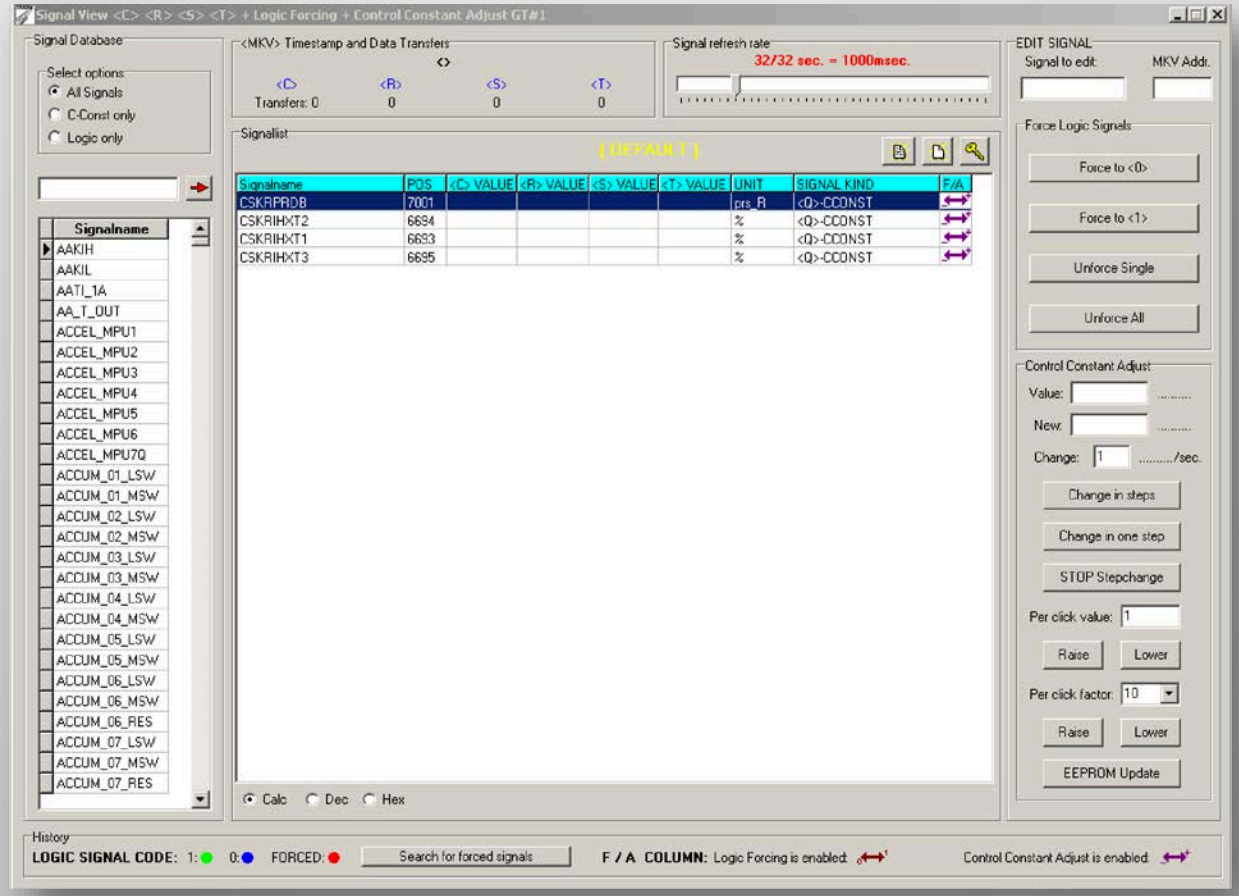
Alarm Help & Rung Display

QUICK ACCESS SHORTCUT



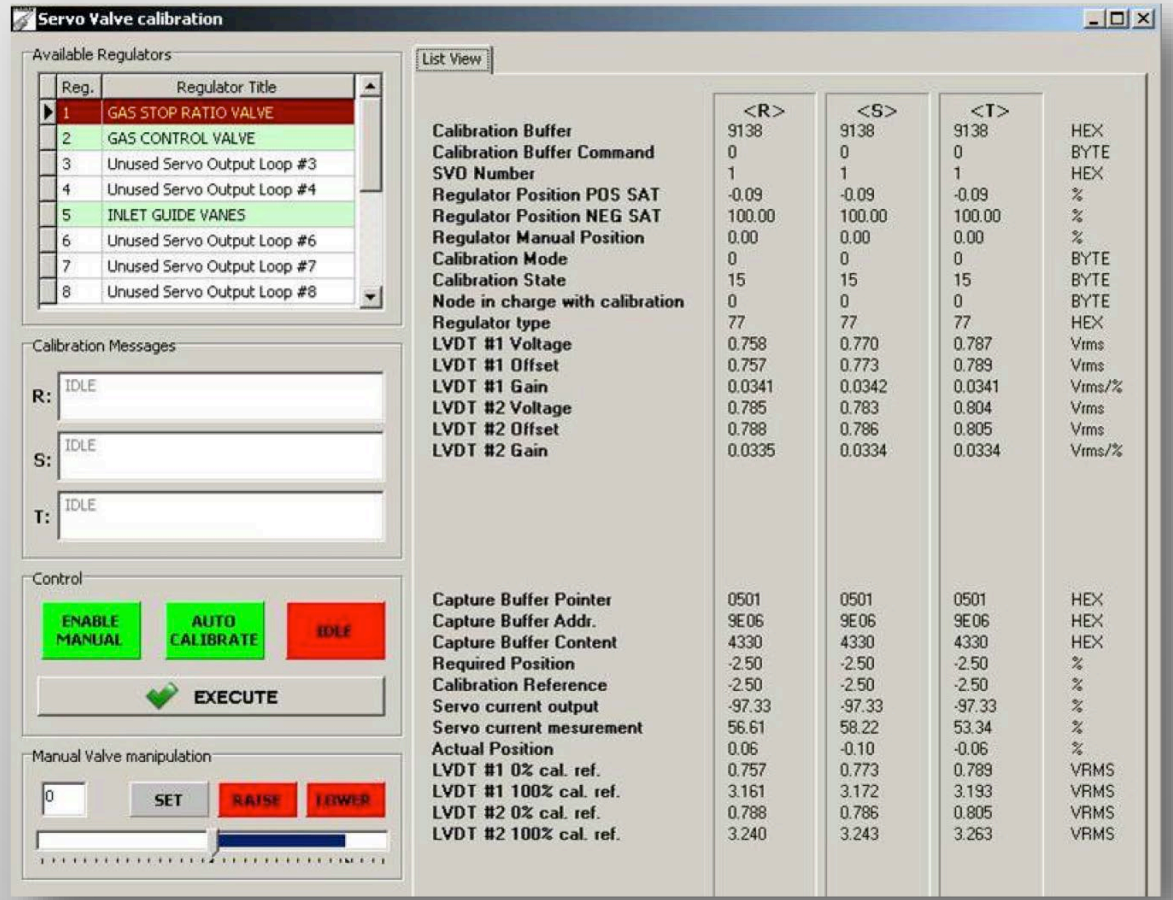
Logic Forcing & Control Constants Adjust

TMOS Gas Turbine HMI



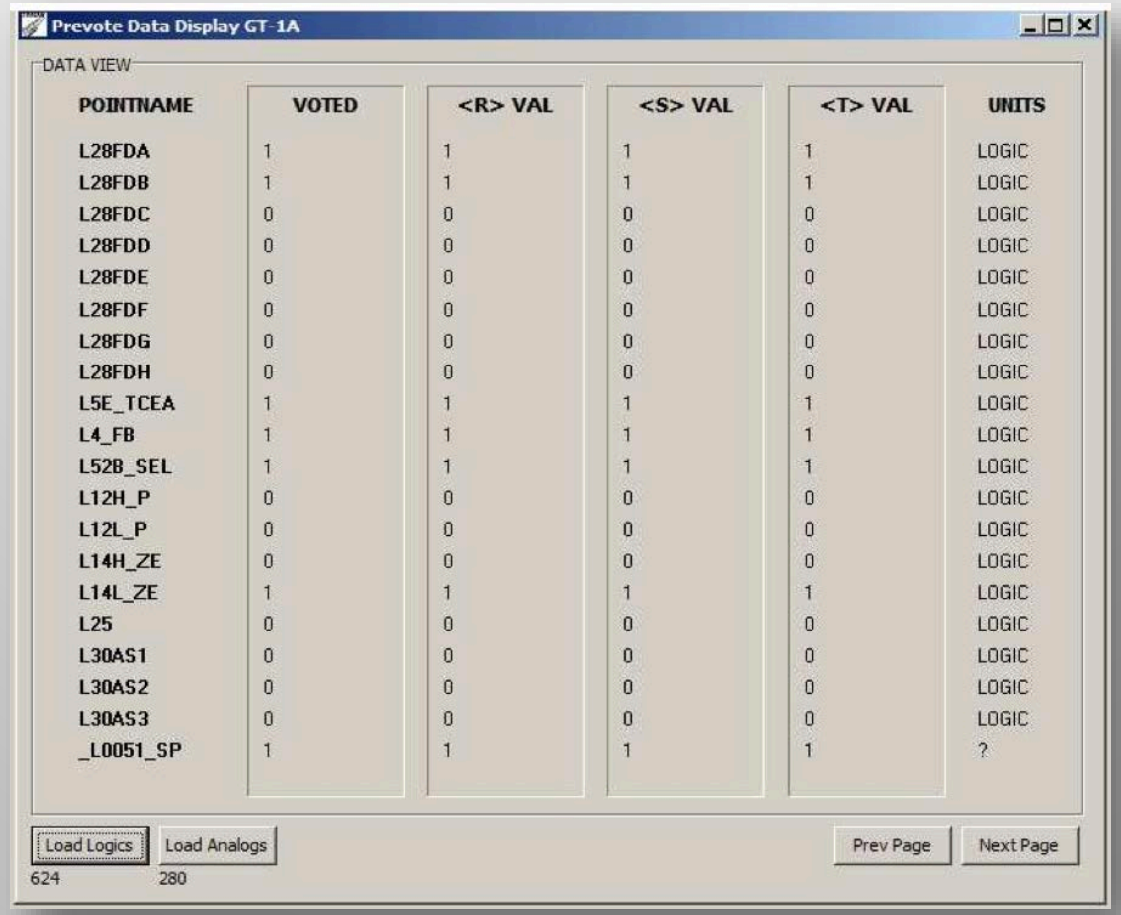
Automatic Servo Regulator Calibration Tool

TMOS Gas Turbine HMI



Pre-vote Data Display

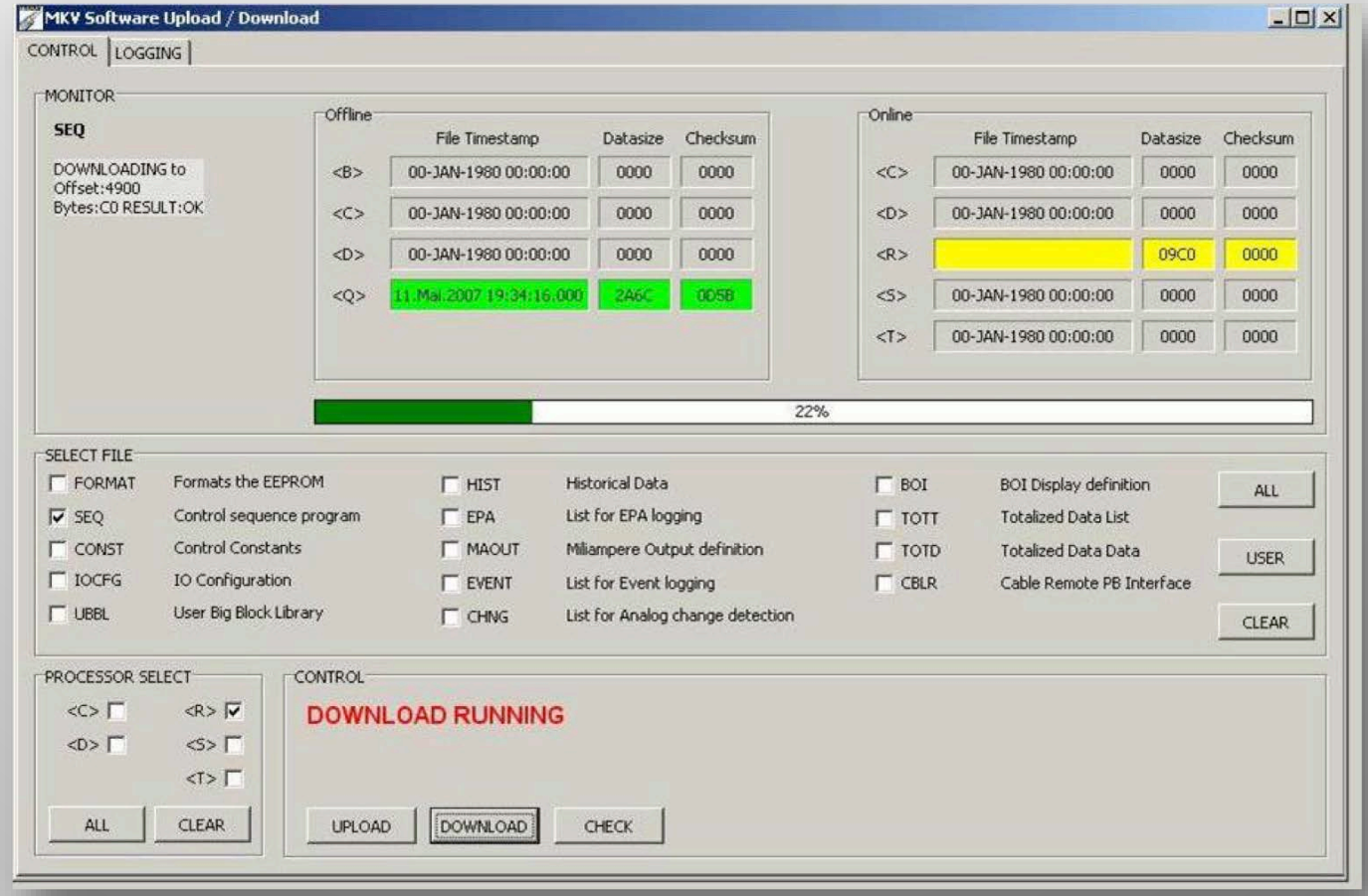
TMOS Gas Turbine HMI



POINTNAME	VOTED	<R> VAL	<S> VAL	<T> VAL	UNITS
L28FDA	1	1	1	1	LOGIC
L28FDB	1	1	1	1	LOGIC
L28FDC	0	0	0	0	LOGIC
L28FDD	0	0	0	0	LOGIC
L28FDE	0	0	0	0	LOGIC
L28FDF	0	0	0	0	LOGIC
L28FDG	0	0	0	0	LOGIC
L28FDH	0	0	0	0	LOGIC
L5E_TCEA	1	1	1	1	LOGIC
L4_FB	1	1	1	1	LOGIC
L52B_SEL	1	1	1	1	LOGIC
L12H_P	0	0	0	0	LOGIC
L12L_P	0	0	0	0	LOGIC
L14H_ZE	0	0	0	0	LOGIC
L14L_ZE	1	1	1	1	LOGIC
L25	0	0	0	0	LOGIC
L30AS1	0	0	0	0	LOGIC
L30AS2	0	0	0	0	LOGIC
L30AS3	0	0	0	0	LOGIC
_L0051_SP	1	1	1	1	?

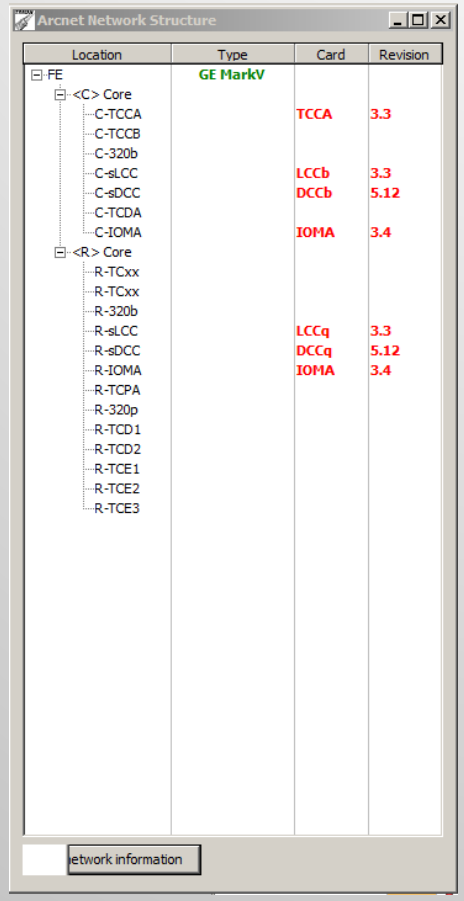
EEPROM Programming Interface

TMOS Gas Turbine HMI



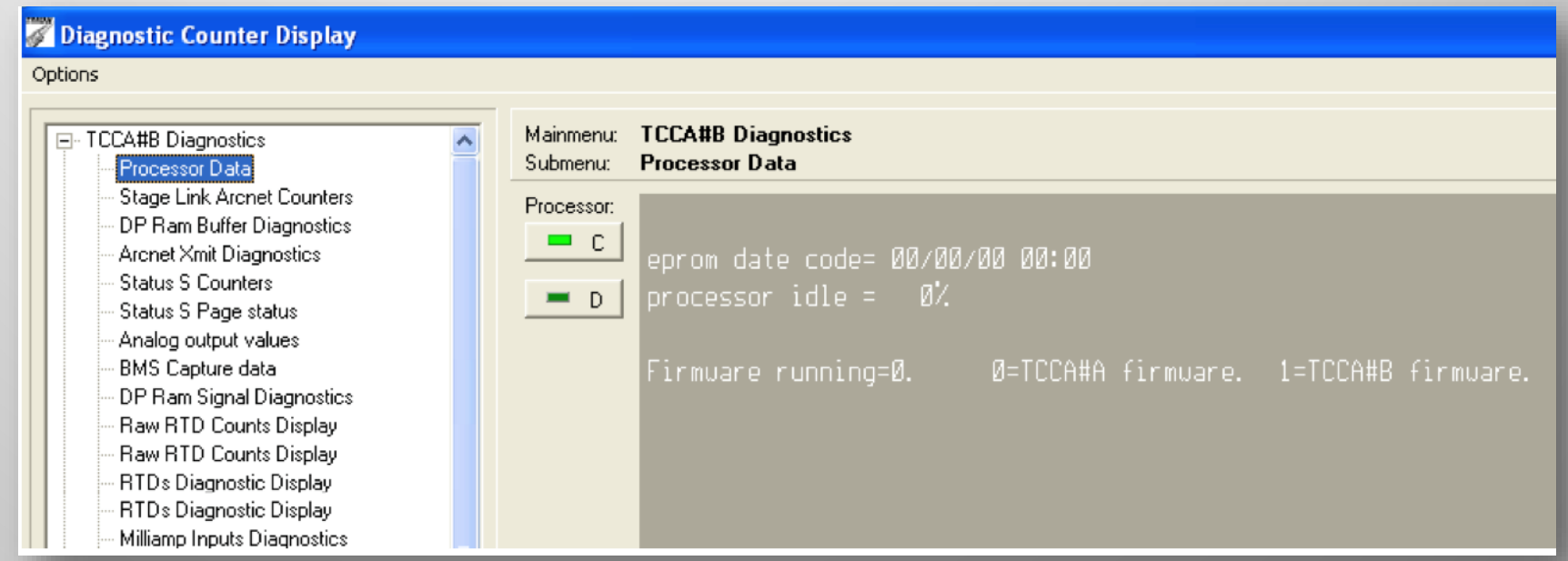
ARCWHO and PROM Version Checker

TMOS Gas Turbine HMI



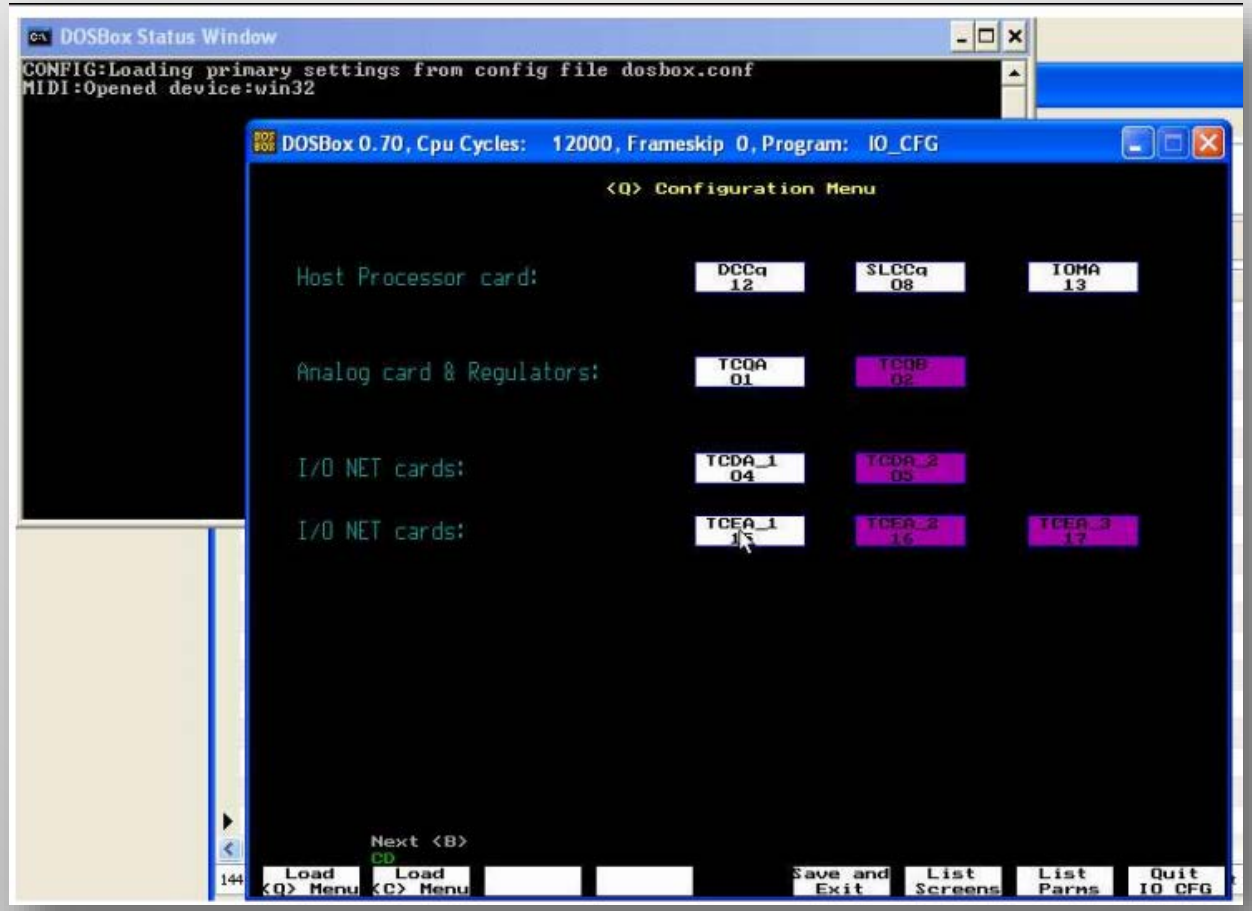
Diagnostic Counter Display

TMOS Gas Turbine HMI



I/O Configurator

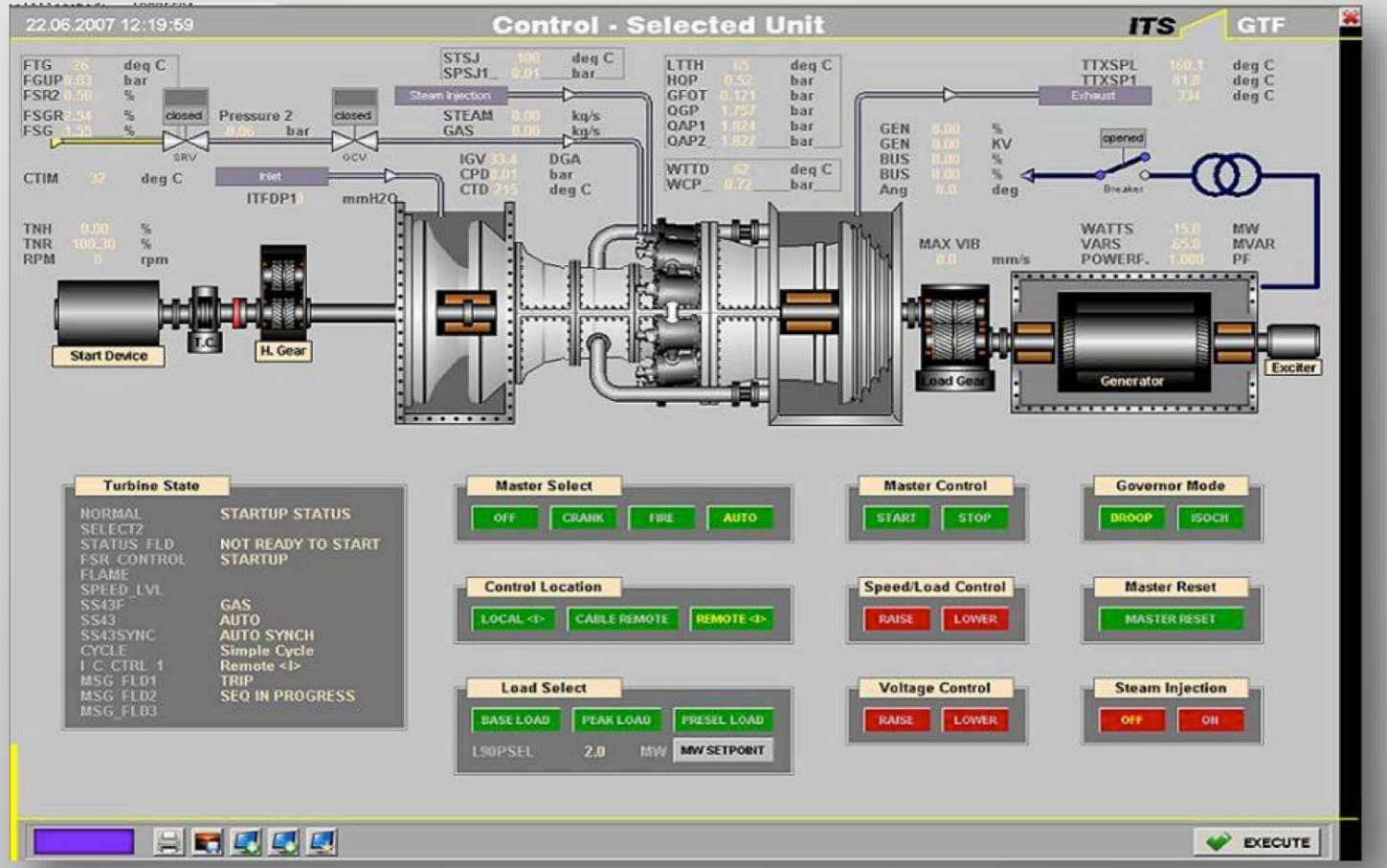
TMOS Gas Turbine HMI



Customized Display

UNIT STARTUP

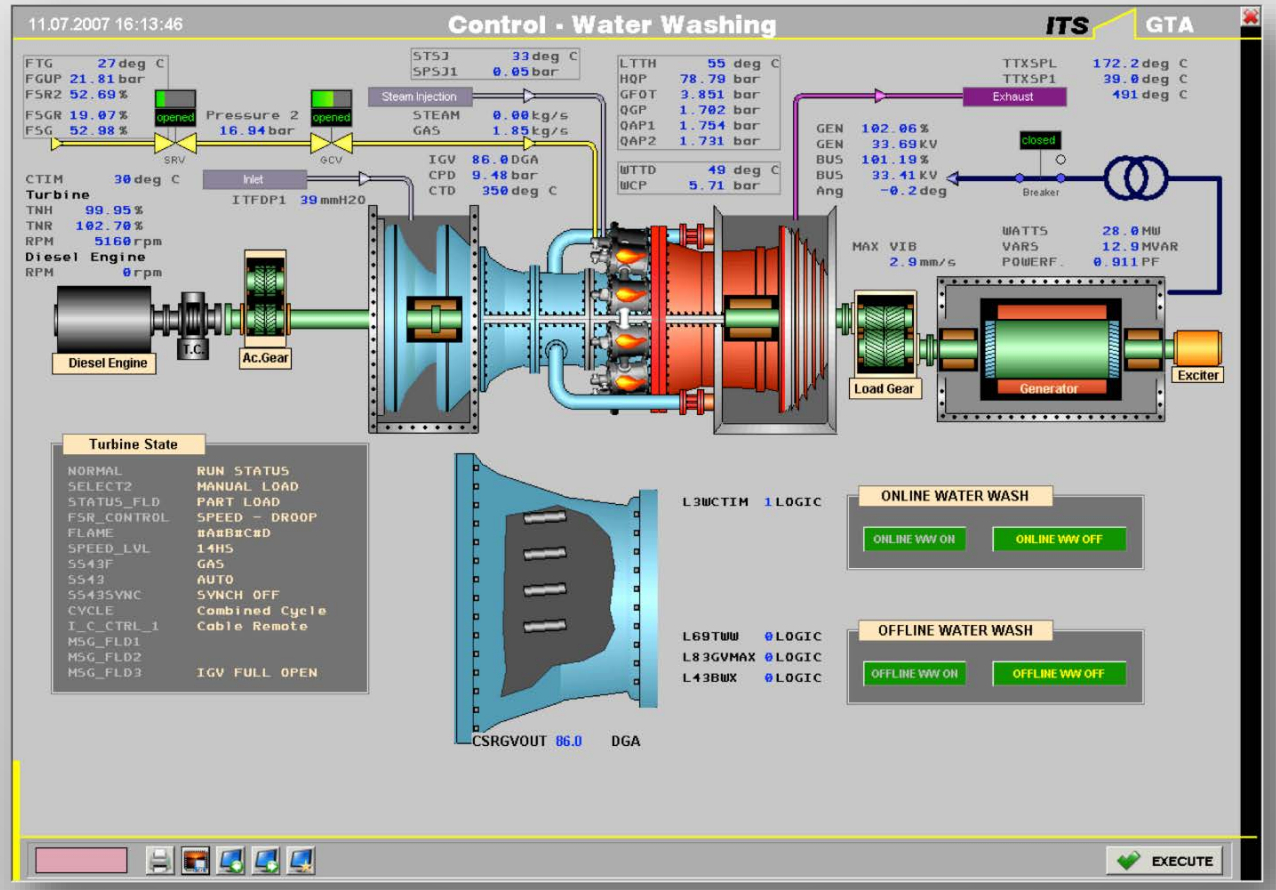
TMOS Gas Turbine HMI



Customized Display

UNIT IGV CONTROL

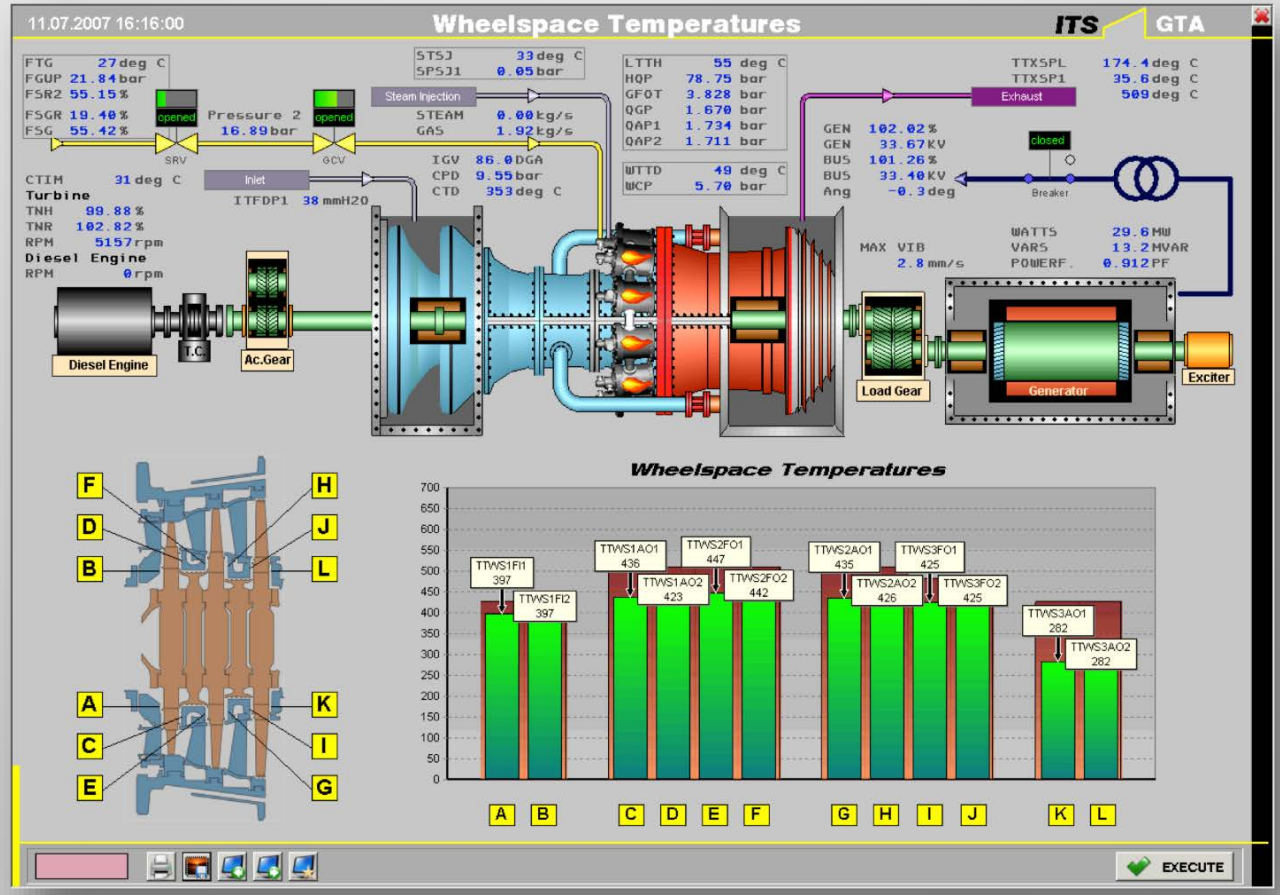
TMOS Gas Turbine HMI



Customized Display

UNIT WHEELSPACE TEMPERATURES MONITORING

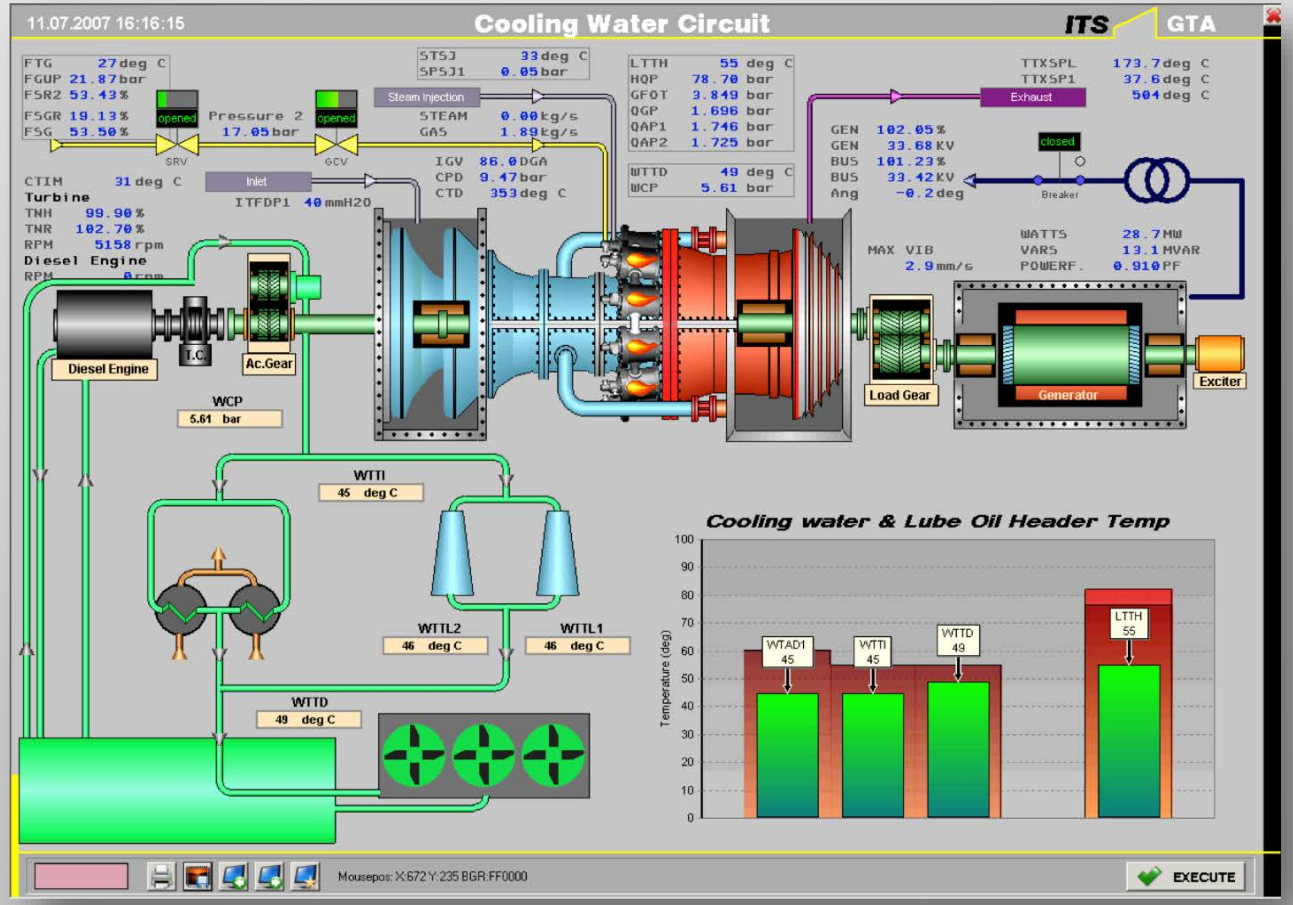
TMOS Gas Turbine HMI



Customized Display

UNIT LUBE OIL MONITORING

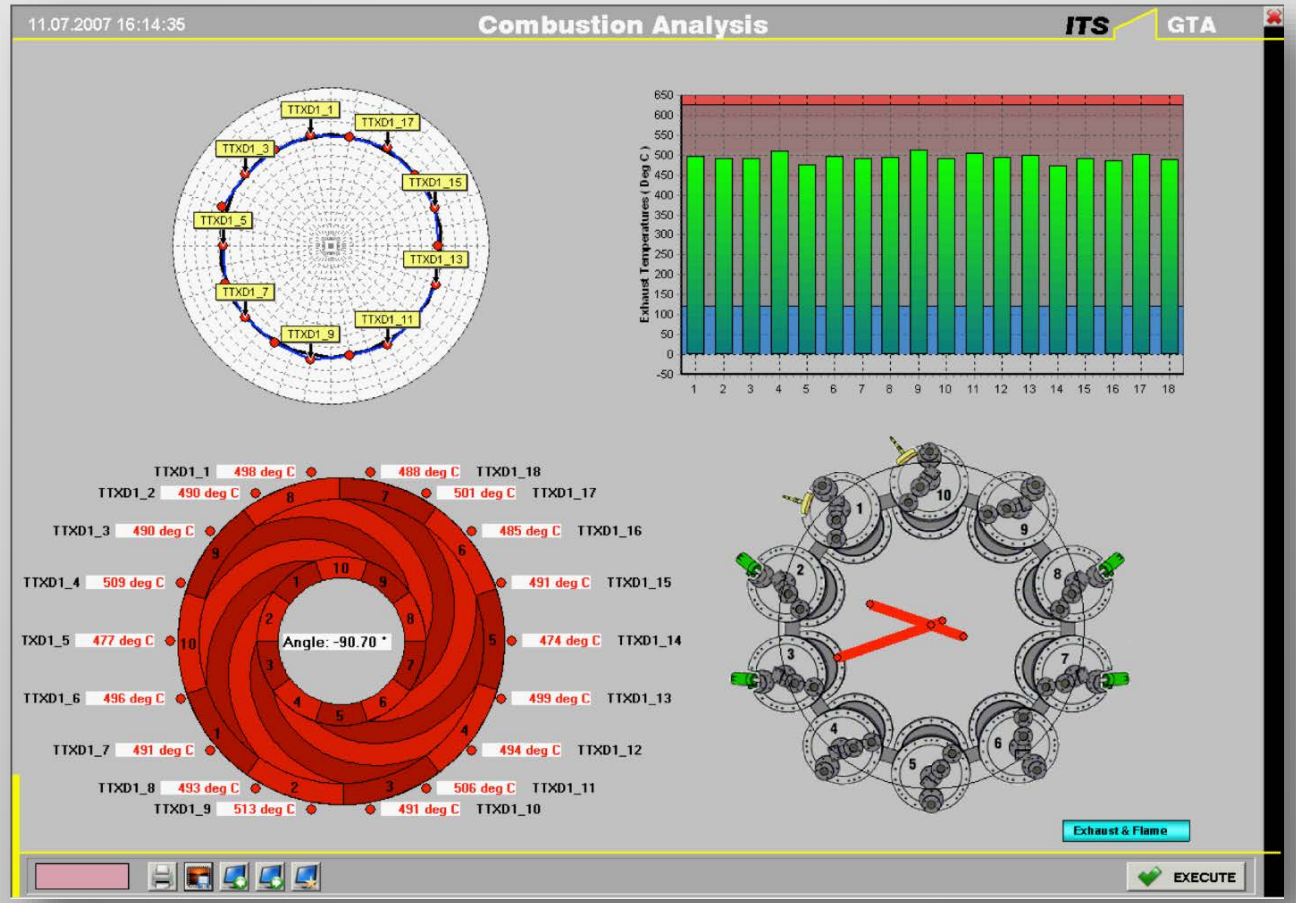
TMOS Gas Turbine HMI



Customized Display

COMBUSTION ANALYSIS MONITORING

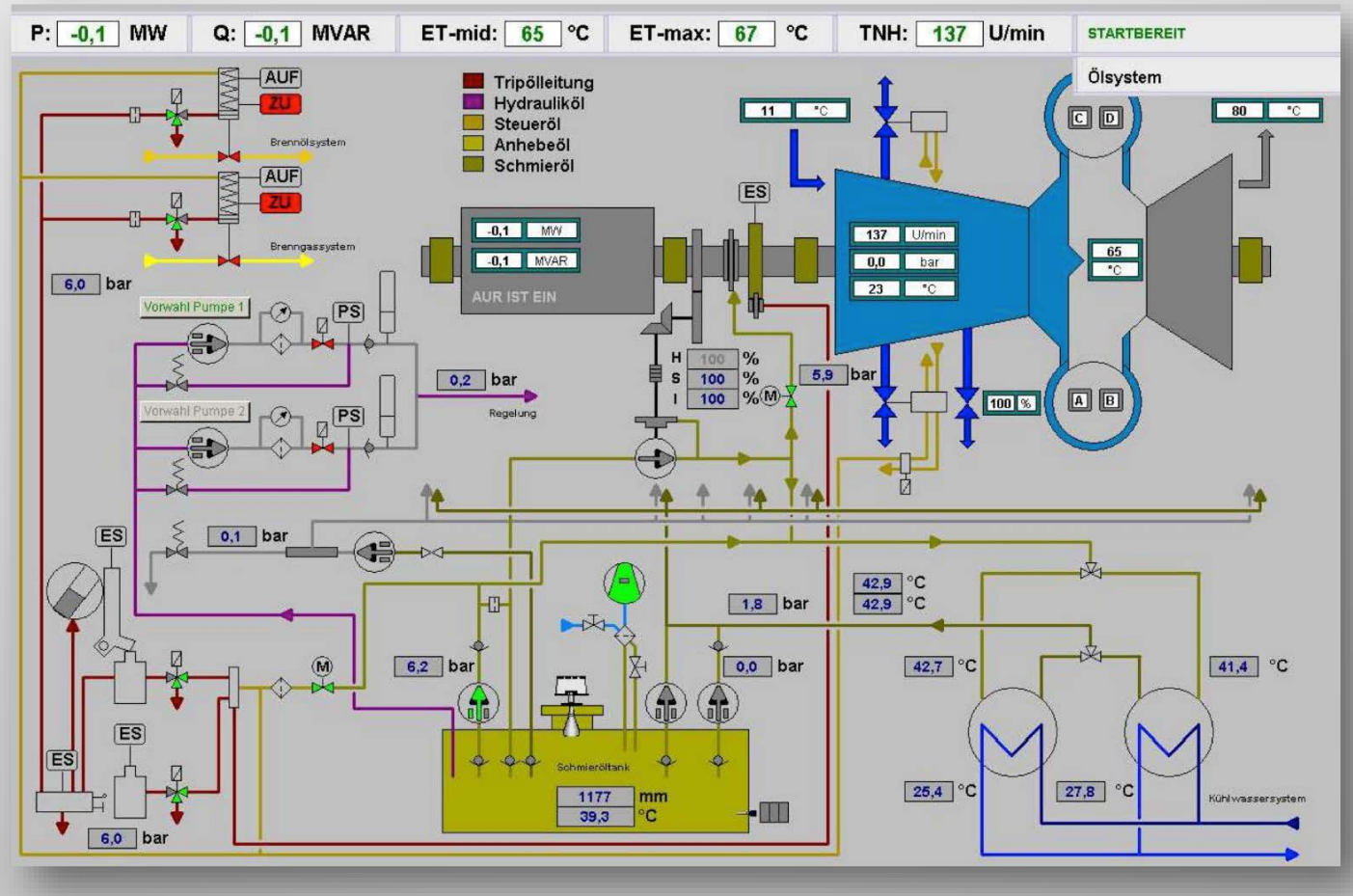
TMOS Gas Turbine HMI



Customized Display

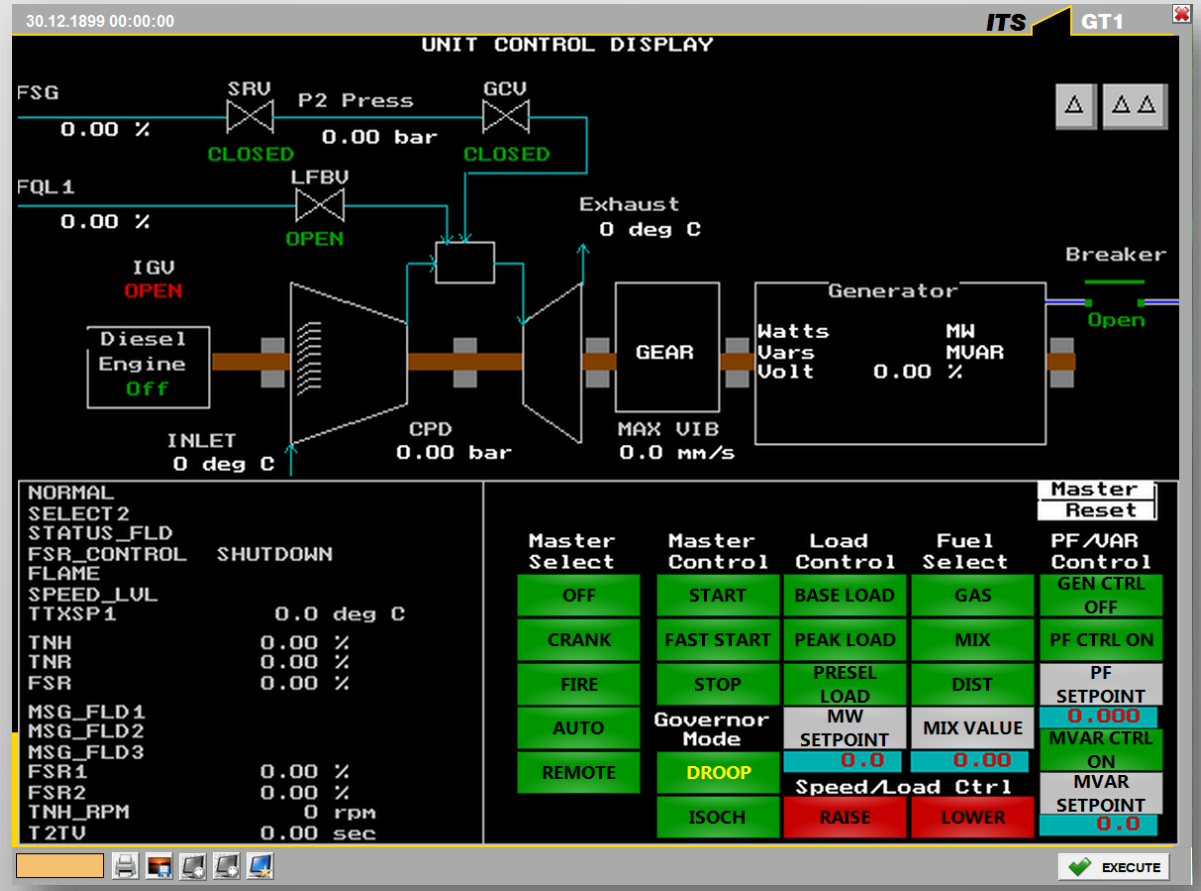
LUBE OIL PID

TMOS Gas Turbine HMI



<I> Display

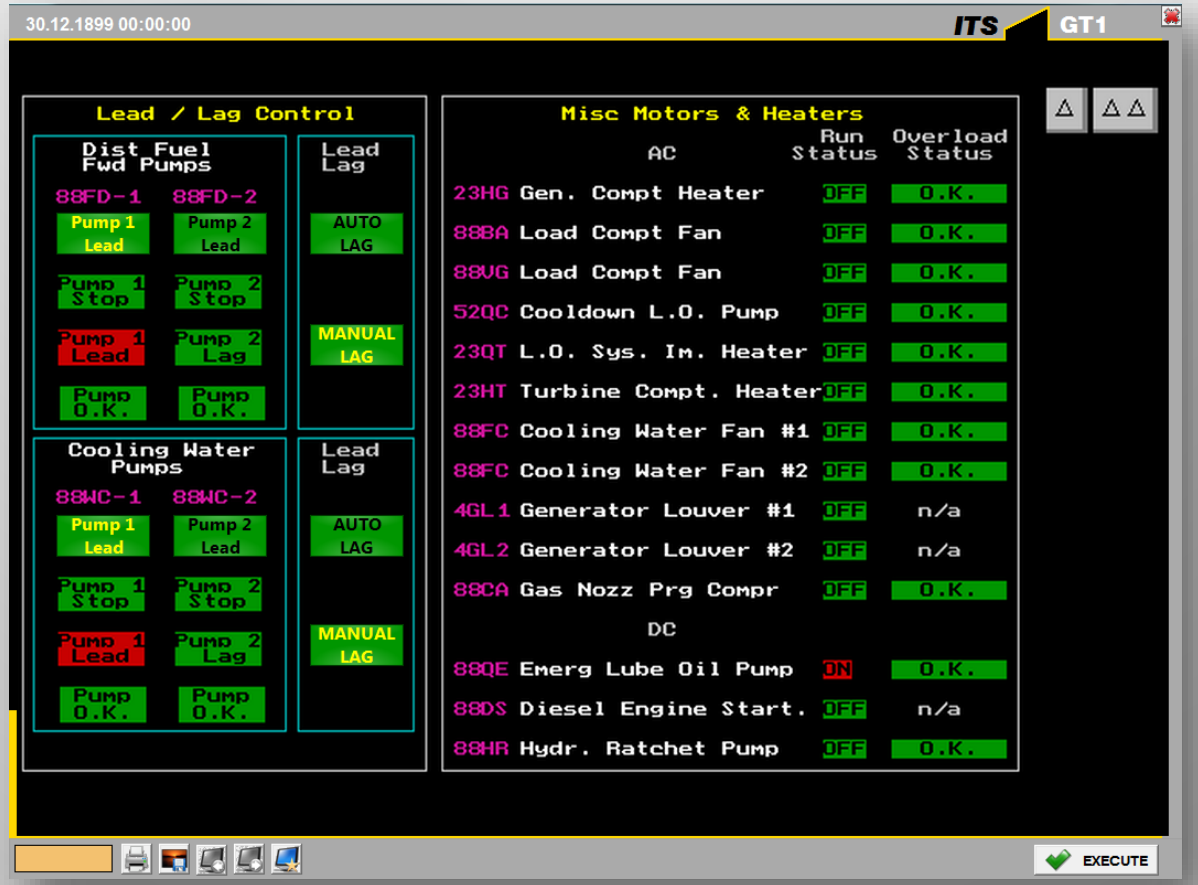
UNIT CONTROL



<I> Display

MOTORS STATUS AND CONTROL

TMOS Gas Turbine HMI



Case Study

TNB PAKA MALAYSIA HMI TO TMOS UPGRADE

TMOS Gas Turbine HMI

Site Information	3 x blocks of 2 GE Frame 9E
Upgrade from	6 HMI Servers + 9 HMI Viewers (total block)
Upgrade to	6 redundant TMOS SCADA Servers with Historian + 9 Clients + new Server Cabinets
Project Execution	Partial Upgrade with HMI and TMOS running parallel for Operators to be familiarized with TMOS for 1 week, then proceed to total replacement. No shutdown caused. Finished in around 2 weeks (including training).

TMOS
Gas Turbine HMI

We know gas turbines.