

AUTOMATION in POL FACILITIES

Sandeep Bhatia
SM(E), WBSO

Terminal Automation System- Automated Control system in Marketing Locations

- To co ordinate the entire operations of Receipt, Storage and Distribution of Terminals for a virtual unmanned fashion.
- The Measurement and Control system needs to take care of product movement, Reconciliation, Invoicing, Loss and Fraud Prevention, Security Access and Safety.
- Consist of various sub systems

Major Sub-systems TAS

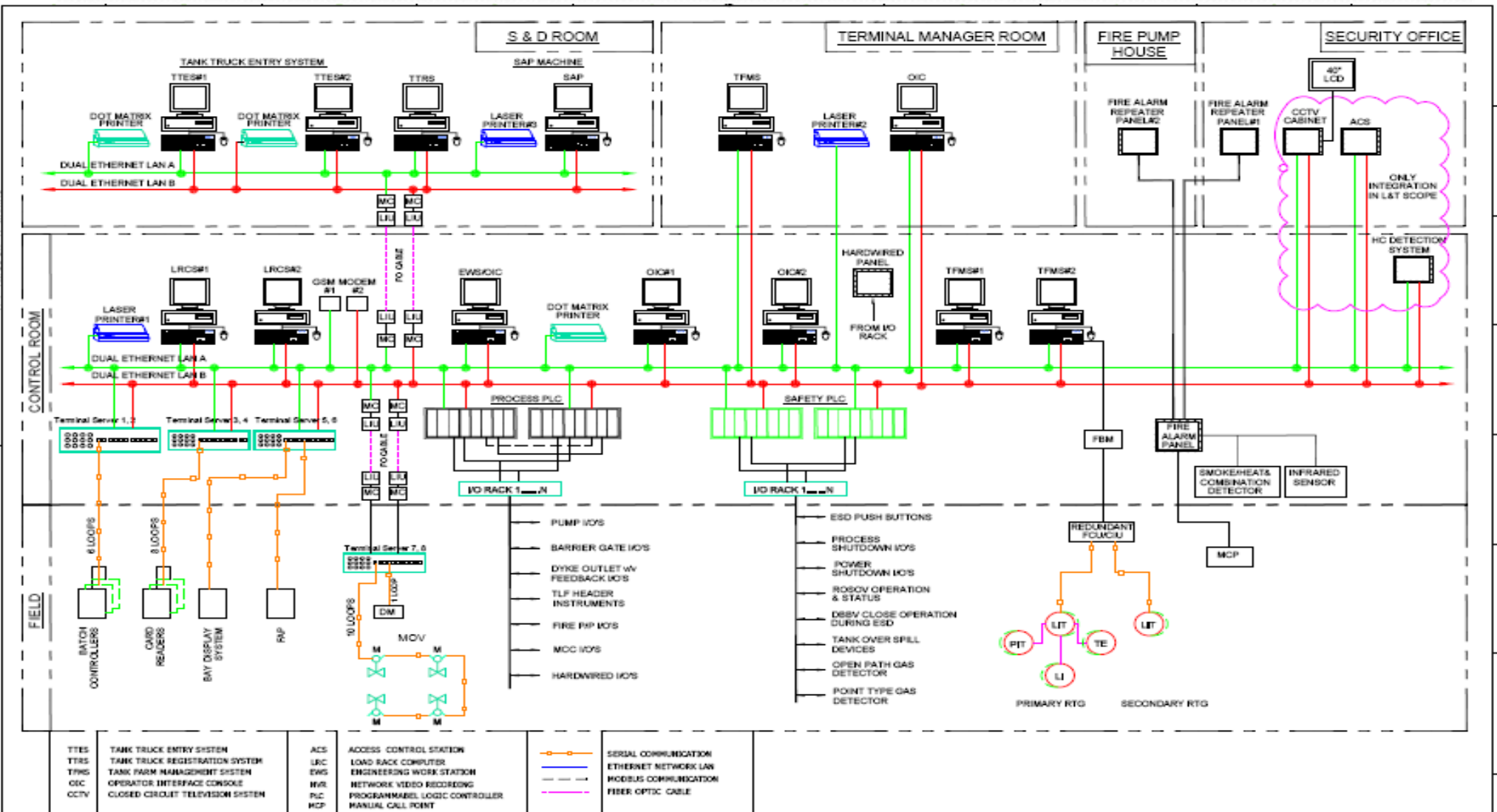
- **GANTRY OPERATIONS (Metering Control)**
- **Load Scheduling , Card attachment**
- **Real time host (SAP) Interface**
- **Pump Control & Monitoring**
- **Tank farm Monitoring system**
- **Control Room**
- **PLC Interface**
- **Safety PLC**
- **Additive dosing/Ethanol blending**
- **Pipeline custody Transfer**
- **Third Party systems Interface**

What makes TAS Different ????????????

- Unlike process manufacturing environments , TAS requires minimal process control, but significant business transactional capabilities.
- However, unlike business environments a hiccup in TAS can have severe consequences to human & environmental safety .

TERMINAL AUTOMATION SYSTEM ARE UNIQUE

TYPICAL TAS SYSTEM ARCHITECTURE



FUNCTIONAL DESIGN REQUIREMENTS (FDR)

TT Reporting & Entry System

- TT Reporting through Card and a card reader at Security Gate
- TT reported shall be queued in SAP if previous load is acknowledged.
- Indent received through SMS and TTs queued in SAP shall be planned through TT Planning & Scheduling Module in SAP
- Once TT is planned it appears as “Registered” in TTES and BQDB
- Every TT to have a permanent Card
- Depending upon the availability of Bay, FAN will be generated automatically and status changes to “Authorized” in BDQB with audio announcement in parking.
- TT moves to Entry barrier gate where it get the FAN and find access into the terminal though permanent card.

Tank Truck Loading System

- SMS INDENTING & ACKNOWLEDGEMENT
- Auto FAN Generation
- Preset Qty to be controlled through Batch Controller
- No Officer Card for Normal Loading
- Auto Invoicing
- MOVs on TLF Header Lines

Tank Wagon Loading System

- Creation of Vehicle in SAP/TWES
- Cluster / Block Loading System
- Single batch Controller for Multiple Tank Wagons
- Provision of Loading of Multiple products at Loading Points
- No Officer Card
- Manual Invoicing

PUMP SEQUENCING

- Auto Start /Stop of Pump – Based on Demand
- Man less Pump-house
- Pump Sequencing based on Pump RUN HOURS

Tank Farm Management System

- All tanks to have SIL certified Primary Radar Gauges for inventory Control
- All tanks to have SIL certified Secondary Radar Gauges for Safety Control
- All tanks to have AOPS for ESD Functions
- First Tank Body valve to be FAIL SAFE ROSOV(Remote Operated Shut Off Valve)
- Second Tank Line valve to be Motorized DBBV

Tank Farm Management System

- All valves to have PUSH BUTTON STATIONS outside DYKE for LOCAL Operation
- ROSOV to have OPEN command only from FIELD
- DBBV to be Remote Operated from Control Room
- Dyke Drain Valves to have Proximity Type Position Sensors
- Water draw off line to have flow switch.
- Tank Sequencing for Receipt & Delivery
- TFMS to have integration with SAP through LRCS

ESD & Safety Interlocks

➤Types

1. Process ESD

- Plant ESD
- Local ESD

2. Power ESD

Both Plant ESD and Power ESD to work in tandem with time lag, however, Local ESD is stand alone

➤**Actuation** through Push Buttons in field/Control Room or Soft switches on OIC.

➤Position of Plant ESD & Power ESD

1. Control Room
2. Each battery of TLF
3. Cabin of location in-charge
4. T/W Gantry (3 nos- 2 at the ends & one in the middle)
5. Security Cabin

ESD & Safety Interlocks

➤ Functions of Process ESD(Plant)

1. Automatic Wailing Siren
2. Stop all Product Pumps irrespective of their mode.
3. Share ESD signal with PLD for closure to their Station Control valve & Delivery Valve followed by closure of ROSOV&DBB on receipt line and custody transfer line.
4. Send ESD signal to Jetty in case of Coastal Locations for closure of Vessel Pump followed closure of ROSOV&DBB on receipt line and valves on jetty manifold.
5. Close ROSOV & DBB on Delivery & recirculation line irrespective of their mode in the field.
6. Opening of Barrier Gates
7. “EMERGENCY” pop-up on all PCs on LAN

➤ Functions of Process ESD(Local)

1. Stop all connected pumps.
2. Close header valves between P/H and TLF or between P/H and Siding as the case may be.
3. Stop all metering equipments at TLF or TWG as the case may be.

ESD & Safety Interlocks

➤ **Functions of Power ESD:** Cut off power supply to all except following.

1. Siren.
2. Bore well
3. DG Room, PMCC & Fire P/H.
4. CCTV
5. Security Cabin
6. 2-3 High Mast Tower in Hazardous & Non Hazardous area
7. Control Room
8. MOVs on Foam Pourer and Sprinkler Line , if provided.

Tank level Alarms

➤ Level Alarm through Radar Gauges:

Operator Hi Level - Safe Filling Capacity - Qty. corresponding to 15 minute of pumping at max. flow rate.

- flow would be diverted to sequenced tank followed by closure of DBB and then ROSV of the first tank

Hi-Hi level - Safe Filling Capacity - Qty. corresponding to 10 minute of pumping at max. flow rate

- Audio-Visual Alarm on Alarm Annunciation Panel and OIC

- Distress signal to Pipelines/Refinery to close their isolation valve and close feedback to come to Mktg. PLC through their PLC.

- On getting close feedback of isolation valve, DBB & ROSOV shall close simultaneously

- In case close feedback is not received in 150 sec from PLD/Ref., system would close DBB on custody transfer point, if provided.

-On getting close feedback from DBB, system would close ROSOV and DBB simultaneously

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- - In case close feedback is not received within 150 seconds from custody transfer DBB, system would close tank DBB followed by ROSOV with time gap of 60 sec.

Tank level Alarms

➤ Level Alarm through AOPS:

Hi-Hi-Hi Level - Equal to Safe Filling Height.

- Audio-Visual alarm on OIC indicating tank number and product.

- Distress signal to Pipelines/Refinery to close their isolation valve and valve close feedback to come to Mktg. PLC through their PLC

- In case close feedback is not received from isolation valve, simultaneous closure of ROSOV & DBB for both Inlet & Outlet through Safety PLC and close feedback of DBB/ROSOV to come to PLC.

- In case close feedback is not received either from DBB or ROSOV, ESD will be activated.

- Auto SMS to Location In-charge & State Operations Head.

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THIRD PARTY SUB SYSTEMS

- **CCTV SYSTEM**
- **RIM SEAL FIRE PROTECTION SYSTEM**
- **DYKE VALVE POSITION INDICATOR**
- **HYDROCARBON DETECTION SYSTEM**
- **UPS STATUS**
- **DG STATUS**
- **BOREWELL STATUS**
- **FIRE ENGINE STATUS**

FUTURE REQUIREMENTS

- **MOV /DBBV IN PH MANIFOLD**
- **DYKE VALVE MOVs**
- **MOVs in Sprinkler / Form Pourer**
- **MOVs in Water Draw Off Line**
- **Remote Start/ stop OF Fire Engines from Control Room**
- **Integration of Mass Flow Meter with SAP**



THANK YOU