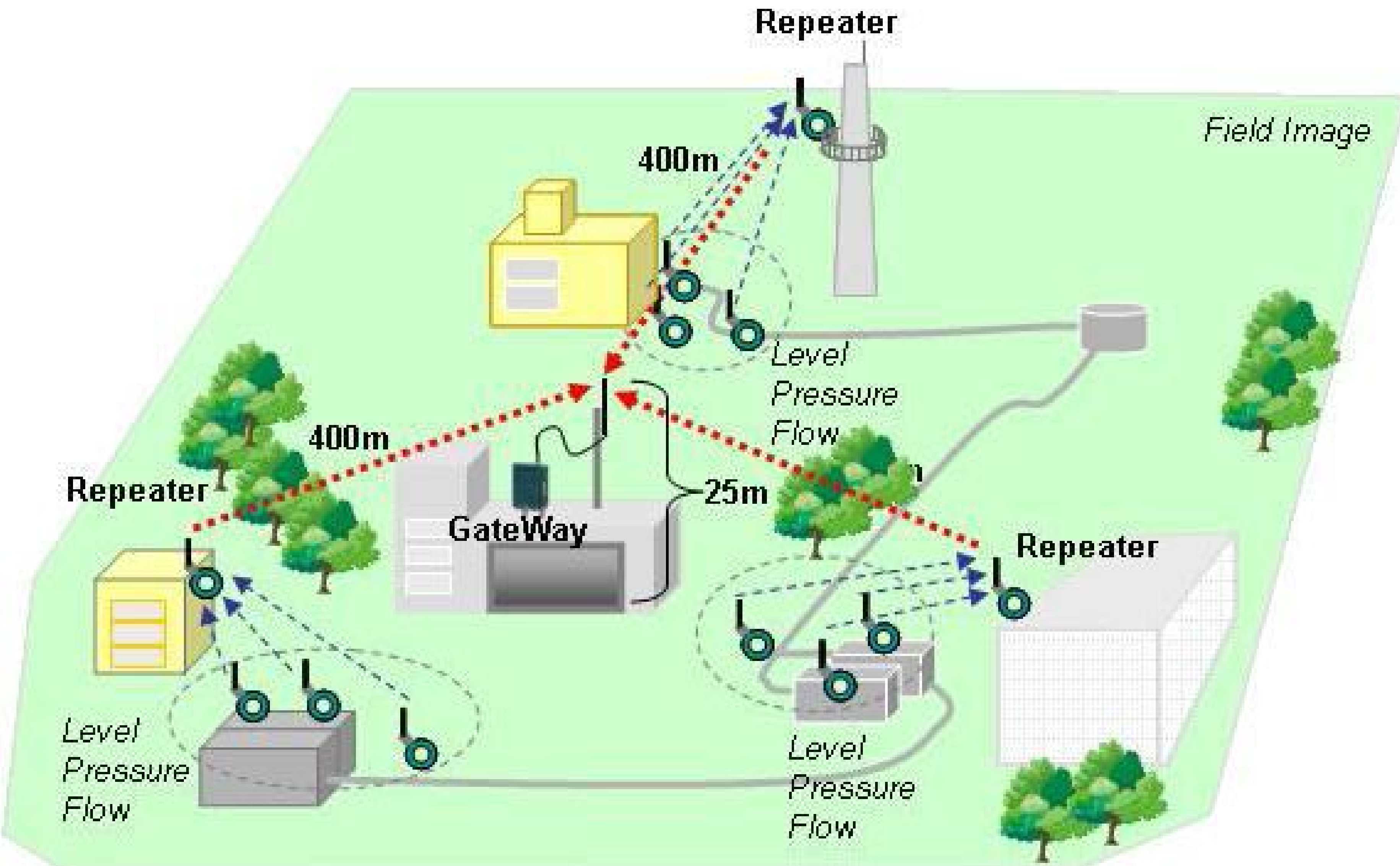
Utilities Management Project – Paper plant

- Challenges
  - Two / Three measurement point per measurement zone
  - Four measurement zones about 400 meters apart
  - Cable laying is costly and tedious for just two / three measurement at 400 meters apart
  - Measurement point almost at ground level
  - Lot of trees in the plant in between the measurement zones

Utilities Management Project

- Field Wireless Solution proposed
  - EJX110 – 8 Nos (5 on level and 3 on flow)
  - EJX530 – 2 Nos
  - Field Wireless gateway (positioned over water tank)
  - EJX110 – 3 Nos used as repeater (positioned suitably)
  - Orifice plates for flow measurement

Plant layout and our solution

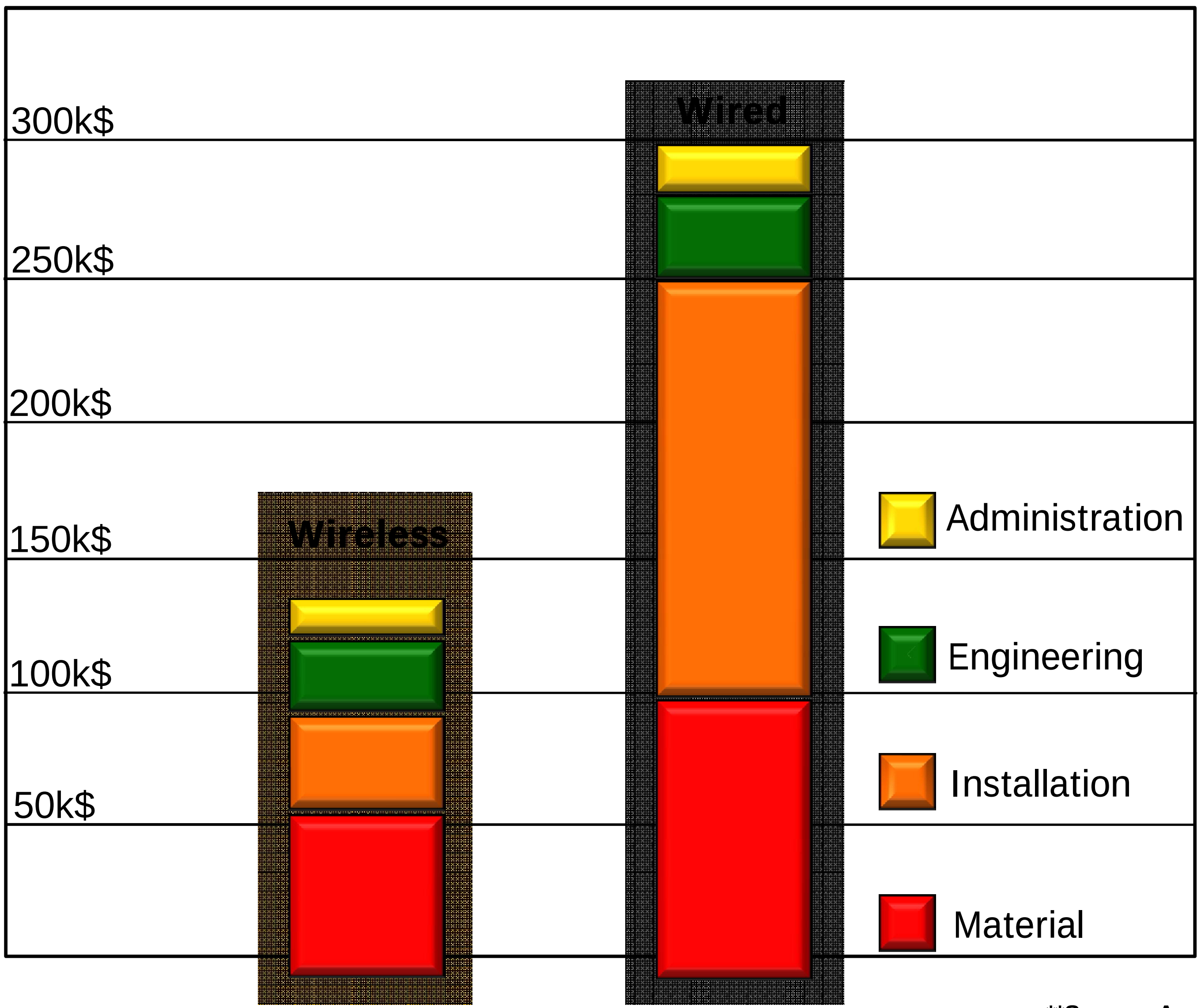


Utilities Management Project

- Customer Benefit
  - Avoided cable laying covering over 1600 meters
  - Less modification work
  - Flexible to add more measuring points at later date
  - Once connected to their PLC they can automate the oil transfer and also do better inventory management

Order received and under execution

Cost comparision



**Source: Apprion survey "Wireless Economics"

More information at http://www.field-wireless.com

ignment of EPC companies Advancement in Foundation Fieldbus Technology

26-Sep-2

Abstract

This presentation will focus on utilization of advancement in Foundation Fieldbus technology by EPC companies

What is Fieldbus?

A Fieldbus is a digital, two-way, multi-drop communication link among intelligent measurement and control devices. It serves as a Local Area Network (LAN) for advanced process control, remote input/output and high-speed factory automation applications.

Current Advancement

esignMATE

lectronic Device Descriptor anguage (EDDL)

igh Speed Ethernet (HSE)

irtual Marshalling with Fieldbus

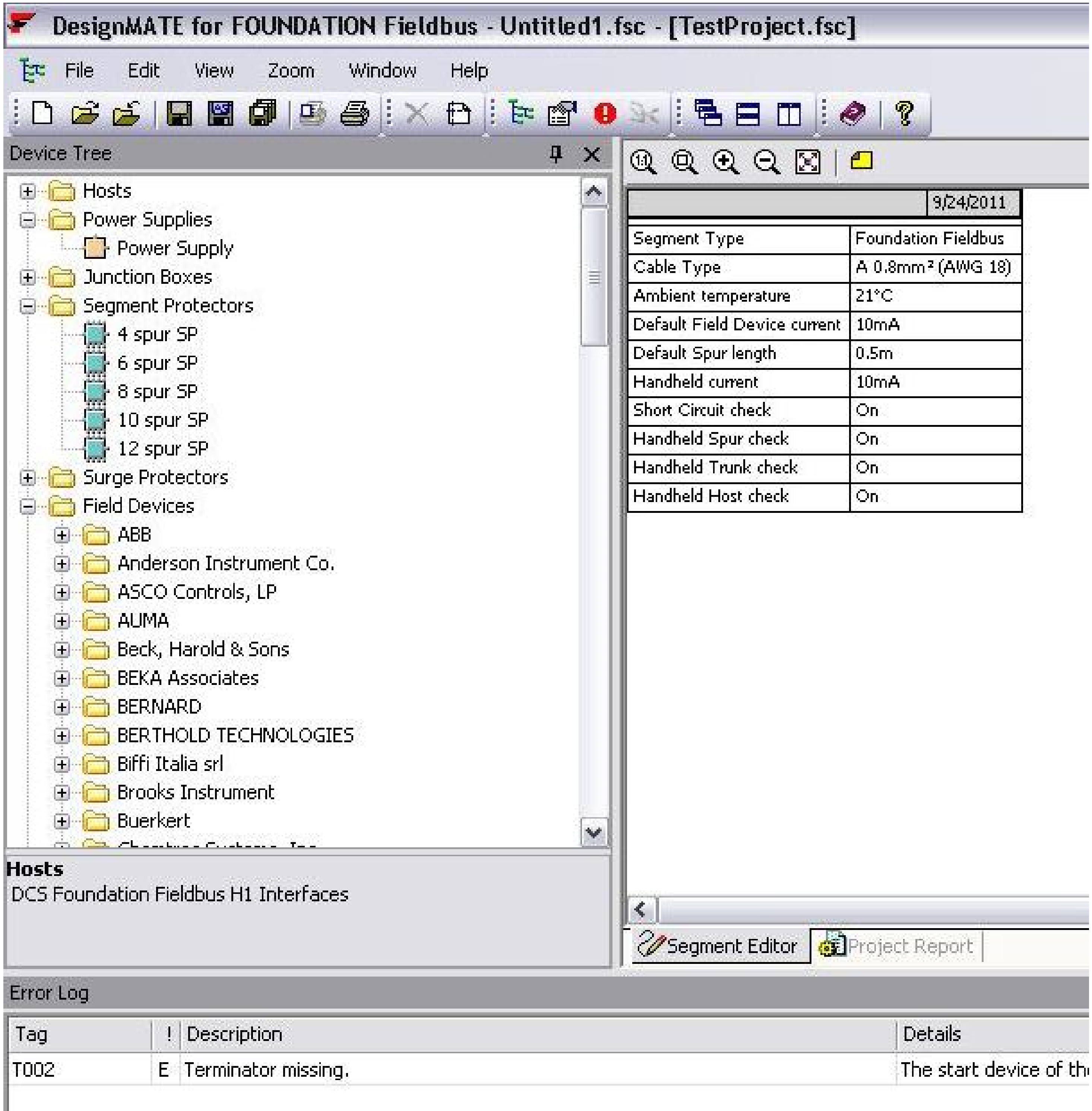
DesignMATE

What is DesignMATE?

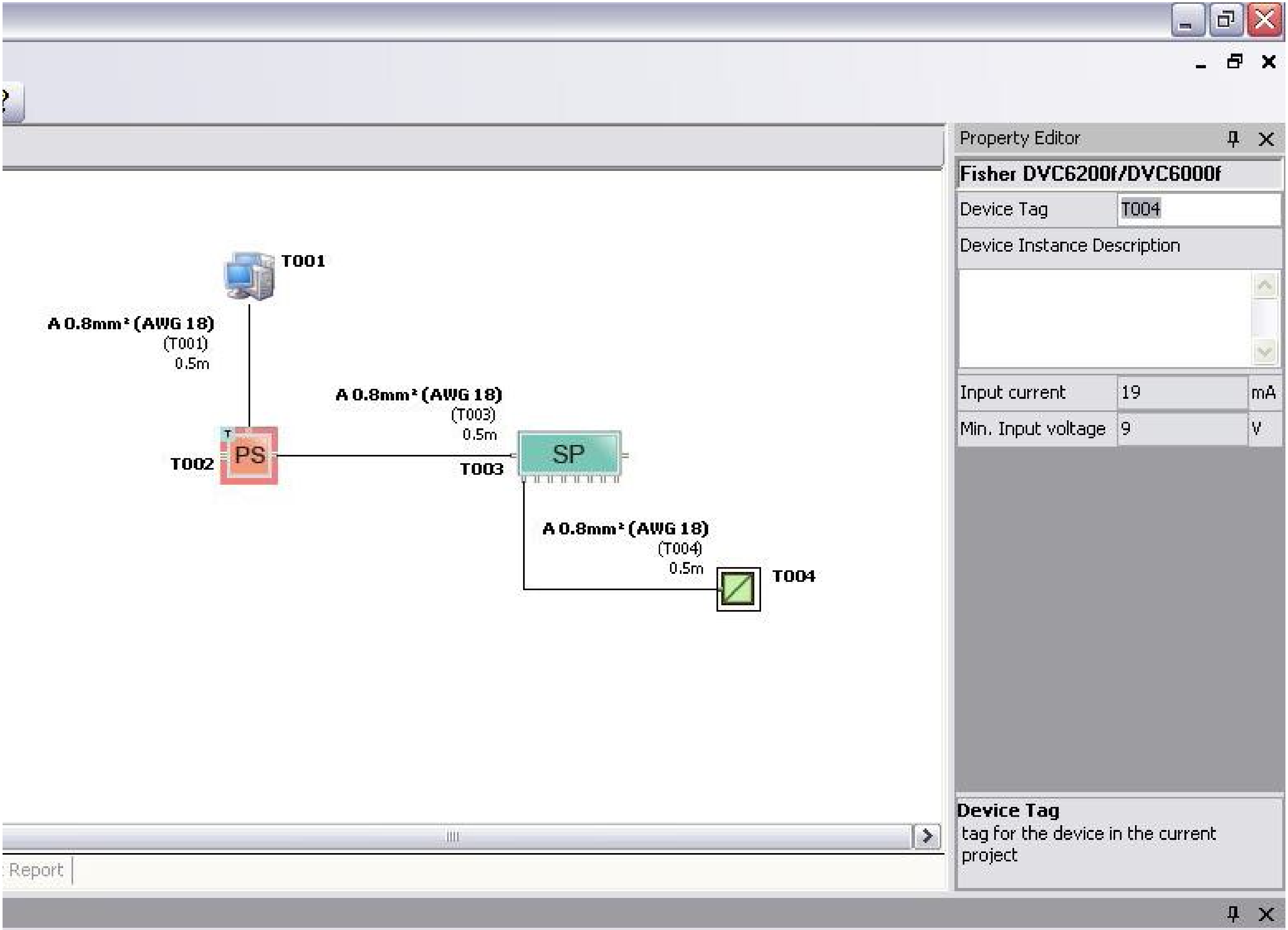
Features and advantages of implementing DesignMATE

- User Friendly
- Report Generation
- Parameter Testing

Example


DesignMATE for FOUNDATION Fieldbus - Untitled1.fsc - [TestProject.fsc]
File Edit View Zoom Window Help
Device Tree
Hosts
Power Supplies
Power Supply
Junction Boxes
Segment Protectors
4 spur SP
6 spur SP
8 spur SP
10 spur SP
12 spur SP
Surge Protectors
Field Devices
ABB
Anderson Instrument Co.
ASCO Controls, LP
AUMA
Beck, Harold & Sons
BEKA Associates
BERNARD
BERTHOLD TECHNOLOGIES
Biffi Italia srl
Brooks Instrument
Buerkert
Hosts
DCS Foundation Fieldbus H1 Interfaces
9/24/2011
Segment Type | Foundation Fieldbus
Cable Type | A 0.8mm² (AWG 18)
Ambient temperature | 21°C
Default Field Device current | 10mA
Default Spur length | 0.5m
Handheld current | 10mA
Short Circuit check | On
Handheld Spur check | On
Handheld Trunk check | On
Handheld Host check | On
Segment Editor
Project Report
Error Log
Tag | ! | Description | Details
T002 | E | Terminator missing. | The start device of th

Example



T001
A 0.8mm² (AWG 18)
(T001)
0.5m
PS
T002
A 0.8mm² (AWG 18)
(T003)
0.5m
SP
T003
A 0.8mm² (AWG 18)
(T004)
0.5m
T004
Property Editor
Fisher DVC6200f/DVC6000f
Device Tag
T004
Device Instance Description
Input current
19
mA
Min. Input voltage
9
V
Device Tag
tag for the device in the current project
Report

Example

Untitled1.fsc - [TestProject.fsc*]

wer Distribution Check

	Current [mA]		Voltage [V]		
	must	is	must	is	Result
1	10.0	10.0	9.000	24.000	success
2	28.0	38.0	9.381	24.000	success
2:Output	28.0	28.0	9.381	24.000	
2:Master Con.	10.0	10.0	9.000	24.000	
3	28.0	28.0	9.380	23.999	success
3:Spur 1	19.0	19.0	9.000	23.605	
4	19.0	19.0	9.000	23.605	success

mary:
imum applied voltage level for a device: 23.605V

ort Circuit Check

	Current [mA]		Voltage [V]		
	must	is	must	is	Result
1	10.0	10.0	9.000	24.000	success
2	28.0	95.0	9.381	24.000	success
2:Output	28.0	85.0	9.381	24.000	
2:Master Con.	10.0	10.0	9.000	24.000	
3	28.0	85.0	9.380	23.998	success
3:Spur 1	19.0	19.0	9.000	23.604	
4	19.0	19.0	9.000	23.604	success

Property Edi
8 spur SP
Number of sp
Min. Input vo
Max. Curren
Internal curr
Series Resist
Short circuit
Series Resist
Terminat

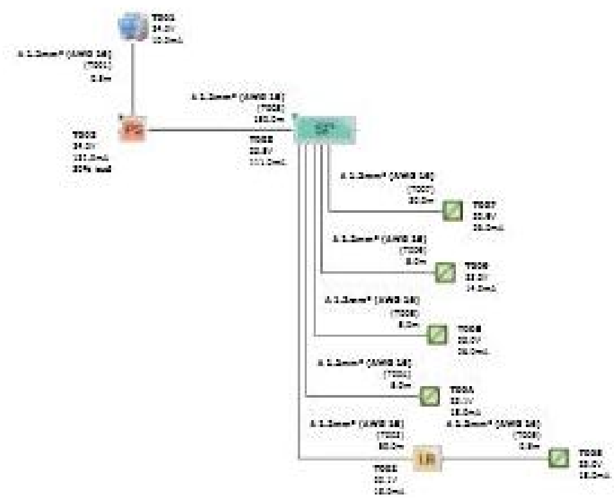
Segment Editor | Project Report

Details

Sample Report Example

DesignMATE for FOUNDATION Fieldbus

	9/9/2011
Segment Type	Foundation Fieldbus
Cable Type	A 1.2mm² (AWG 16)
Ambient temperature	21°C
Default Field Device current	10mA
Default Spur length	5.0m
Handheld current	10mA
Short Circuit check	On
Handheld Spur check	On
Handheld Trunk check	On
Handheld Host check	On



Project Parameters

Segment Type = Foundation Fieldbus
Cable Type = A 1.2mm² (AWG 16)
Ambient temperature = 21°C
Default Field Device current = 10mA
Default Spur length = 5.0m
Handheld current = 10mA
Short Circuit check = On
Handheld Spur check = On
Handheld Trunk check = On
Handheld Host check = On

Checker Results

Checker Summary	
Topology Check	success
Power Distribution Check	success
Short Circuit Check	success
Handheld Communication Check	success
Handheld Host Check	success
Handheld Spur Check	success
Handheld Trunk Check	success

Device Summary

Devices	
3051 Fieldbus Pressure Transmitter (Rev.07)	1
8 spur SP	1
8742 Fieldbus Magnetic Flow Transmitter (Rev.04)	1

EDDL

What is Device Descriptor ?

“ A clear and unambiguous, structured text description that precisely describes field device dat to host system”

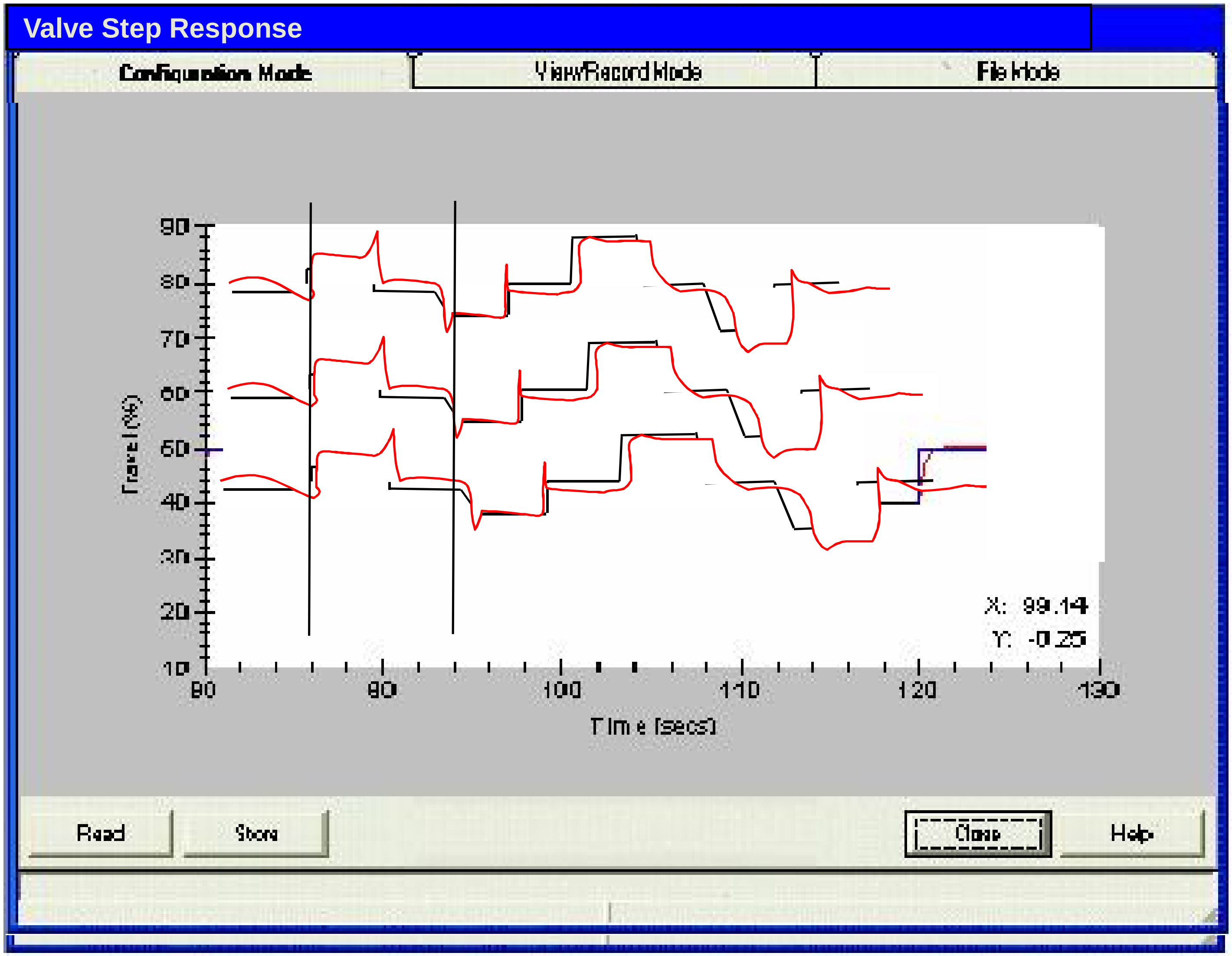
What is Electronic Device Descriptor Language?

" The international standard for developing electronic device descriptions (EDDs) according to IEC61804-2"

EDD is an extended description of the data, user interface and communication in a device which is used by PC applications and handhelds for engineering, commissioning, monitoring, operation and diagnostics

LDDL Visualization Example

RT is used to
nt the real-
continuous)
values



EDDL

Features/Benefits

- System Independent (Including OS)
- Open and Interoperable
- A single EDD for all hosts
- Testing and Registration
- Reduction in commissioning time
- Compact and bundled file for easy download

WIO & HSE

- High Speed Ethernet
- In April 2011 Foundation Fieldbus announced that wireless and remote I/O will enable the utilization of an open, interoperable Fieldbus automation infrastructure incorporating both Foundation Fieldbus High Speed Ethernet (HSE) and industrial wireless applications.

Virtual Marshalling

Signals are brought into control strategy using only software.

Drastically reduces system foot print as marshalling cabinet are eliminated.

Little or no engineering cost to add additional signals

Future Roadmap

Foundation Fieldbus Safety Instrumented Functions (FF-SIF

IEC to adopt EDDL Technology for IEC61804-3

SUMMARY

Advancement like EDDL, DesignMATE will significantly help EPC companies to promote the use of Foundation Fieldbus technology on their projects. It will help EPC companies to be more cost competitive in all the phases of EPC projects and win customer satisfaction and confidence.

RESOURCES

www.fieldbus.org

www.eddl.org

Thank You!

QUESTIONS???

Thermo Fisher
SCIENTIFIC

Combining EFM and Controls

Matthew A. Diese
Oil & Gas Business Development Manager
Thermo Fisher Scientific
Sugar Land, Texas

Combining EFM and Control

- Introduction
  - History and Evolution of Control in Oil & Gas
- Control Algorithms
  - Traditional PID Algorithm VS Velocity Equation
  - Tuning PID Loops
  - Failure Modes
- Integration of Controls with other Production and Transmission Algorithms
- Conclusions

History and Evolution of Pipeline Control

- Pneumatic Implementation of PID Loop
  - Mainly Pressure Control
  - Very Labor Intensive

- Introduction of Modern Electronics
  - Allowed for Automatic Setpoint Adjustments
  - Still required local intervention – expensive, time intensive
  - Flow Control required two devices
    - One Device for Flow Measurement
    - One Device for PID Control

- Addition of Remote Communications
  - Provided Remote Setpoint Downloads
    - Unreliable Comm's Required two step process (Arm and Execute)

Control Algorithms

- PID is an acronym for Proportional-Integral-Derivative. This refers to a three term equation that calculates a Percent Output (m_i) based on a measured Process Variable (PV), a user desired Set Point (SP), a Gain (K_c), an Integral (K_I), and a Derivative (K_D).

$$m_i = K_c [1 + \frac{K_D}{T}] e_i - [\frac{K_c K_D}{T}] e_{i-1} + [T K_c K_I] S i$$

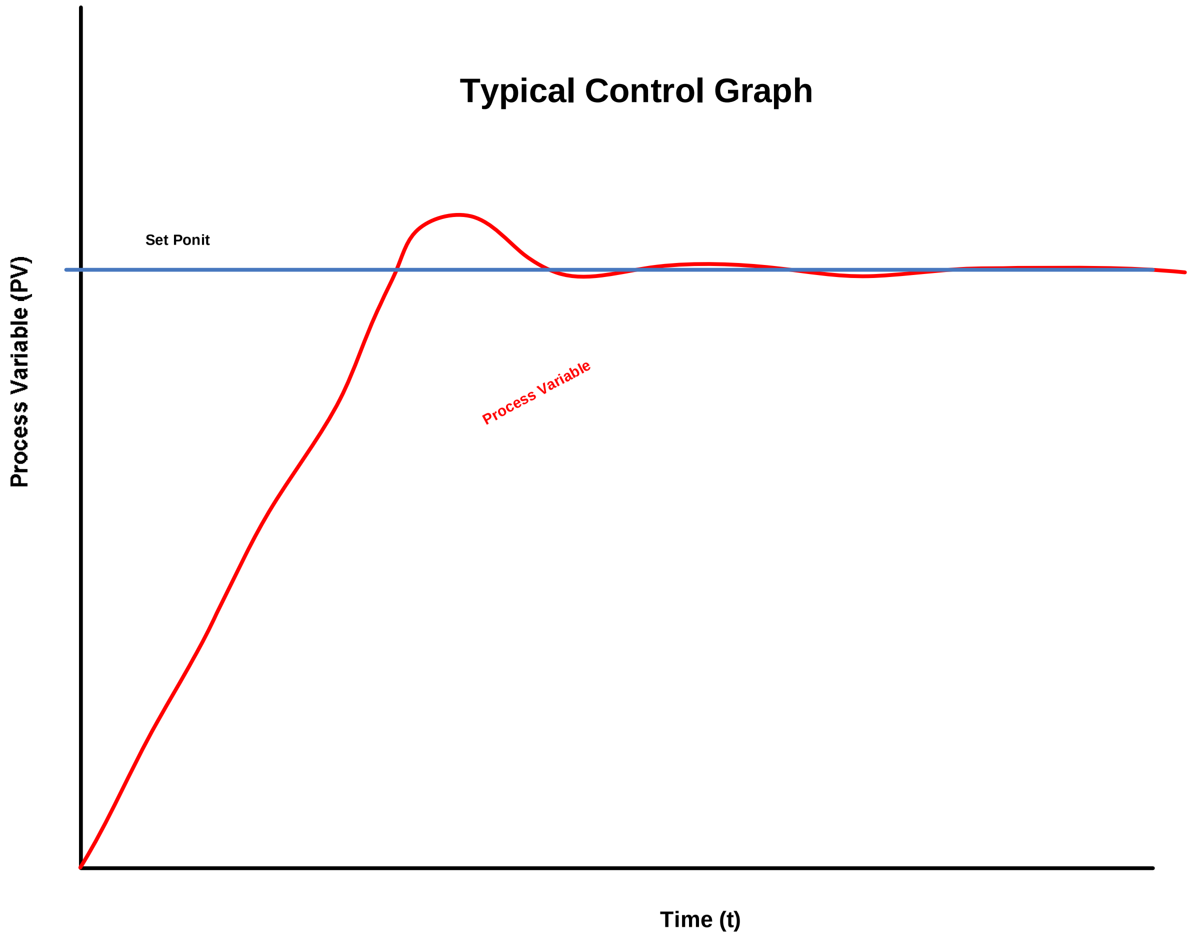
$$S_i = \sum_{j=1}^{i} e_j$$

Where:

m_i = % Output
K_c = Gain
K_I = Integral
K_D = Derivative
T = Sampling Interval
e_j = Error (Setpoint – Process Variable) at time j

- 4-20ma Loop Updated Continuously
- Requires on average 12ma continuous current draw

Control Algorithms



Control Algorithms

- Velocity Equation[1]:

$$\Delta m = K_C [1 + TK_I + \frac{K_D}{T}] e_i - K_C [1 + \frac{2K_D}{T}] e_{i-1} + [\frac{K_C K_D}{T}] e_{i-2}$$

Where:

Δm = Change in Output
K_c = Gain
K_I = Integral
K_D = Derivative
T = Sampling Interval
e_i = Current Error (Setpoint – Process Variable)
e_{i-1} = Previous Error
e_{i-2} = Error 2 cycles back

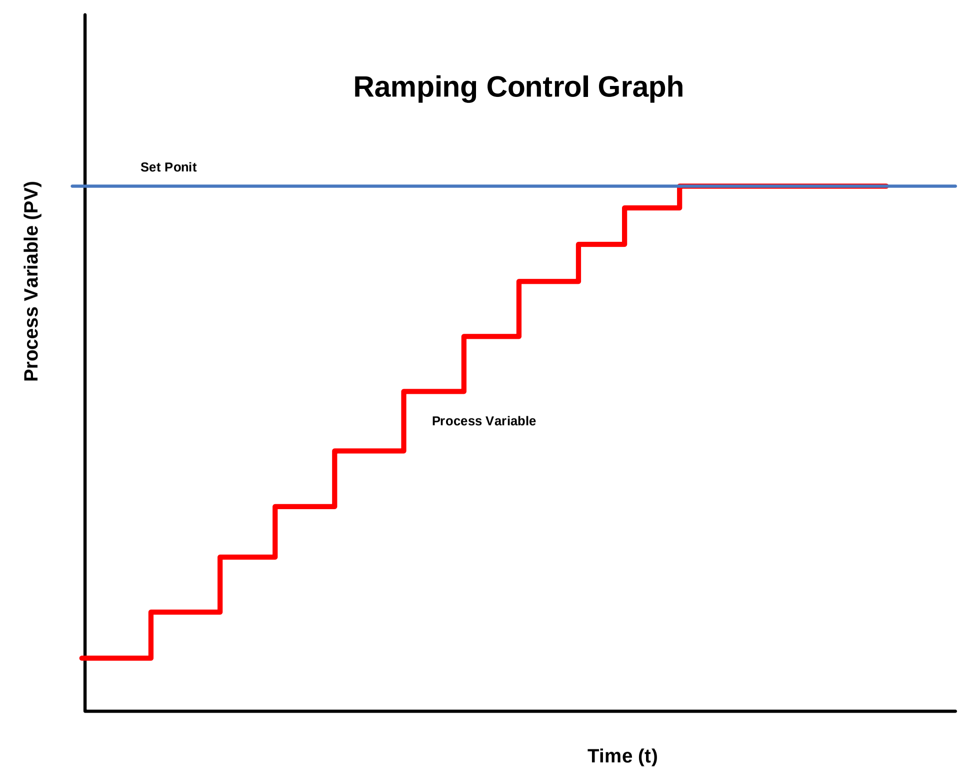
- Calculates Change in Output
- Facilitates Raise/Lower (Jog) Control
- Requires Less Power

Reference:

1. Real-time computing: With applications to data acquisition and control (Van Nostrand Reinhold) Edited by Duncan A. Mellichamp Copyright 1983

Control Algorithms

- Mitigating Oscillation
  - Imposing a Max Output Change
  - Providing Setpoint Ramping
  - Fail Modes
    - Fail Open
    - Fail Close
    - Fail Fix



ThermoFisher SCIENTIFIC

Benefits of Combing EFM and Controls

- Electronic Flow Measurement (EFM)
  - Widespread Acceptance beginning mid-1980's
  - Required for Accurate Flow Measurement
  - Required for Custody Transfer beginning early 1990's
  - Low Power Electronics allows for Solar Powered Autonomous Operation
- Eliminates need for 2nd Electronic Device
- Eliminates connection between the two devices
- Can be combined with other flow measurement algorithms
  - Nominations
  - Plunger Lift
  - Meter Run Staging
  - Cascade Multi-PID Control
    - Flow Control
    - Pressure Overrides
    - Meter Run Protection

Combining EFM and Control

Combining EFM and Control

Conclusions

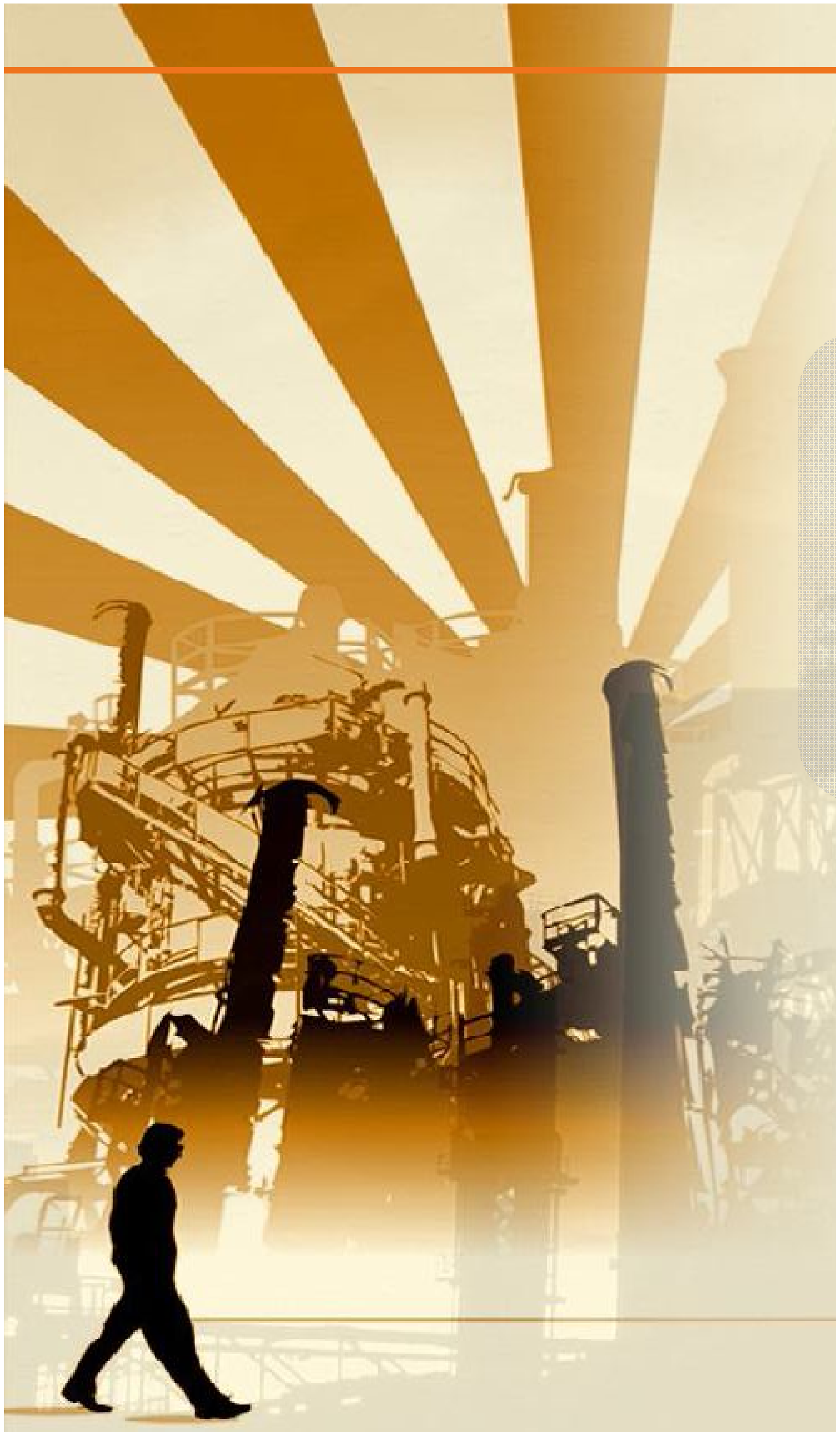
- Combination of EFM and Control Gains Efficiencies
  - Initial Cost
  - Maintenance
  - Trouble-Shooting
  - Makes existing EFM Algorithms much more Powerful
    - Nominations
    - Plungerlift
    - Meter Staging

Q&A

Thank you for your time.

Any questions?

ThermoFisher SCIENTIFIC



IOCL SAP Integration with Panipat Naphtha Cracker Terminal Automation System

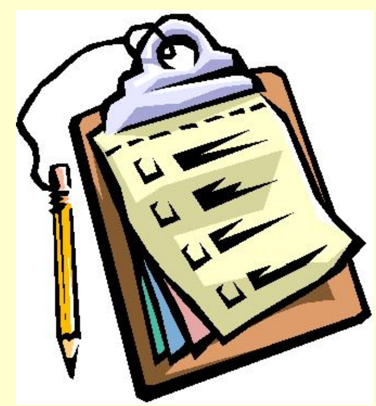
A Case Study

ISA - Delhi

26th September 2011

Agenda

- IOC's Glycol Perspective
- Panipat Naphtha Cracker
- Terminal Automation System – Process Introduction
- Terminal Automation System – System Configuration
- Challenges in Design & Implementation at PNC Gantry Area
- SAP LRC Interface Services
- Methodology of Implementation
- Learning, Benefit & Success Story
- Road Ahead – Plans for Future at PNC Gantry Area

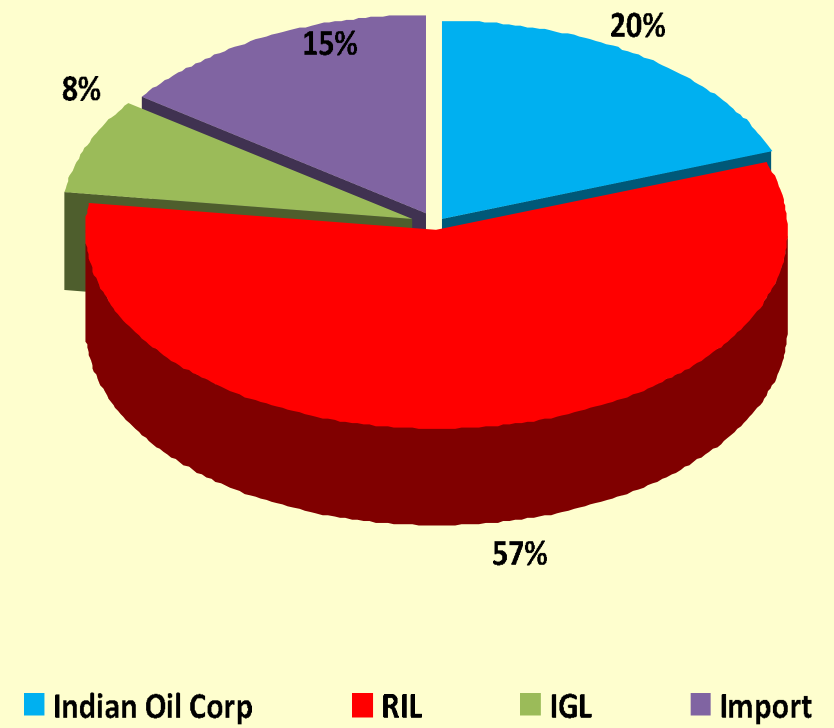


Indian Oil's Glycol Perspective

Performance 2010 - 11

- Total Sales :- 151.1 MT
- Domestic Sales :- 146.0 MT
- Export Sales :- 5.1 MT
  - DEG Exports to Belgium, China & Italy
  - TEG Exports to USA

MEG Market Share 2010-11



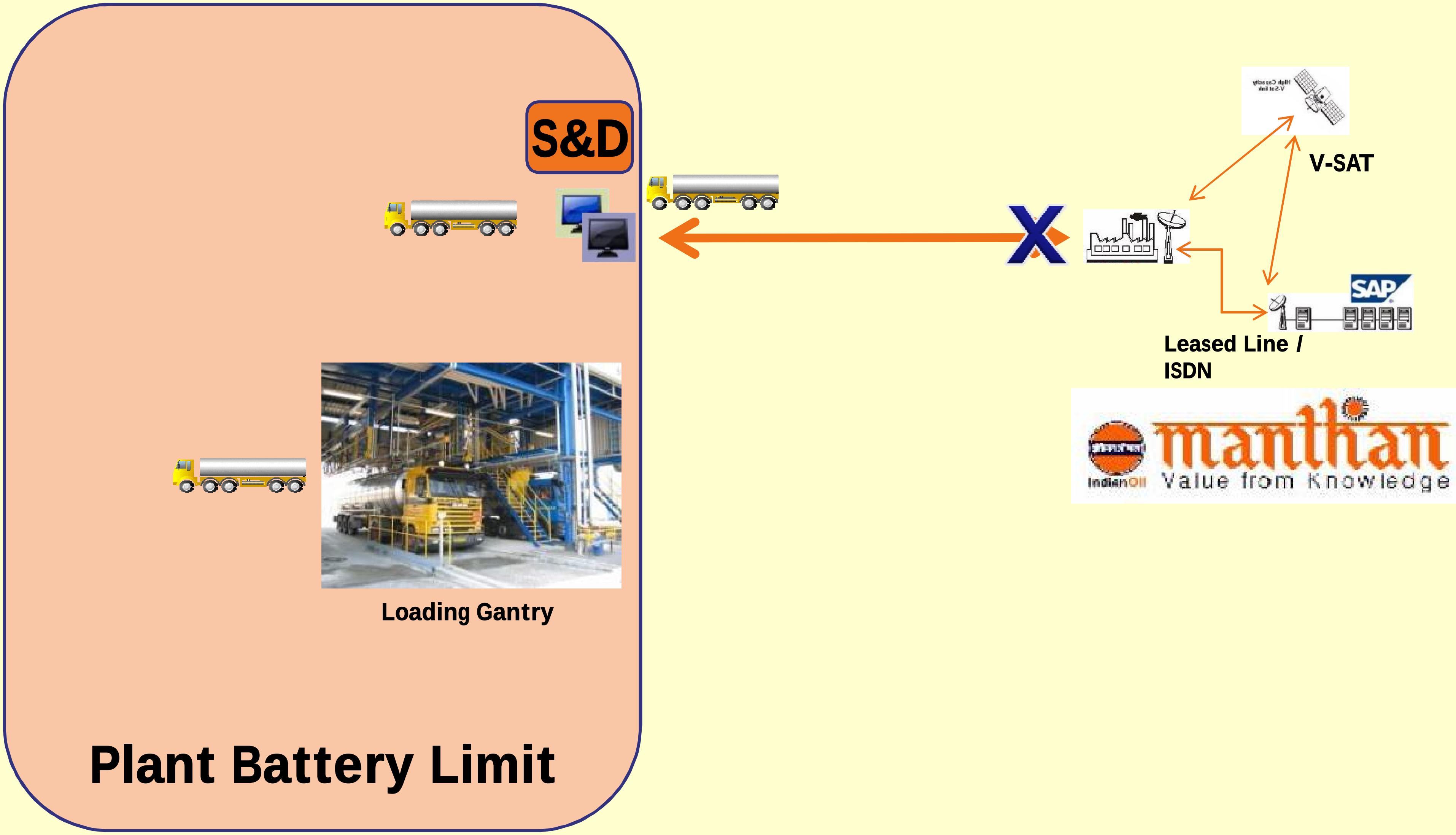
IOC Glycol Capacity : 325KT

Panipat Naphtha Cracker Complex

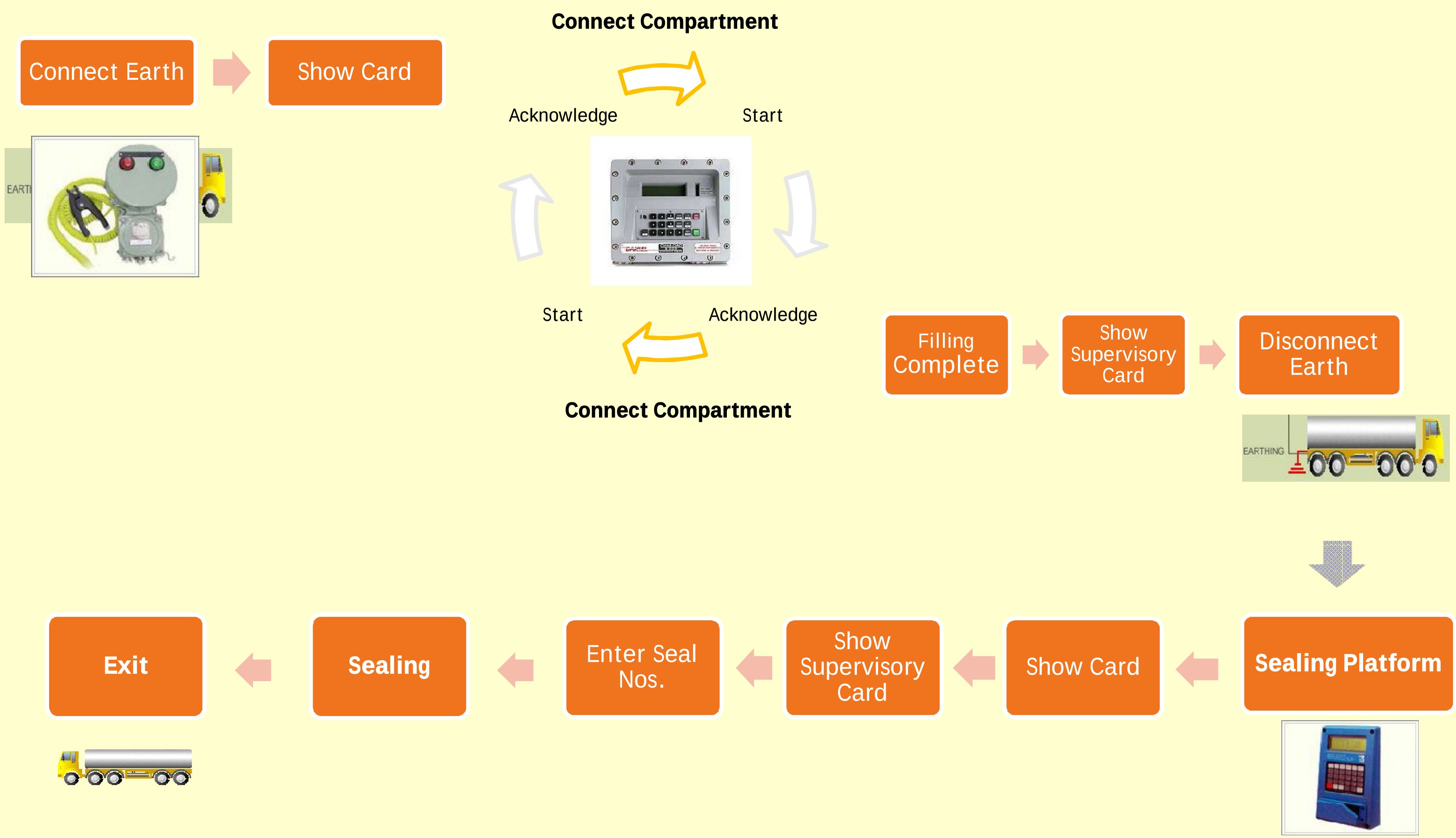
PRODUCT OUTPUT	'000 TPA
LLDPE/HDPE	650
PP	600
MEG	300
LPG	140
BENZENE	125
DEG	21
PYROLYSIS GASOLINE & C9+	320
PYROLYSIS TAR (CBFS)	90

UNIT	CAPACITY (MMTPA)
NAPHTHA CRACKER UNIT	0.8 (ETHYLENE)
LLDPE/HDPE SWING UNIT	0.35
POLYPROPYLENE UNIT	0.6
HDPE UNIT	0.3
MEG UNIT	0.3

Typical Movement of TT at Installations



Typical Sequence of Operation at Bay



PNC Loading Gantry

IndianOil

Station 4

- MEG
- MEG
- MEG
- MEG
- MEG
- DEG/TEG
- CBFS
- CBFS

Top Loading

Station 3

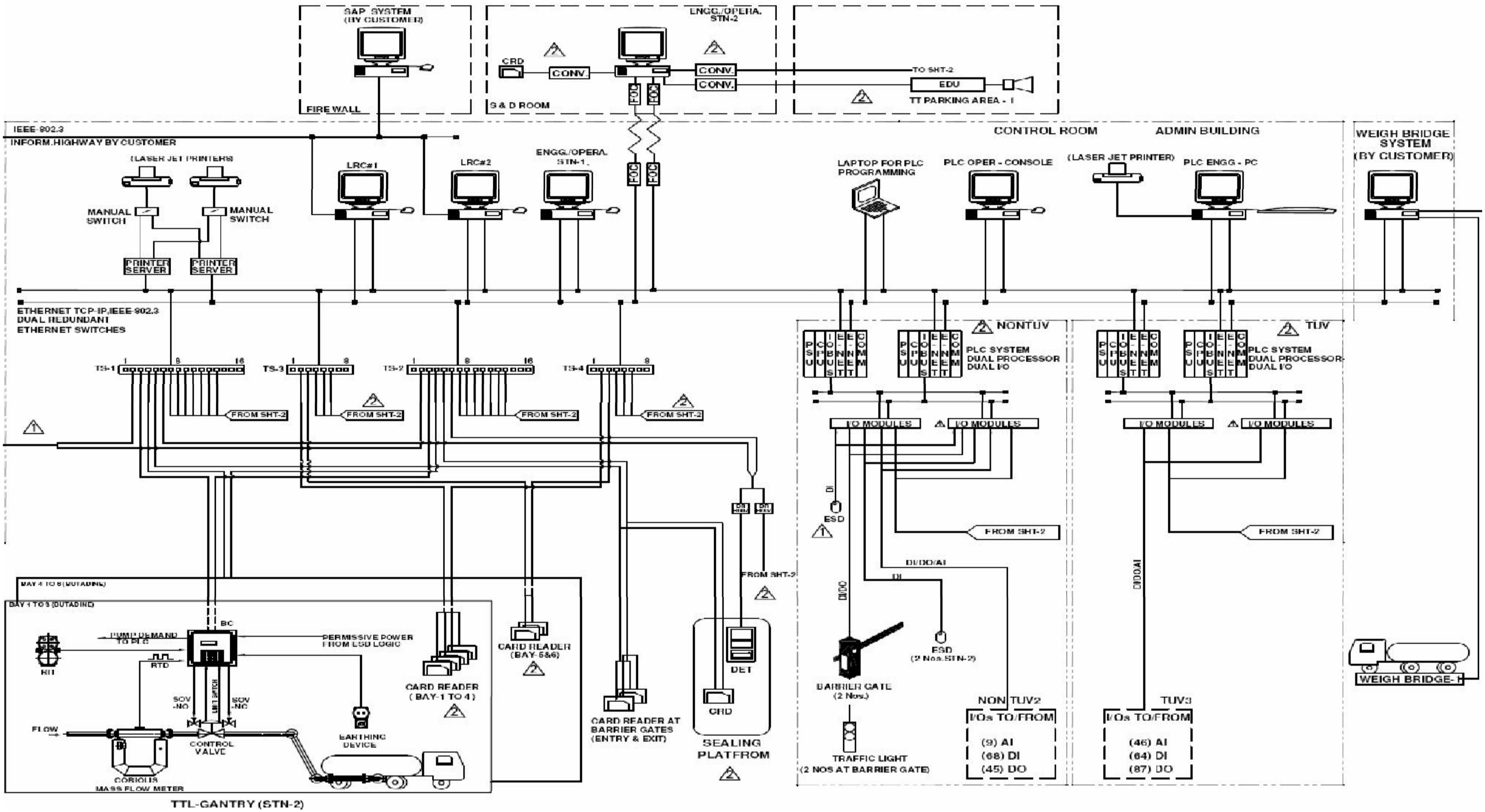
- Benzene
- Benzene
- Benzene
- Benzene

Bottom Loading

Station 2

- Butadiene
- Butadiene
- Butadiene
- Butadiene
- Butadiene
- Butadiene

Typical System Configuration



Major Components

- Loading Controller:- Danload
- ESD System – GE Fanuc (90/70)
- Load Rack Computer:- HP Proliant ML 350 Server, Server 2003, In Redundant Mode
- Mass Flow Meter – Micromotion / Emerson
- Loading Software :- AST-Smart Terminal Manager / Oracle 10G

Challenges in Design & Implementation

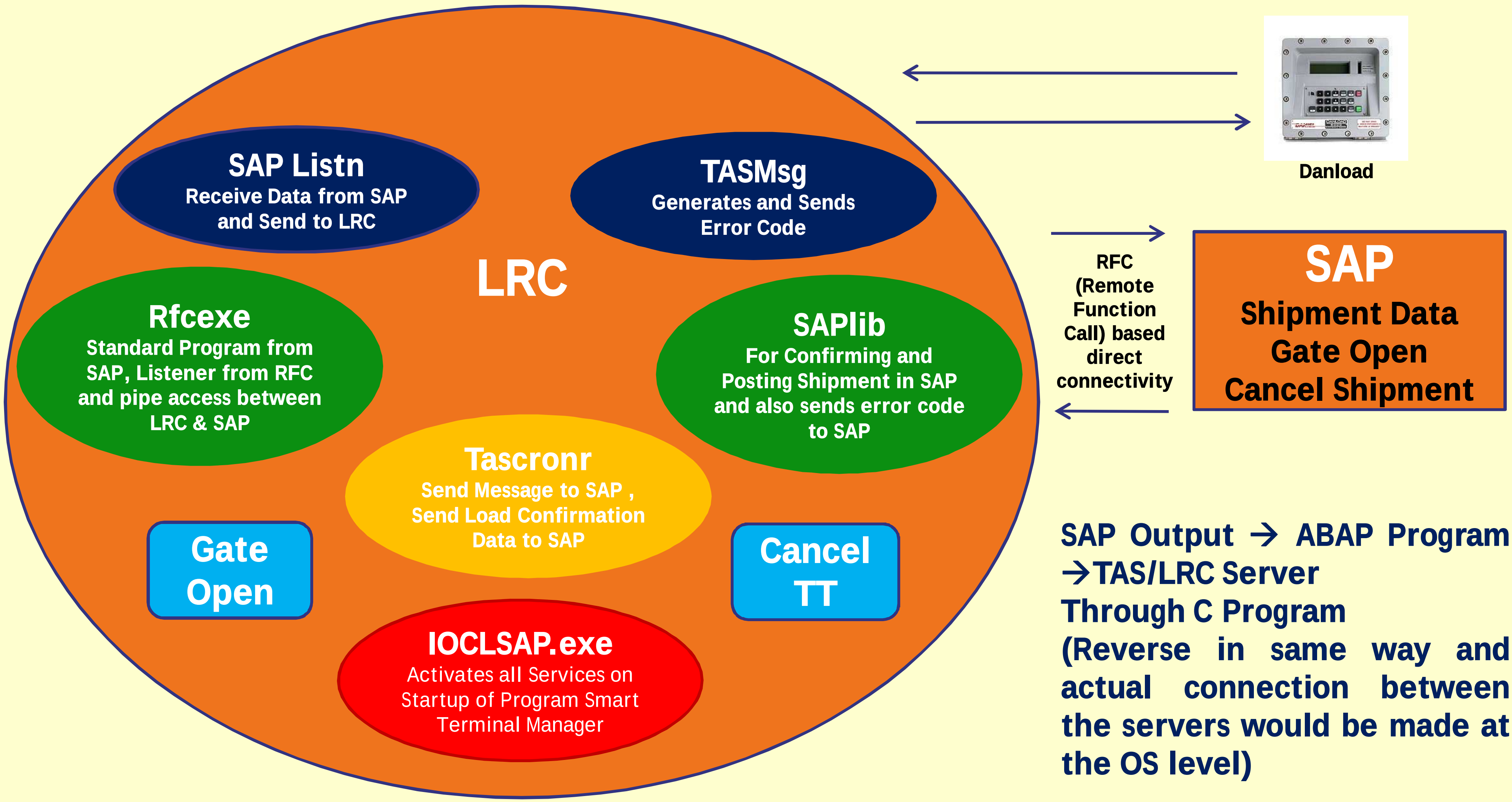
IndianOil

- Direct Mass Based loading in variance to traditional volumetric loading of petroleum products or Weigh Bridge (LPG,BO,BM)
- New Product Profile (Correction of Density Factors)
  - Mono Ethylene Glycol (MEG)
  - Di- Ethylene Glycol (DEG)
  - Tri-Ethylene Glycol (TEG)
- Variety of TTs, Export Containers & Wagon Loading through Road Delivery. (Wagon facility at PTA Terminal)
- Integration with Gantry Control Room PLC (GE Fanuc)and Subsequent Data Transfer to Main Control Room PLC (Triconex)

Challenges in Design & Implementation

- Involvement of Multiple Stakeholders
  - IOCL (PNC-CG):- Overall Project Coordination & Implementation
  - IOCL (BD) :- Internal Customer for MEG/Deg/TEG Loading
  - IOCL (Marketing) :- Internal Customer for Benzene Loading
  - IOCL (CO-IS) SD Team :- Functional Team of IOCL SAP
  - IOCL (CO-IS) Engg Team :- Engineernig Team of IOCL SAP
  - EIL – Consultant for LSTK of EPCC – 8 @ PNCP
  - IOTL - LSTK of EPCC – 8 @ PNCP
  - Advanced Systek – System Integrator

Typical SAP LRC Interface Services



SAP Output → ABAP Program →TAS/LRC Server Through C Program (Reverse in same way and actual connection between the servers would be made at the OS level)

The Changes...

IndianOil

SAP - TRWI	• Development of SAP TRWI (Dispatch By Road, Mass Flow Meter Control)
LRC - Density & Temperature Interface	• Provision removed due to direct Mass Data to LRC
SAP - Mapping of Vehicle Capacity in SAP	• Permissible Limits of Kg defined on KL Vehicle Capacity
LRC – TASCronr Services	• Confirmation of Individual Compartment Quantity incorporated • Confirmation of Total Loaded Quantity incorporated. • Independent Loading Complete Confirmation configured
SAP – Removal of Middleware Server	• Legacy Terminal Documentation Module had been removed in design • Direct RFC based methodology implemented wherein both LRC on IOCL LAN and assigned IOCL IP Addresses

The Changes...

IndianOil

LRC – SAPListn Services	• Validation Processes of TT like Registered Gross Weight, Registered Tare Weight and Loading Value change typically used for LPG Loading removed for streamlining of process
LRC – SAPListn Services	• Configuration Unit of Measurement changed from Litre to Tonne
LRC – Antivirus update	• Directly through IOCL LAN

Business Process Comparison

IndianOil

VA01	• Sales Order
VL02N	• Delivery
PGI	• Goods Issued
LRC OS	• Manual FAN Generation, • Smart Card Issue
LRC OS	• Manual BOL Printing
VF01	• Billing
F-30	• Customer Account Knock off
VF-03	• Challan Print

VA01	• Sales Order
VL02N	• Delivery
SAP	• SAP Interaction with LRC – Batch Creation
LRC OS	• Smart Card Issue
SAP	• SAP Interaction with LRC – Qty Delivered
VF01	• Billing
F-30	• Customer Account Knock off
VF-03	• Challan Print

Learning & Benefits

- Development of SAP TRWI (Dispatch By Road Mass Flow Meter Control) and understanding of petrochemical dispatch requirements
- Efficient S&D Management
  - Direct data availability on SAP - Improvement in TT scheduling
  - Duplication of work by S&D Personnel (Creation of document both in SAP & in LRC) eliminated
  - Reduction in Billing Time
  - Reduced manual intervention – Improvement in Overall Operation Time

Learning & Benefits

- Possibility of mismatch in actual and delivered quantity removed
- Inclusive Correctness of data through compartment wise and total loaded quantity
- General Acceptance of direct Mass Flow Meter delivery by Internal as well as external customers
- Dependence on Weigh Bridge Manual Intervention Eliminated and hence reduced man-hours
- SAP ID Tagging ensured security of operation at LRC Level

Learning & Benefits

IndianOil

- Real Time Information available to S&D Operation Manager on site and Customer interface at Corporate on a key stroke.
- Flexibility in Target Setting at Local and Corporate Level based on field Situation.

Success Story…

- Highest MEG TT Loading of 1117 TTs with 24805 MT in June’2011
- Internal Customer (IOCL Business Development) Confidence
- NIL Customer Complaint achieved on Qty Deliveries and Loading Time