

Industry Category - Engine Line Manufacturing Customer -Tata Cummins Ltd., Jamshedpur

1.0 REQUIREMENTS ANALYSIS

1.1 OUTLINE CUSTOMER REQUIREMENT

The basic understanding from customer of the requirement for SCADA System for Diesel Engine Assembly Line is as follows:

- 1.1.1 To replace existing Honeywell SCADA system and connect to the new Siemens S7 PLC via Ethernet and pick data from
 - 1.1.1.1 Main Line – 52 stations
 - 1.1.1.2 Block Assembly – 9 stations
 - 1.1.1.3 Head Service Assembly – 20 stations
 - 1.1.1.4 Test Cell Line – 61 Stations

TOTAL: 140 Stations
- 1.1.2 To provide two redundant SCADA Server system with one Operator node as per requirement of the Assembly line and link 11 nodes of Data Entry Terminals (DET) in Main Line, 4 DET Nodes of Test Cell and 6 nos. of Web Based View Clients.
- 1.1.3 The Main SCADA Line system has to be configured as an Unlimited byte system as requested
- 1.1.4 To prepare applications with appropriate mimic screens as required on the central SCADA system as well as at each DET location and Web Based View Client locations.
- 1.1.5 To get data from 95 nos. of different RFID Readers (EMS/P&F/Siemens Make) as follows
 - 1.1.5.1 Main Line – 52 nos.
 - 1.1.5.2 Head Service Assembly – 20 nos. (Existing Siemens make)
 - 1.1.5.3 Test Cell Line – 23 nos. (Existing EMS make)
- 1.1.6 To get data from 7 nos. Nut Runners and 4 nos. IPV and do communicate to the same as per communication protocol documents on Ethernet or via RS485/232.
- 1.1.7 To prepare Excel based reports as required
- 1.1.8 To connect SCADA system to Oracle Manufacturing System and pick as well as store data in tables allocated by the IT and in the required formats.
- 1.1.9 To provide SMS alarms as well as emailing reports – (GSM Modem with SIM required)

Based on the information collected, we had engineered the solution for putting together the proposed way of achieving the SCADA System.

2.0 PROPOSED SOLUTION

2.1 SYSTEM PHILOSOPHY

We have proposed SCADA system for Diesel Engine Assembly System based on the MOVICON SCADA connected to the Siemens S7 PLC using Siemens Ethernet communication.

The system comprises of central SCADA system, Data Entry Terminals (DET) and View Clients (VC). The central system which reads all data from all stations via the central Siemens PLC will be the Server system. We have proposed to have a HOT redundant system with two servers and one Slave operator Station. The redundant Servers which will automatically switch communication, data storage etc. if one server fails making the system reliable as the DET and View clients are also connected to this network. The Server will have a base MOVICON Runtime PRO system with Editor, Redundancy and required Web Licenses options enabled.

The DETs proposed are Movicon Runtime Client LITE Stations which will allow operators there to enter data as well as view relevant data in lists or grids as required. These stations will also have capability to read data from RS232 ports from devices like Bar Code Scanners so that data can be updated directly into the system. They will **NOT** have any drivers and so will not have capability to talk to complex devices like PLCs but only communicate to single ASCII based device.

The redundant SCADA pair will communicate to the Siemens S7 PLC via a Control Ethernet Switch. The switch will have the Main Siemens PLC and the SCADA redundant pairs linked to each other. There will 2nd set of Ethernet cards required on the redundant servers which will expose the Server data to the Oracle system as well as the View Clients. It is recommended that the DETs will be linked to the central Servers a third Ethernet network.

The SCADA pair will also communicate to the different RFID systems on Profibus, Modbus TCP Gateways and Ethernet networks as required depending on selection of the RFID manufacturers. The Engine Tracking System uses a Soft Logical tracking mechanism to track the engines in the line and updates the RFID tags with the necessary information. The IPV Equipments as well as the Nut Runners will need to be brought to the SCADA servers using the some Serial to Ethernet converters which has to be provided by the respective manufacturers. If TCL requires us to work out the converters then a cable layout plan has to be provided to us.

The View Clients will be Java Web Based which means that any PC with Java on it can see all the data on the Server System live by only using Web Browser like Internet Explorer. Any PC with Windows OS before XP and after Win98 supports Java by default as well as any Graphical Linux environment like RedHat will be able to view the data from the Servers. The Web Based Clients will allow two way communications and will be security protected so that only authorized personnel can access and change system files and data.

The MOVICON Servers will store data using MOVICON's powerful DataLogger / Recipe engine and reports will be presented using Excel. The Excel reports will be embedded within the MOVICON environment thus ensuring security. The database can be any RDBMS that supports ODBC but in this case we will be selecting Oracle as TCL has standardized on it. We will assume one week of data storage in case communication with the central ERP Oracle fails.

The system also has capability to send SMS messages to concerned personnel as well as email the reports that are prepared on a schedule. Recommended modem should be of WaveComm make

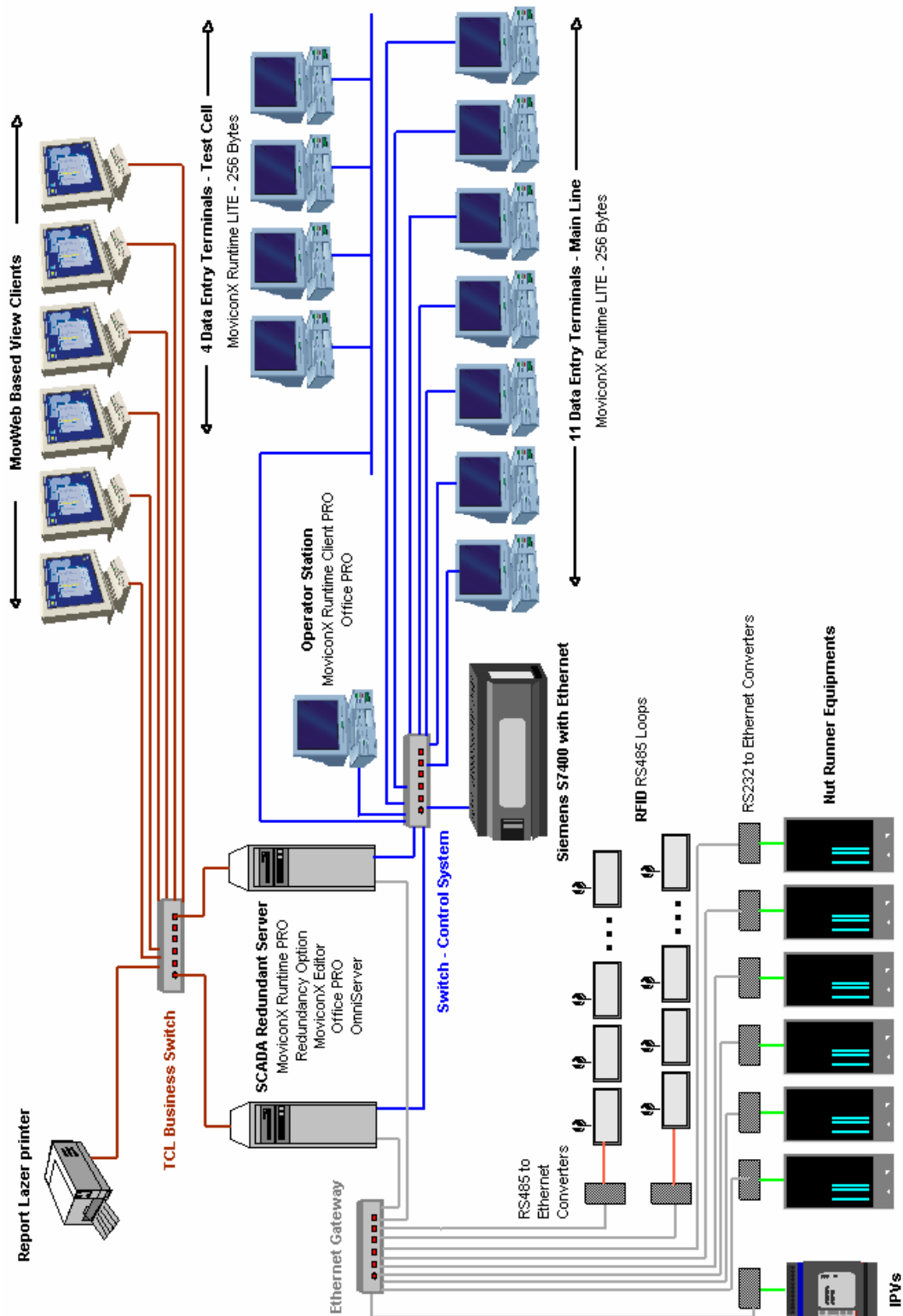
The MOVICON Server should be the latest state of art PC with base following specifications:

HP Workstation Grade PC - PIV 2.4 GHz or above, 4 GB RAM, 140 GB HDD, Ethernet card – 3 nos, VGA supporting 1280 x 1024 resolution with independent 16 MB RAM, 4 USB ports, Serial and Parallel ports, CD Drive with Writer, Floppy drive, Keyboard and Mouse, 17 to 19" Colour TFT Monitor

The DET can be High End Desktop machines with base following specifications: PIV 2.4 GHz or above, 256 MB RAM, 40 GB HDD, Ethernet card – 1 no, VGA supporting 1024 x 768 resolution, 2 USB ports, Serial and Parallel ports, CD Drive, Keyboard and Mouse, 17 to 19" Colour TFT Monitor

Kindly check additional details in the technology section for complete feature listing.

2.2 SYSTEM LAYOUT



3.0 BOM

3.1 BOM FOR SCADA SYSTEM FOR ENGINE ASSEMBLY

Sr. No.	Item Description	Qty
1.	Servers - MOVICON X Runtime SCADA PRO – Unlimited Bytes	2
2.	Servers - Redundancy Option	2
3.	Servers - Editor Option	2
4.	DET - MOVICON X Runtime Client LITE – 256 Bytes	15
5.	View Nodes - MOVICON X Web Client – 3 Users enabled for each redundant server	2
6.	Upgrade of existing MOVICON Servers of new Line from 4096 bytes to 8192 bytes	2
7.	Upgrade of existing MOVICON Operator Station of new Line from 4096 to Unlimited bytes	1
8.	Servers – OMNIServer (RFID, IPV and Nut Runner communication)	2

3.2 ENGINEERING SERVICES

Engineering required: It is intended that at least 90% of the engineering will be completed in at our works in Bangalore and a FAT (Factory Acceptance Test) be conducted at our works. After which the remaining of the project will be executed at site. The engineering will involve development of multiple applications which will have mimic screens, alarm configurations, database table designs, interfacing code for communication to Oracle, OMNIServer protocols creation for RFID, Leak Test Equipments and Nut Runner.

Sr.	Item Description
1.	Lump sum Engineering (Main Engine Line, Test Cell and DET applications, OMNIServer applications for Nut Runner and IPV, Bar Code integration)
2.	Lump Sum Commissioning (2 Engineers) – Valid for 45 man days only after which daily rate was applicable
3.	Training for MOVICON Basic – 3 days
4.	Training for MOVICON Advanced – 2 days

4.0 SCOPE:

4.1 OUR SCOPE:

- 4.1.1 Supply and Installation of MOVICON and OMNIServer on TCL machines
- 4.1.2 All Engineering as per TCL Engineering design at Bangalore
- 4.1.3 All Commissioning activities related to the above system
- 4.1.4 Connectivity to Siemens S7 PLC using Ethernet
- 4.1.5 Creation of communication driver in OMNIServer to IPV's and Nut Runners based on protocol document provided.
- 4.1.6 Preparation of Excel Sheet reports and sending by email (TCL email account to be provided)
- 4.1.7 Creation of SMS messages (based on availability of GSM modem)

4.2 END USER SCOPE:

- 4.2.1 Submission of detailed write up of requirement (SRS) or process flow for all operations of Main line and Test Cell
- 4.2.2 All PC Hardware supply with relevant Microsoft products and Oracle licenses
- 4.2.3 All Supply and installation of Networking components like Ethernet cables and Ethernet switches
- 4.2.4 All Mimic Screens formats
- 4.2.5 All RFID equipment with necessary cabling
- 4.2.6 IPV Equipment and Nut Runner ASCII protocol details
- 4.2.7 Providing Bar code protocol details for DET station
- 4.2.8 All Design Documents with related drawings and PLC IO lists
- 4.2.9 All required Report formats
- 4.2.10 Providing necessary converters to convert IPV, Nut Runner data to Ethernet