Efftronics system pvt. Ltd
ISO 9001:2015
20000813 QM15

Approved by RDSO
Govt. of India
Ministry of Railways

“R&D”
Recognized by DSIR
Govt. of India

Since 1985
Vision

‘To provide insight for enhancing wealth’

INSIGHT - refers to TRUTH. Our Vision is to develop Products & Solutions to the Customers which provide truthful information that can optimize & improve the Business Process.

Quality Policy

“We shall provide information technology products/services that exceed customer expectations in their functionality, usability, reliability, performance, adaptability and supportability to achieve market leadership and continual improvement of business performance”

Mission

To provide freedom of creativity/innovation in exploiting the potential of information technology.

OEM Partner

Gartner

Client for understanding the Technology trends & Market Trends in ICT

CIO Choice – 2017’ Award

30+ Years of Product Expertise by harnessing latest technologies

50,000 SQFT facility for various activities

In-House Manufacturing facility with 100+ Staff

100+ Engineers in Research & Development (R&D)
Building End-End Smart IoT Solutions

Embedded Systems & Application Software

700+ People

Conceive
- Concept

Develop
- Analysis
- Design
- S/W & H/W Implementation
- Integration
- Testing

Manufacture
- Assembling
- Quality Testing

Implement
- Installation
- Configuration

Support
- Commissioning
- Maintaining
OUR DEVELOPMENT PROCESS

Design Thinking

TECHNOLOGY
- What can technology do feasibility

PERSON
- Desires
- Needs

BUSINESS
- Viable
- Sustainable
- What value is going to get/give

FUNCTIONAL INNOVATION
PROCESS INNOVATION
EMOTIONAL INNOVATION
INNOVATION
DESIGN CAPABILITIES

Proven Expertise In Building end-to-end IoT Solutions

- Building Systems of Systems
- Algorithms & Analytics
- Access
- Storage
- Edge Processing
- Communicate
- Sense & Control
MANUFACTURING

Planning and Scheduling and Tracking of orders through ERP

➢ PRODUCTION: 15,000 -SFT AREA 100 -MEMBERS

➢ Following standard processes like IPC & J-STD

➢ Detailed planning and scheduling and tracking of orders through ERP

➢ Implementation of seamless tracking and tracing of material, components and products

➢ Just in time Supply Chain

➢ Chain Process to optimize time, cost and improve quality

➢ Automated Testers

➢ 5S Implementation
### Foot Print

**12000+** Product deployments

**9000+** Locations

**120+** Service Centers

### Deployment in Railways

<table>
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<th>Products</th>
<th>India</th>
<th>Srilanka</th>
<th>Bangladesh</th>
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<td>BHMS</td>
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<tr>
<td>Electronic Block Instrument</td>
<td>45</td>
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IT- DRIVING BUSINESS

1. Enterprise Resource Planning
   - Complete Order Tracking
   - Financial Management
   - Products BOMs & Configuration Management
   - Vendor Evaluation
   - Just In Time Procurement
   - Inventory & Tracking
   - Finished Products Tracking
   - Integration with Mobility/Mail Alert

2. Order Management System
   - Auto Integration With ERP
   - Optimized Sale Orders
   - Execution Planner
   - Inventory Projection Tool

3. Cash Flow
   - Control of Inflow and Outflow of Cash
   - Visualize Future Incoming and Outgoing of Cash
   - Mobile Integration

4. R&D Project Planner
   - Leads to Quotation Integration
   - Integration with ERP
   - Mobile and Web Platform
   - Analytics

5. Time Attendance Management System

6. Customer Relationship Management
   - Leads to Quotation Integration
   - Integration with ERP
   - Mobile and Web Platform
   - Analytics
Human Resources
(RIGHT PEOPLE FOR RIGHT JOB)

- Running **M. Sc. (IoT)** Course for Krishna University,
  **M. TECH. (IoT)** for JNTU Anantapur
- MOUs with 15+ Engineering and science colleges for faculty and student development programs
- Continuous learning program for employees
- Activity based learning
- Collaboration with AP Skill Development Centre & MSME
YOUR ONE-STOP DESTINATION FOR
END-TO-END SMART SOLUTIONS

Data Logger System
Remote Condition Monitoring
Electronic Block Instrument (SIL 4)
Integrated passenger information system
LED Signals (SIL 4)
System Integrity Tester

LED Lighting and Controls
Energy Information System
Appliance & Blind Controls
Indoor Air Quality Monitoring System

Electronic Manufacturing Services
Product Development Services

Smart Transport
Smart Environment
Smart Water

for 24/7 operation
under Harsh Indian Environment Conditions
Smart Signaling

- Improve Average Speed of train by 20%
- Identifies Traffic Bottle-Necks
- Helps Planners To Optimise Train Operations
- Predictive Maintenance of Signalling Assets
- Reduce the Maintenance Cost
- Improve Availability by MTTR & MTBF
- Signaling System Health Monitoring

To provide insight for enhancing wealth
Indigenously Designed, Built, Deployed and Maintaining one of India’s Largest IoT Network for Indian Railways

6+ Million Things of Railway Signaling System Connected To 200+ Command Control Centers across the country

22+ Million Records Generated Everyday

12k Products Installed in More than 7000 Stations in India

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10812 Data Loggers & RTUs

• Works as a black box for Railway Yard for signalling System
• Capture all relay status and analogue parameters in the relay room.

770 Point Machine Monitoring

• Predicts failures much ahead by real time analysis of point machine voltages and currents
• Improves MTTR and MTBF of system

45 Integrated Power Supply Monitoring

• Provides remote condition monitoring of various power supplies with in railway yard
• Identified faulty module in power distribution and informs the railway personnel

78 Battery Health Monitoring Unit

• Predicts failures much ahead by real time analysis of battery parameters
• Extends the battery bank life and guarantees backup

45 Block Instruments

• 2o/03 Architecture
• Complies to European CENELEC standards
• First in INDIA to develop the product and get approval

805 Safety Point Alarm Units

• Eliminates accidents at railroad points through prescriptive alert to station master

200 Control Centers

• S/Ws
• Works as a black box for Railway Yard for signalling System
• Capture all relay status and analogue parameters in the relay room.

Smart Signalling - To Prevent Failures & Improve Operations

SIL-4 Certified

• 2o/03 Architecture
• Complies to European CENELEC standards
• First in INDIA to develop the product and get approval

Prescriptive Solution

• Eliminates accidents at railroad points through prescriptive alert to station master

5/WS

• Failure Analysis System
• Real-time simulation of yard
• Predictive Maintenance of railway assets
• MIS Reports
• Network Management
Data Loggers

MONITORS...

1. Thousands of potential free contacts of relays for every 16ms
2. Various analog inputs in station
3. Health of processor based systems

Black Box for Railway Station
Data Dissemination

Data Processing

Data Acquisition
Multi Monitor Simulation Networked Data loggers in Vijayawada Division Control Office

Tracking

Charting

Prediction
Remote Condition Monitoring

Predictive Maintenance System
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of battery parameters
- Extends the battery bank life and guarantees backup
- Improves MTTR and MTBF of system

Integrated Power Supply Monitoring
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of battery parameters
- Extends the battery bank life and guarantees backup
- Improves MTTR and MTBF of system

Battery Health Monitoring Unit
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of battery parameters
- Extends the battery bank life and guarantees backup
- Improves MTTR and MTBF of system

AC Health Monitoring Unit
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of battery parameters
- Extends the battery bank life and guarantees backup
- Improves MTTR and MTBF of system

Signal Lamp Health Monitoring Unit
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of signal lamp parameters
- Improves MTTR and MTBF of system

Block Instruments
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of signal lamp parameters
- Improves MTTR and MTBF of system

SIL-4 Certified
- 2oo3 Architecture
- Complies to European CENELEC standards
- First in INDIA to develop the product and get approval
- Predicts failures much ahead by real-time analysis of point machine voltages and currents, DC Track circuit
- Improves MTTR and MTBF of system

Failure Analysis System
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of signal lamp parameters
- Improves MTTR and MTBF of system

Point Machine Monitoring
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of point machine voltages and currents, DC Track circuit
- Improves MTTR and MTBF of system

Prescriptive Solution
- Better availability of air conditioning to ensure long life for temperature critical equipment

S/Ws
- Failure Analysis System
- Real-time simulation of yard
- Predictive Maintenance of railway assets
- MIS Reports
- Network Management

Control Centers
- Provides remote condition monitoring of various power supplies with in railway yard
- Identifies faulty modules in power distribution and informs the railway personnel
- Predicts failures much ahead by real-time analysis of signal lamp parameters
- Improves MTTR and MTBF of system

Smart Signalling
**Solution Approach**

**Smart Signalling**

Captures Digital (Relay Status – Controlling, Contactor & Detection) and Analog (Operating & Detection Voltages and Current) parameters

Sends the captured information to central place

Analyzes and identifies permanent way-related and signaling & safety faults as they are emerging using AI and ML

Predictive Maintenance is initiated at right time before any faults occur / Trouble shooting can be more easily integrated into day-to-day operations

**Spectrum of Analytics Capabilities**

Source: Gartner Inc., USA
Smart Signalling

Point Machine Monitoring

Failure Analysis System → Event Logger → Data Logger → Control Room

1. Monitors Point machine operating current
2. Zigbee technology is used to wireless data communication
3. Monitors Feed and Relay end currents of Track circuit

Feed end and Relay end Currents
Point Current Signature
Point Operations Report
Current Signature Analysis

1. Collect fault-free and extreme faulty data
2. Identify areas of interest using analysis techniques and use them to create rules
3. Apply those rules to other waveforms and match similar features using a linear score progression to the recorded extreme
Identifying failure with Current Signature Analysis of point motors

- Carbon brush worn out
- More current at locking time due to spring
- More friction due to lubrication problem
- Problem in Unlocking
- Problem in locking position
- Obstruction in Point Motor
The Benefits of Battery Health Monitoring System

- Reduce bank down time
- Identify Failures
- Health of Cell
- Improve bank Life
- Remaining Backup Time
- Evidence for Warranty
- State of Charging
- Reduce Maintenance
- Real Time Alarms
- Remote Monitoring
- Graphical representation of Bank parameters
- Graphical comparison of failed battery and healthy battery

Main screen shows the online status of Battery bank state.
SHMU monitors signal lamp current and alerts the user in case of abnormality. These alerts are used for predictive maintenance – by which number of failures can be reduced. Also used to reduce the duration of signal failure.
Monitors Power supply of each and every station

1. Supervisory Unit captures diagnostic data from IPS and sends to Data logger.
2. Data can be seen in local PC and Test room CMU.
3. Important alarms can be sent as SMS and overall status can be sent to OEM by automatically from Test room.

SMS escalation for Failures
- Immediate advice / recommendation on failures as they emerge
- Early warning of system degradation before its eventually leads to failure
- Enable maintenance staff to have prior knowledge about root cause of failure before attending a site
- Improved maintenance planning with proper statistical data
- 24/7 monitoring and notifications in case of failures / warnings

Benefits of Remote Condition Monitoring

- Higher Availability
- Lower Operating Costs
- Increased Reliability
- Increased Efficiency
- Improved Safety
System Integrity Test

Identified 975 defects of design & implementation of interlocking

Conducted at 48 stations

Software & Hardware development & implementation for System Integrity Test as per Table of Control /Route Control Chart.
By wiring potential free contacts of ELD to data logger and identifying the relays

- Which power the conductors
- Which are powered by the conductors

External defective cable pair responsible for earth fault can be identified by CMU alarms software
Data Synchronisation between all stakeholders of the system

Data archiving, Reports, Escalation
Signals
RDSO Approved

2-way LED stencil route indicator
4-way LED stencil route indicator
Single digit Route indicator
Double digit Route indicator

Main Signals

A - Markers
Route indicator
Shunt Signals
Calling on

Long Visibility
Energy Saving
Maintenance Free
SIL-4 Certified
Quality & Reliability
Smart Signalling

Electronics Block Instrument

Fail Safe as per CENELEC

Cable (2 pairs) / OFC (2 Channels)

Data Communication & Block Telephone

RDSO APPROVED

Block Panel

Field Inputs

LSS Control

Block Panel

Field Inputs

LSS Control
Integrated Passenger Information System

- Passenger Information Systems
- Smart Signalling
- RDSO Approved

- Platform Clocks with GPS Synchronization
<table>
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THANK YOU

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