



FIT  RIGHT

Perfect Solution for your Changing Needs



L&T Electrical & Automation

ABOUT E&A



L&T Electrical & Automation (E&A) is one of the largest manufacturers of low and medium voltage switchgear components, switchboards, power quality solutions, solar energy solutions, energy management system & metering solutions, life cycle enhancement (modernisation) and industrial automation solutions. These products and solutions cater to the distribution, monitoring and control of electrical power in industries, utilities, buildings & critical infrastructure, national assets and agriculture sectors.

E&A makes high quality energy meters and protective relays for utilities, industries, commercial establishments and domestic consumers.

E&A undertakes turnkey contracts for comprehensive system engineering, supply, installation, testing and commissioning of switchboards and allied equipment including Retrofitting.

E&A's manufacturing operations in India are located at Navi Mumbai (Mahape), Ahmednagar, Vadodara, Coimbatore and Mysore.

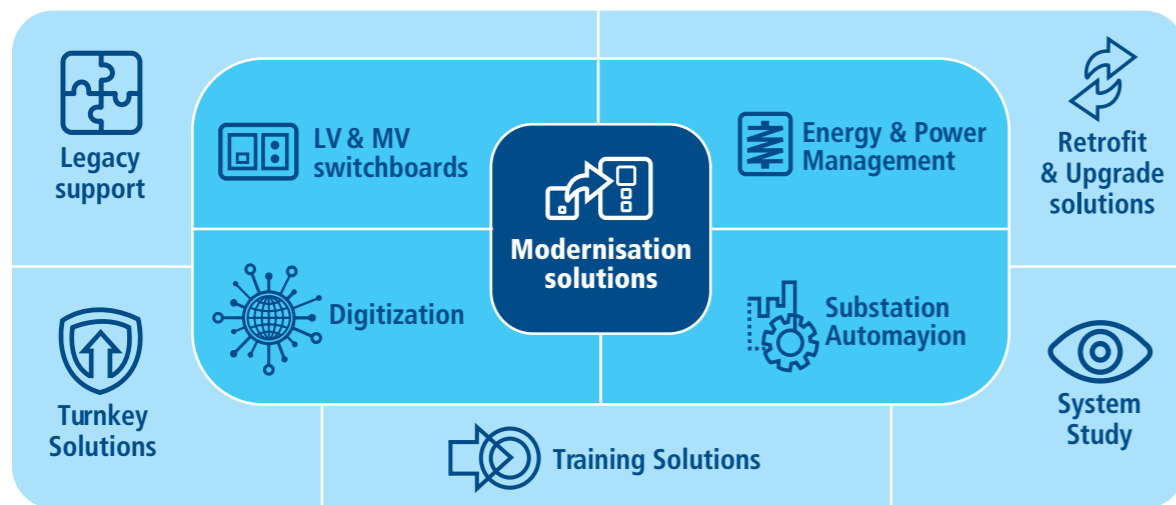
FIT RIGHT

Retrofitting is the process of upgrading the older technology with new one and it improves the technical performance, safety and cost efficiency.

Retrofitting consists of replacing switchgear components to upgrade, renew, or provide more functionalities, such as connectivity.

It is often used on outdated active components like circuit breakers in primary distribution, contactors, and protection relays to prolong the switchgear's lifespan.

TOTAL SERVICE SUPPORT



FitRight solutions help you plan and implement initiatives to improve:

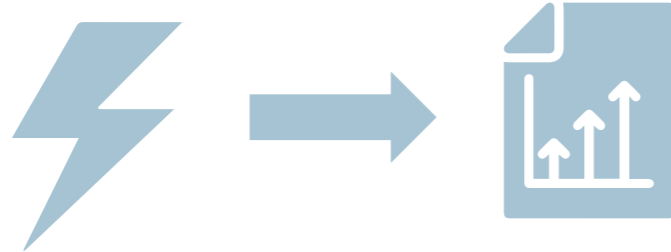
- Safety**
 upgrading your installation for enhanced safety and conformance to latest standards
- Process**
 improving productivity, quality and reducing cost
- Efficiency**
 Reduce losses and optimize processes
- Reliability**
 Improve system uptime and eliminate breakdowns
- Power quality**
 Enhance power quality to support a more stable operating environment

In today's competitive times, facilities need to safeguard against inconvenient, unwanted breakdowns, while maintaining productivity and efficiency of a high order. An important challenge several industries face today is replacement of old systems, which are nearing the end of their useful life, with the latest technology. Monitoring the system and investing in the system upgradation(s) and modernisation is absolutely essential to remain competitive in the market. Our FitRight solutions can help you prepare a comprehensive modernisation programme for your electrical and automation system(s).

L&T Electric & Automation (E&A)'s Service Solutions open up a new range of possibilities to extend the life of your installation, improving the utilization of assets and migration to a new environment-friendly, efficient and reliable tomorrow.



An alternate for the complete replacement of your systems, The that they are in line with the contemporary technological changes while making sure your productivity is not compromised under any condition.



With RetroGain you get.....

- Life extension of your switchgear
- Speedy execution Time Saving
- No re cabling
- Cost optimization
- No re-routing of power
- Minimum downtime
- Easy availability of spares
- No change in foundation
- Phased execution
- Technology up gradation
- Continuity in plant operations

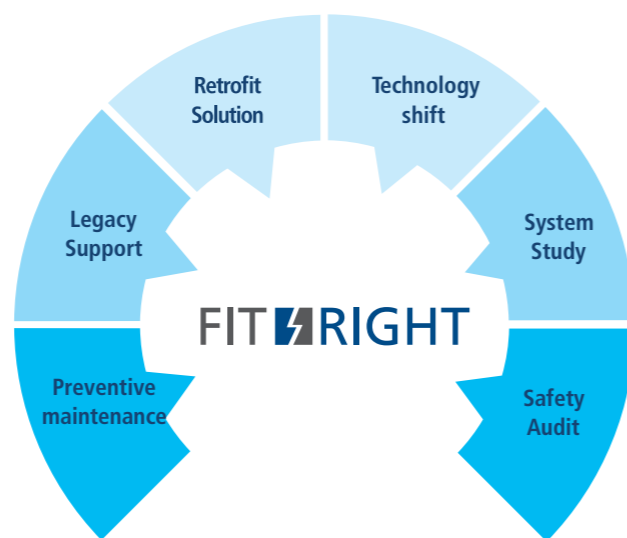
An adaptable solution to the changing needs. Your system's reliability and efficiency can be improved with replacement of either switchgear product or assembly. This avoids any unplanned shutdowns, loss of productivity and time for restoration. Thus, giving you high return on investment of retrofitting. We offer both panel as well as product replacement.

Switchgear Assembly replacement:

It is a long-term solution with one time investment and larger downtime. Entire new philosophy can be easily implemented making your system more reliable and robust. Investment one time and gain for a lifetime!

Product Replacement:

It is a cost-effective short-term solution with one-to-one product replacement with minimum shutdown time. ACB, SFU, MCCB, feeders, relays, shrouds can easily be replaced, and your system safety can easily be enhanced multi-fold.



Optimally Designed for you...



Benefits:

- Continuity in plant Operation
- Cost Optimization
- Life Cycle Extension
- Increased Safety

Different Types

Product Replacement

- Cost effective Solution
- One to one product replacement of ACB, MCCB, SFU, Feeders, Relays etc.
- Minimum down time
- Increase in product life-time with reliable and robust solution

One to One VCB Replacement

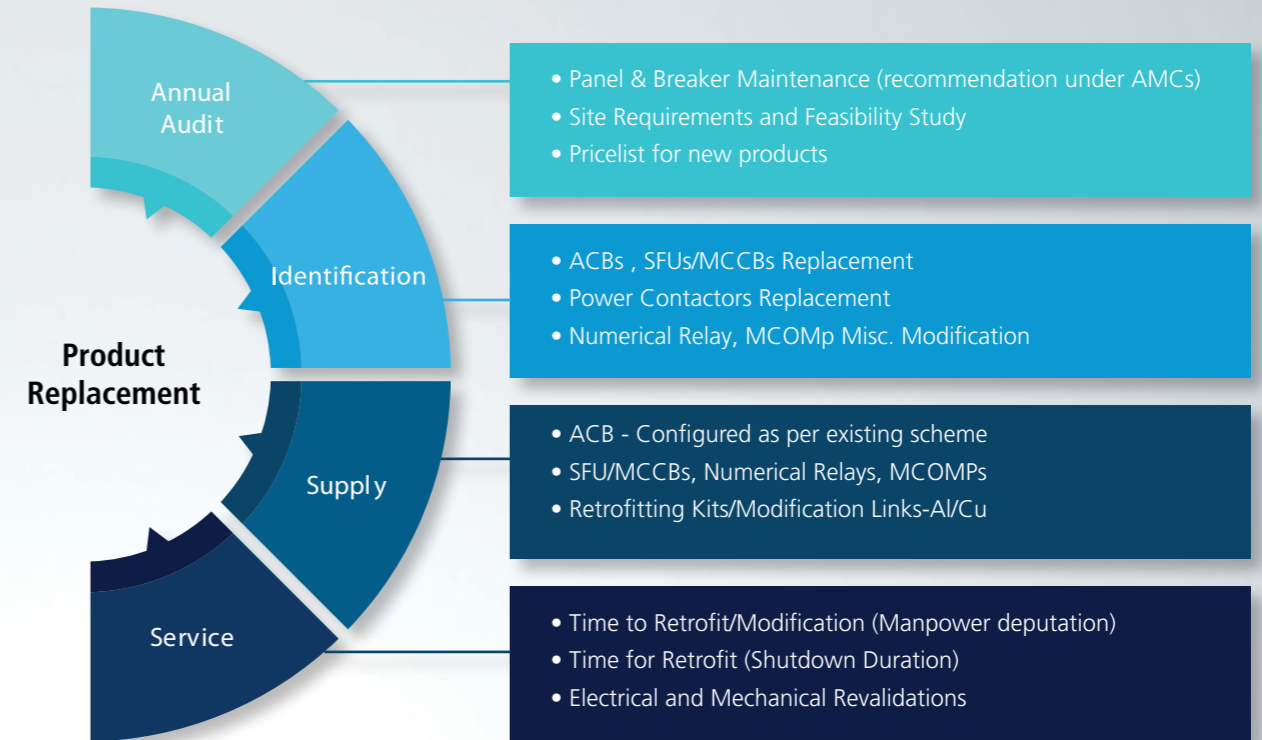
- Exact match of horizontal travel distance for breaker truck
- Exact match of isolating, power & auxiliary contacts' position

TQ 2 modules replacement

- Implementation of new philosophy
- Enhanced technical features and safety
- Increased efficiency & lifecycle

Switchgear Assembly replacement

- Site Audit/Assessment – Feasibility Report, Tentative shutdown time, Nature of load connected
- Data Collection - viz. substation layout, existing panel drawings, power/control cable sizes, bus duct arrangement etc
- Detailing of decommissioning and Commissioning activities, Scope Matrix, Engineering drawing submission and approval
- Manufacturing clearance to factory, Customer Inspection and dispatch to site
- Pre-shutdown activities - Testing & Inspection of panels at site, check for transit damages, if any
- Decommissioning of Old Panel - Removal of Power & Control Cables. Dismantling of Panels/ busducts.
- Erection of all verticals on existing base frame, Modification of busduct, Termination of Power and Control Cables
- Testing & Commissioning – As per approved drawings
- Long Term solution with one-time investment
- Implementation of entire new philosophy
- Increase in product lifetime with reliable and robust solution





TECHNOLOGY SHIFT

We believe in constant improvement

Offers:

- Moving towards Intelligent switchgear
- From Conventional Relay to Numerical Relay (communicable)
- Enhancing features/Safety in existing switchgear
- Digitisation & Automation

Drivers:

- Space Saving
- Safety Enhancement
- Cost Optimization
- Ease of Operation & Maintenance

Why Modernisation

- Your system's reliability and efficiency can be improved with replacement of either product or assembly. This avoids any unplanned shutdowns, loss of productivity and time for restoration. Thus, giving you high return on investment of modernisation

Greater Sustainability

- Efficient use of resources and replacement of Electrical Equipment with latest ranges and Mechanical Components
- Complete modules or complete feeder assembly
- Full panels with latest range
- Support to our legacy products/panels and other Panels
- Latest range of Extension panel to legacy phased-out panels
- Latest range of Extension panels to other make panels

Improved Safety

- Retrofitting of open-door draw-out module operation to closed-door one
- Retrofit arc flash relay to minimize effect of arc flash

Resiliency with Digital Capabilities

- Replacement of electromechanical relays with numerical relays –
- Replacement of thermal overload relay with communicable motor protection relays
- Retrofitting with various sensors for alarm and predictive maintenance

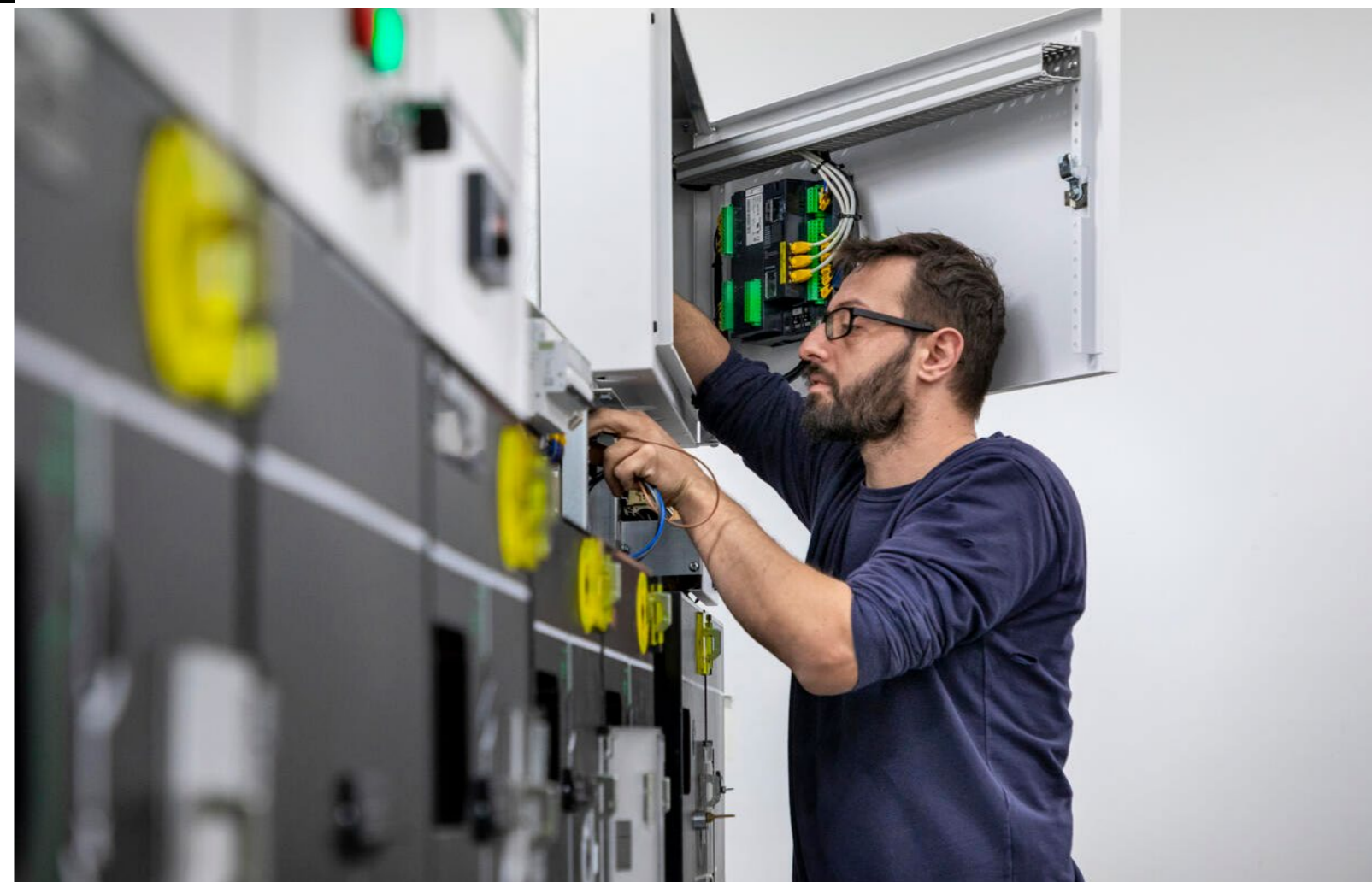
Expert Support

- Support with L&T Electrical & Automation's warranty
- Skilled installation and commissioning expert support locally
- Various AMC contract
- In plant training for updates of latest trend in Electrical Industry

Benefit

- Sustainability ensures longer trouble-free life of switchboard panels

- Improved safety enables safer working environment for operator and limited internal damage in case of inadvertent arc flash
- Digital brings remote operation ability
- Predictive maintenance to avoid unplanned downtime





SAFETY ENHANCEMENT FEATURE – CLOSE DOOR OPERATION

Personnel safety is becoming increasingly important for most industries as cost of accident and Injury became more and more costly and involves legal complications. It is seen that more than 40% flashovers happen during racking (in/out) of withdrawable modules.

One way of protecting the operator against injury in such instances is use of Closed-door designs; which ensures no access to live parts and prevent gases and flying debris hitting the operator while flashover occurrence.

Thanks to L&T E&A's continuous quest of safety improvement in all equipment and supporting legacy supply through retrofit possibility...TQ3 supplies with open door module operation can now be retrofitted with closed-door operation with possible safety interlocks as below-

SCPD Interlock-

- Door should not open if SCPD is ON
- Tool operated defeat facility is there for skilled operator to open door even when SCPD is ON

Door Interlock-

- Door should not open unless module is in isolated position
- Tool operated defeat facility is there for skilled operator to open the door in service and test condition

Racking Interlock-

- Racking of module is possible only when SCPD is switched off and door is closed

Module Padlocking-

- Module padlocking facility in service/test/isolated position is there by external locks (Provision of 3 locks) to prevent racking by unauthorized personal.

S-T-I Indication-

- While racking of module Service-Test-Isolated (S-T-I) position indications are visible on door

Others-

- IP2X is maintained while module is in test or isolated position.
- Hinged door is there to have easy access of base plate mounted equipment





RETROFITTING - LV

Retrofitting with various sensors for alarm and predictive maintenance

Behind most of the electrical asset failure, rise in temperature is a common phenomenon. Early detection of abnormal bus bar temperature rises will help preventing electrical failures and fire. In fact, today periodic thermographic surveys of MV and LV connections have become general practice to mitigate the risk of faulty connections. However, these periodic inspections can have following difficulties:

- Restricted access to electrical rooms (safety regulations)
- Operator safety (opening a door to check live connections)
- Limited accessibility / visibility of contacts (example busbar)
- Human error while collecting and collating data
- Historical time stamped data availability for further analysis along with other electrical parameters from relay/meter etc.

In order to overcome above difficulties, it is proposed to equip critical connections with wired/wireless, continually transmitting temperature sensors, environmental sensors to monitor ambient conditions / humidity & HMI/SCADA to display alarms and indication when critical parameters exceed a threshold with status indicators. Wired (for LV modules) and wireless (other LV and MV applications) temperature sensor one qty per phase may be mounted near busbar joint, cable link and other critical joints of L&T E&A supplied LV / MV switchboard.

Wired ambient / humidity sensor may also be mounted one per board for obtaining ambient and humidity details.

Above sensor data along with current / voltage / time etc data from numerical relay may be processed in L&T E&A's iPredict algorithm to set customer defined alarm and trips.



SUBSTATION AUTOMATION SOLUTIONS



Power, a non-renewable source of energy is one of the most focused industries today. For systematic power distribution, power needs to be healthy. At every substation level the parameters are checked to determine the condition of power and these parameters allow protection, control, automation, monitoring, and enable communication with associated equipment's. Substation Automation Systems integrate all these functions in a single system & execute simultaneous tasks. At L&T E&A we have a word for this – 'iONE' – integrated into one.

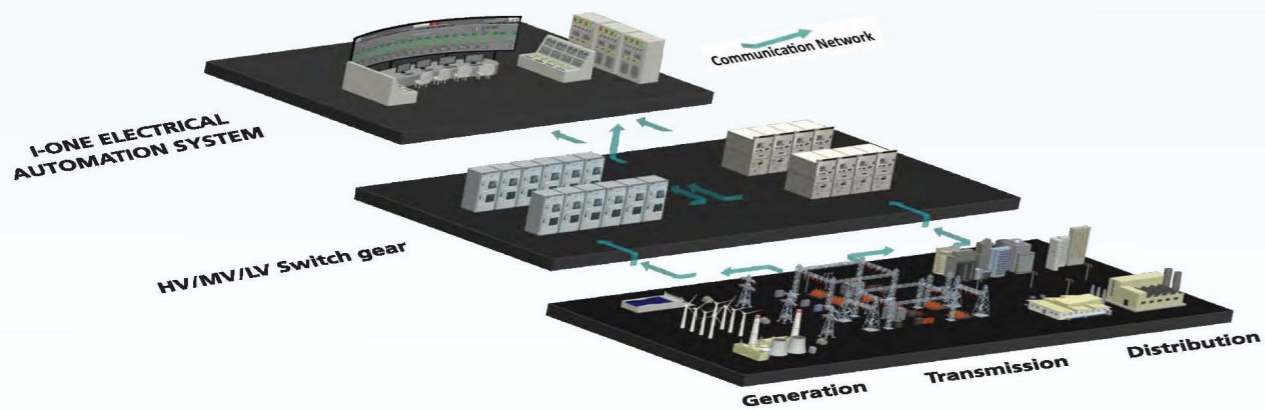


FIG:INTEGRATION OF VARIOUS SOURCES OF ENERGY.

We are determined in completing a job, right from selection of IEDs or relays, configuration, programming, parameterization, logic building to selecting protocols, configuring networks, programming controllers & designing HMIs – it enables us to give you a one stop solution!

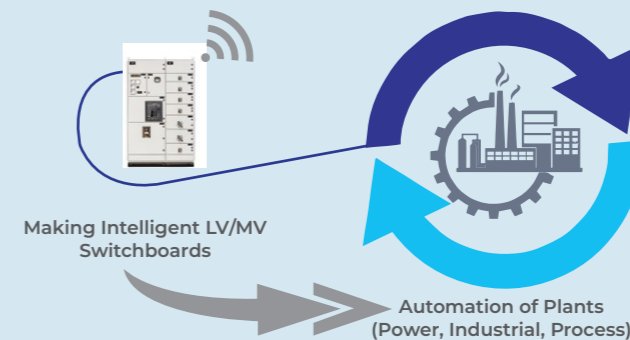


FIG:INTEGRATION CAPABILITIES.

protection & metering function of switchgear. m

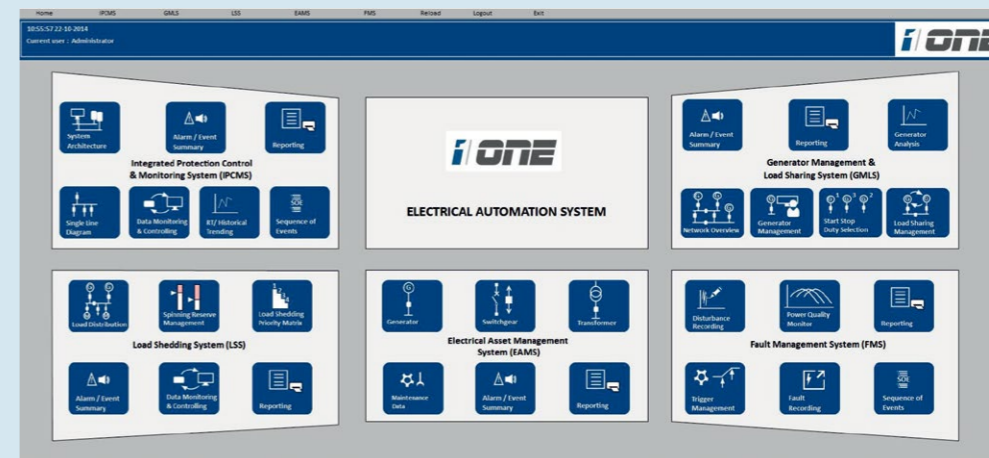


FIG: SOFTWARE MODULES

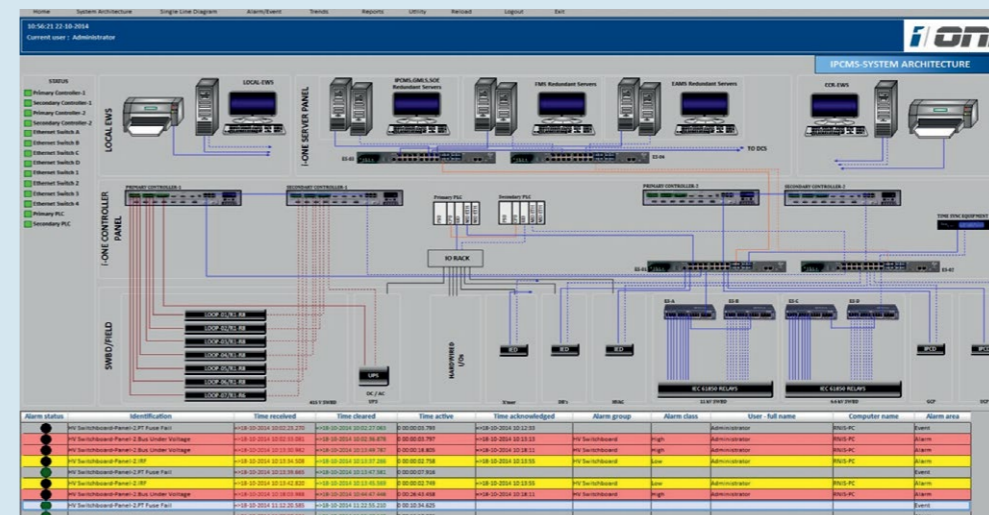


FIG: SYSTEM ARCHITECTURE

Our solutions have the following subsystems:

Integrated Protection, Control and Monitoring System (IPCMS):

It integrates electrical control,

- Supervisory control & monitoring of switchgear
- Monitoring of 3rd party systems (UPS, HVAC etc.)
- Interfacing capability for other plant monitoring & control system e.g., DCS, existing SCADA, HMI, etc.
- Alarm, SOE management
- Parameter trending
- Trends & Reporting etc.

Electrical Asset Management System (EAMS)

- Online monitoring of critical parameters/ machinery health data associated with generator, motors, Transformers, and switchgear.
- Integrated Alarm and reporting.
- Trending of critical parameters.

Fault Monitoring System (FMS)

- Monitoring of critical equipment's such as generators, motors and transformer generally connected to LV/MV/HV switchgear.
- Fault/disturbance recording and archiving.
- Analysis of pre & post fault data.

Additionally, customers can also avail the following value added features

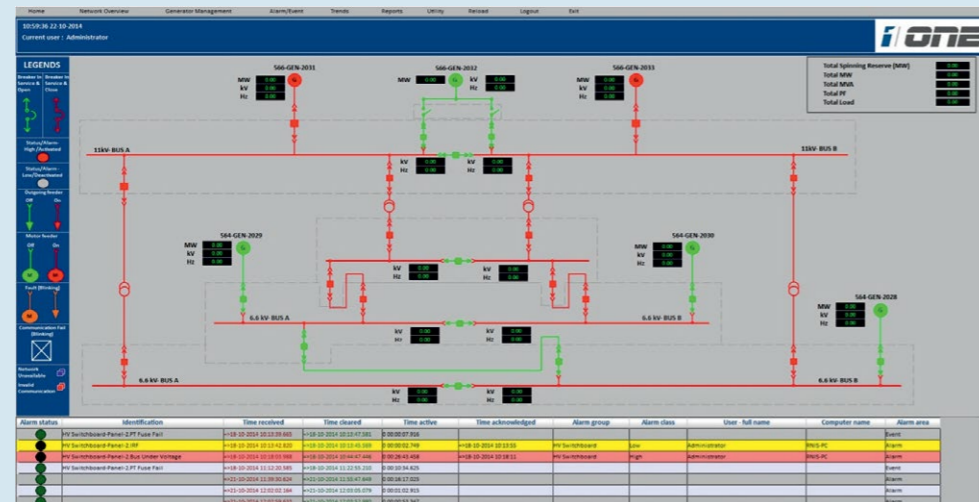


FIG: LOAD SHARING

- Generator control & measurement,
- Duty selection,
- starting & stopping of Generators,
- Spinning reserve management,
- Active and Reactive load sharing,
- Frequency and power control,
- Generator and group synchronisation

Load Shedding System (LSS):

Main generator load shedding system consists of

- Power based fast load shedding
 - gradual load shedding
 - Frequency based load shedding.
 - load shedding priority matrix
 - Spinning reserve management,
- LSS is interfaced with GMLS for information and switchgear for load shedding.



FIG: CLOUD BASED DASHBOARDS

ELECTRICAL ASSET MANAGEMENT SYSTEM - IPREDICT

Health monitoring system, a pre-engineered solution with inbuilt intelligence, is offered as a value-added service to integrate our own switchboards or any 3rd party equipment's.



The Solution is make & model agnostic & hence can be used to derive insights from any switchboard. The options to choose from are – On premise solution: can be offered in case the customer already has an existing SCADA / HMI system or a subscription-based system, which will help the customer to monitor Switchgear health, predict imminent failures, alert customer on preventive and predictive maintenance.

In a switchgear following parts are regularly monitored – breaker contacts, busbar joints, cable connections in cable compartment to help determine the overall health of the Switchboard. This is achieved by fitment of following sensors / devices within the Switchboard(s):

- Temperature sensors in busbar, cable terminations, breaker cradle.
- Humidity sensors per compartment
- PD sensors (applicable for 3.3 kV & above)
- Gas Monitoring Manometer (applicable for GIS)
- Protection release/ relays can also keep account of no of breaker operations and fault interruptions.

iPredict Features

- It allows to maintain a list of Assets and its devices, stored in an SQL database.
- It provides all the required properties (Type, manufacturer, serial number, equipment model, etc.) to easily group the list of assets as required.
- Current asset health & overall Switchboard health.
- Maintenance Schedule & Service intervals basis OEM Info & pre-defined thresholds for timely alarm generation.
- Easy access to maintenance data – which Asset, equipment, utility, etc. has to be maintained today / this week / next month etc.
- Prediction of future faults & anticipate Switchboard health.
- Asset utilization information captured automatically from respective Asset(s).
- Access to Asset Document management system.
- Automatic Report generation based on pre-configured intervals
- Role based Authentication.
- Cyber security compliance.

Fault Management System (FMS)

Faults are unavoidable and analyzing their cause is must to protect equipment in future and reduce system stress and blackout. Various protective and measuring devices (e.g., Numerical relays, digital fault recorders, etc.) are introduced in the system to increase

system reliability and awareness of the associated conditions,

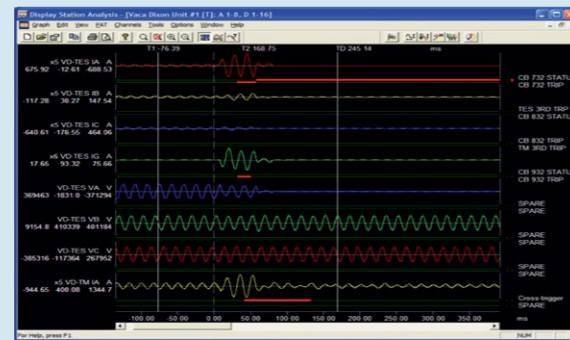
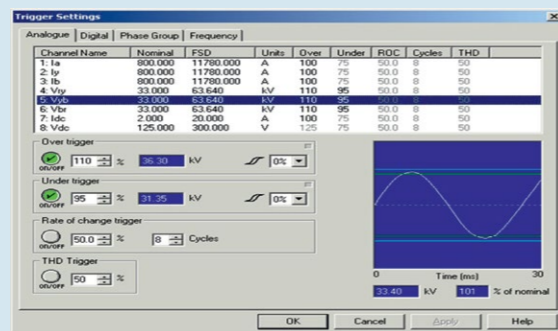


FIG: COMTRADE VIEW

Following a disturbance in a system, protection engineers are entrusted with the responsibility of analyzing the unstructured data, to better understand the behavior of protection system. Timely assessment and rectification of such data helps in operating the overall power system in a reliable manner. Traditionally, this would take few days to few weeks for the utility personnel to derive insights and come up with remedial measures. Also due to manual intervention, this may be prone to error and often hinder effective decision making.

We introduce FMS Solution for automatic download of DR files from a remote location for further analysis.



Key Features

- Disturbance & event recorder are inbuilt function of numerical relays which generate oscillography files. These files are remotely accessed via SCADA/HMI or retrieved automatically.
- A relay triggered with disturbance record, will automatically store oscillography files in the relay memory.
- Disturbance record of relays can be retrieved manually using relay software wherein user can select relay to be viewed from list of relays in the plant by entering IP address or can be configured for auto download, cyclic, or event trigger based.
- Only authorized user(s) are allowed access to disturbance records.

- Automatic fault analysis can be provided as an additional feature in the fault management system.
- Customized report generation with auto-publish feature via SMS, mails etc.
- Enables O&M to quickly analyze fault details, reduce outage time and help in proactive repair and maintenance.





SYSTEM STUDY

Now rest assured about the conditions of your switchgear assembly as we offer the superior services of our switchgear experts.

Our Service engineers are dedicated for the complete analysis of your systems so that your switchgears are not affected due to any unforeseen defects. All the site requirements and system details are collected in-order to carry out feasibility study and identify the product or switchgear assembly to be replaced along with healthiness of your entire system.

Along with Annual Audit our system study also covers all your future requirements and helps you in the budget planning.

L&T E&A's team of professionals has the best resources and proficiency in delivering fast and accurate results that ensure value addition at every stage of work contributing to the project's success.

Engineering Consultancy Services comprise of the following:

1. Powersystem Studies

- 1.1. Load Flow studies
- 1.2. Short Circuit studies
- 1.3. Motor Starting studies
- 1.4. Relay Coordination studies
- 1.5. Transient Stability studies
- 1.6. Islanding scheme
- 1.7. Arc Flash studies both at MV and LV bus

2. Power Quality studies

3. Protection System consultancy

4. Training on system studies as mentioned above

All these services are available as independent offerings to the end clients, irrespective of equipment supply.





SAFETY AUDIT

Continuous operation of switchgear for many years may reduce efficiency and may cause malfunctioning of one or more equipment(s).

Any unplanned failure of switchgear cause death, serious injury and major damage.

Safety audit helps you to identify hot-spots in the switchgear assemblies and its fault-level. It covers full panel inspection.

Detailed assessment report and recommendations from our expertise gives you exact idea about healthiness of your switchgear.

Based on safety audit reports, you can decide on further plan for improving your system's safety and reliability.

- System Fault Level Calculation
- Hot Spots Identification
- LOTO provision
- Arc Flash requirement study
- Assessment Reports
- Recommendations

PREVENTIVE MAINTENANCE

Keep your switchgear running in peak condition by preventive maintenance. We offer you agreements ranging from self-maintainer maintenance strategy to multi-engineer resident service contracts.

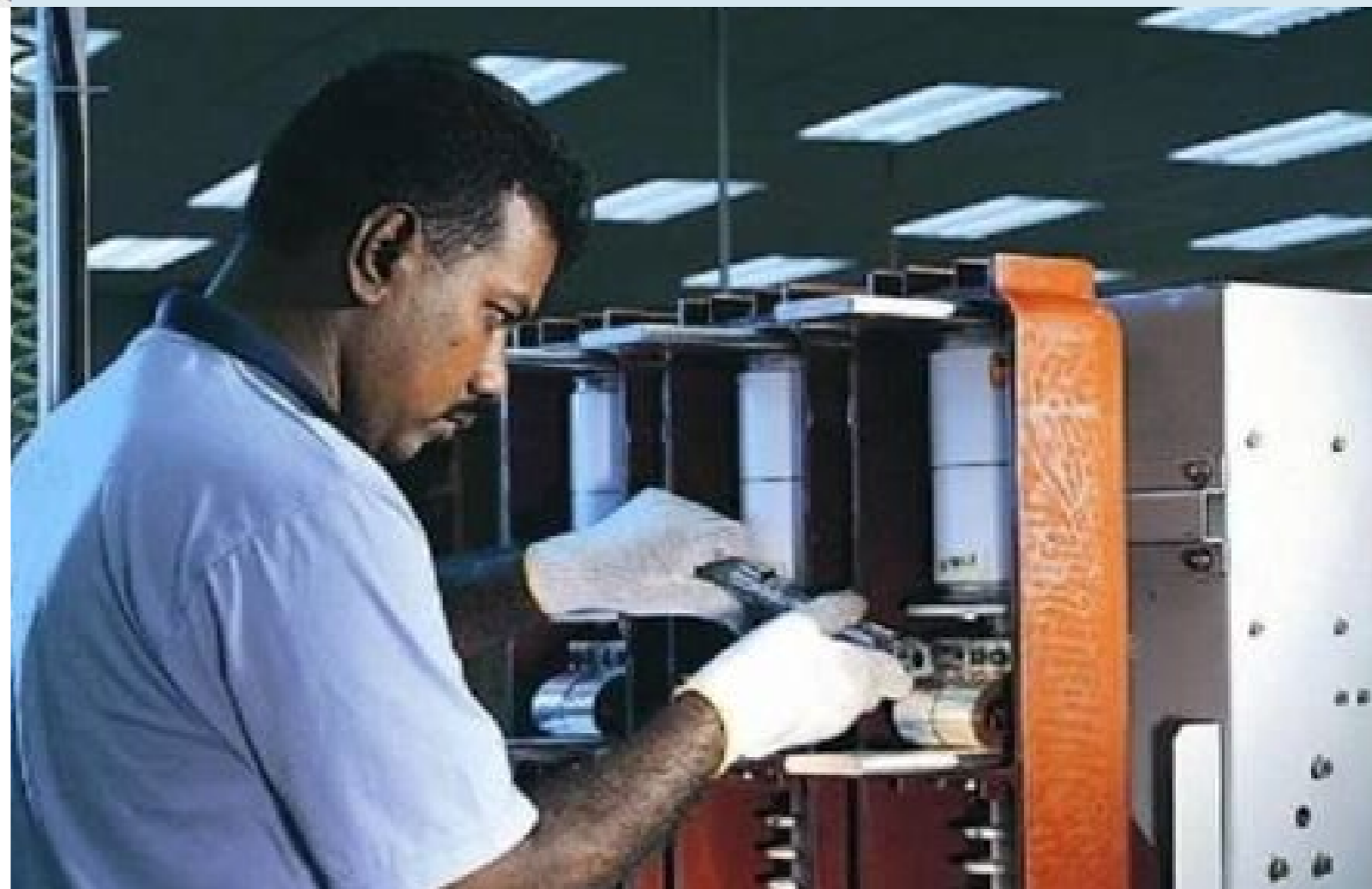
Electrical Substation Maintenance:

An E&A trained service personnel will be allocated at your site for substation maintenance.

Switchboard Maintenance:

E&A personnel will visit to your site periodically for thorough maintenance check and supervise the activities like breakdowns, ACB servicing, panel Servicing, retrofitting.

Contact us to find out which solution is perfect for you.





LEGACY SUPPORT

We give our customers more than what they expect!
We offer you customized training programs at our factories, at our training institutes or at your sites.

Class-room Training Programs:

We have well equipped modern training centres based in 3 locations in India exclusively for Switchgear and other allied electrical products. Training courses are conducted throughout the year as per published schedule to cover the essence of technical & operational features of switchgear components as well as about Relays / Digital Systems.

Onsite Training Programs:

This includes formal presentation by expertise and hands on training for your workmen making them expert in operating the supplied equipment and, hence extending its life.

PERFECT SOLUTION FOR YOUR CHANGING NEEDS



FIT RIGHT



Sales Offices - India

Bengaluru

Wework Central,
36 Infantry road,
Bangalore 560001.

Chennai

Olympia Technology Park 10th Floor,
CITIUS A Block,
Plot No.1, Phase 1,
Guindy, Chennai - 600032,
Tamil Nadu.

Hyderabad

Schneider Electric India Pvt. Ltd.
Prestige Phoenix, 4th Floor,
Near Begumpet Metro Station,
Pillar no. 1408, Uma Nagar, Begumpet,
Hyderabad-500016,
Telangana State, INDIA

Kolkata

Electrical Systems & Equipment
L&T Electrical and Automation
A Unit of Schneider Electric India
Pvt Limited
2nd Floor, BN3, Salt Lake,
Sector V, Kolkata 700091.

Mumbai

L&T Gate NO. 5,
L&T Business Park TC -II,
Tower B - 7 th Floor, Saki vihar road,
Mumbai 400 072

New Delhi

A-25, Imperia, First Floor,
Mohan Co-operative
Industrial Estate,
Mathura Road,
Near Sarita Vihar Metro Station
New Delhi- 110044

Vadodara

Notus IT park, 11th Floor, Block D,
Bhailal Amin Marg, Sarabhai Campus,
Vadodara.

Sales Offices - International

Australia

TAMCO Electrical Industries
Australia Pty. Ltd
31 Kitchen Road, Dandenong 3175
Melbourne, Victoria, Australia
Tel:+613 9706 7288
Fax:+613 9706 9112
Email: sales@tamcoaustralia.com.au
www.tamcoaustralia.com.au

India

Schneider Electric India Pvt. LTD.
Electrical & Automation Campus,
A-600, TTC Industrial Area,
Shil-Mahape Road,
Navi Mumbai - 400 710
Tel : +91-22-6722 6916
Email: ese-intl@Lntebg.com

Indonesia

PT. TAMCO Indonesia
F-36, Jalan Jababeka Raya
Jababeka Industrial Estate
Cikarang Utara, Bekasi, 17530, Indonesia
Tel.: +62 21 893 5070
Fax: +62 21 893 5071
Email: sales@tamco.co.id
www.tamco.co.id

Kuwait

Kana Controls General Trading &
Contracting Co. W.L.L
P.O Box: 25593 Safat, 13116
Kuwait
Tel: +965-2474 1373
Faxes: +965-2474 1537
Email: ese-kwt@Lntebg.com

Malaysia

TAMCO SWITCHGEAR (MALAYSIA)
SDN BHD
Sub Lot 24, Lot 16505, Jalan Keluli 1
PO Box 2100, Bukit Raja Industrial Area,
Section 7
40802 Shah Alam, Selangor, Malaysia
Tel: +603 3361 8200
Fax: +603 3341 6200
Email: tamco@tamco.com.my
www.tamco.com.my

Oman

P.O.Box 598, Ruwi,
Postal Code-112
Sultanate of Oman
Tel:+968 98034317
Mob:+968 98034317
Email: ese-oman@Lntebg.com

Qatar

2 & 3rd Floor, Building No. 209
Zone 42, Street 230
Najma Intersection,
Opp: Doha Cinema
C-Ring Road,
P.O Box No- 24399
Doha, Qatar
Tel: +974-44-239 000
Fax: +974-44-551 286
Email: ese-qatar@Lntebg.com

UAE

2203, 22nd Floor
Green Emirates Tower - A
Electra Street, P.O. Box 52514
Abu Dhabi, UAE
Tel. : +971-2-676 5988
Fax. : +971-2-676 6399
Email: ese-uae@Lntebg.com



L&T Electrical & Automation, Electrical Systems & Equipment - Head Office

7C, TC II, Tower B, Level 7, L&T Gate No. 5, Saki Vihar Road, Powai, Mumbai 400 072.
Tel: +91-22-6705 1748 Fax: +91-22-6705 1556
Email: ese-cmt@Lntebg.com Website: www.Lntebg.com

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