

Since 1961

Electrical India

India's oldest magazine on power and electrical products industry



Task Oriented Luminaires

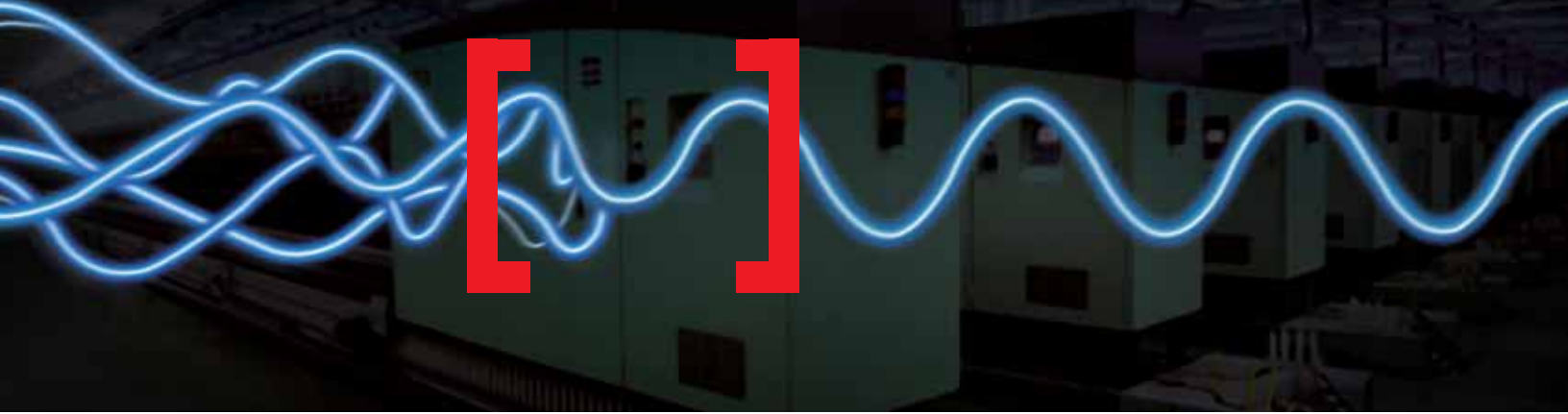
CABLE Power Carrier

- ▀ Energy Efficient LED Driver Concept
- ▀ Task-Oriented Luminaires
- ▀ Underground Cables
- ▀ CABLE - Power Carrier
- ▀ Online Partial Discharge Measurements on Power Cables
- ▀ Capacity Sufficient, Demand Deficient
- ▀ Smart Transient Free Switching of Switchgears

Smart Transient Free Switching of Switchgears



Smart is In Better Power Quality Management



Power Capacitors Capacitor Duty Contactors

Thyristor Switching Modules APFC Controller

Reactive Power Management Solutions

Active Harmonic Filter

Detuned Harmonic Filter Reactor

Harmonic Filtering Solutions

L&T Electrical & Automation, India's leading switchgear solutions company, provides Power Quality Management Solutions that help industrial and infrastructural installations operate more cost-efficiently.

Lower Bills. Higher Productivity.

Higher use of energy-saving devices leads to increased harmonics. This lowers productivity through overheating of equipment, electrical component failure and ultimately, expensive shutdowns, besides having an adverse impact on the power factor.

Our Active and Passive Harmonic Filtering Solutions help reduce harmonic distortions. Combined with our range of Reactive Power Management Solutions, they enhance the power factor and help reduce your electricity bills.

For more information on how our 'smart' Power Quality Management Solutions can ensure continuing productivity and profitability, visit www.Lntebg.com

Customer Interaction Centre (CIC)

BSNL/MTNL (Toll free): 1800 233 5858 Reliance (Toll free): 1800 200 5858
Tel: +91 22 6774 5858 Fax: +91 22 6774 5859 E-mail: cic@Lntebg.com



THE POWER OF SILVER CONTACTS

MAKING THINGS WORK, WITH THE RIGHT SILVER CONTACTS



CONTACT ASSEMBLIES



SILVER CONTACT TIPS
(AgC, AgCdO, AgNi, etc.)



SILVER WIRE



**ELECTRACON
PARADISE**
LIMITED

CONTACT MATERIALS
PURE SILVER (Ag999)
SILVER COPPER (AgCu)
SILVER TIN OXIDE (AgSnO₂)
SILVER NICKEL (AgNi)
SILVER GRAPHITE (AgC)
SILVER CADMIUM OXIDE (AgCdO)

A - 7, (G.F.) Mayapuri Industrial Area, Phase-2, New Delhi - 110 064 (INDIA)

☎ +91 8800138383 • +91-11-28115275/5475 • +91-11-45017688

E-mail: sales@paradiseind.com • Website: www.electracon.in • www.paradiseind.com



Wind power: Its important to absorb into the grid

Hello and welcome once again to *Electrical India*. Energy is the lifeline of any economy in the world and electricity is certainly one of the most crucial and critical of all infrastructures for any growing nation. And for a developed economy, power is all the more crucial because the nation needs to sustain that growth and the lifestyle.

Unlike many other nations, the power sector of our country is one of the most diversified and widely spread out into different sources of energy - from coal to wind, solar and nuclear. And with the prime minister's pet "Make in India" project taking shape,

electricity generation is going to be one of the most crucial infra projects. For the simple reason, you cannot expect investors and big corporate houses to invest money in India unless there is non-stop electricity 24 hours a day, 365 days a year.

The world is staring today at a serious environment crisis. Should we then get deeper into this trap by going for more coal-based power? Can we not learn from the so-called mistakes of the super powers and more so from our next door neighbour China, who went in for rampant thermal power plants, thereby creating a devastating environment problem there? What the western powers did was when there was not enough technology. Coal was the main source of power in the fifties through eighties. What China did was a serious environmental catastrophe because they generated more electricity, mainly from coal, in just about a decade as compared to the nearly six to seven decades that the United States took to generate the same energy.

The Modi-government has an ambitious plan of generating almost 40% of our electricity through renewable by 2030 - that is close to 125,000 MW, a commitment made by the country at UN Climate change meet in Paris in 2015. We are now reaching the mid-way mark as of current generating capacity. By 2030, we would need to generate close to 150,000 MW through clean energy. The dynamic power minister, Mr Piyush Goyal is though very optimistic. He is a man who is open to new ideas and thinking. He recently announced that India is ready to experiment with offshore wind power projects as well - and why not, with a coast line of nearly 7,500 kms. China is planning to eclipse the world offshore power capacity by 2020 with nearly 30GW.

But let us not repeat the mistakes what China made. You need to have a proper electricity absorbing mechanism by the grid from the power generated through renewable. China, which is the world's largest clean energy investor is facing this issue with its record installations of solar and wind power. The mis-match in the ability to deliver renewable generated at far off places to places where it is required has led to many renewable companies in trouble. We certainly would not like to repeat that mistake in our country. Hope you enjoy reading this issue as much as we have in bringing this to you.

Do send in your comments at miyer@charypublications.in

Publisher & Editor-In-Chief

Vol 57. Issue No. 5 • May 2017

Directors

Pravita Iyer
Mahadevan Iyer

Publisher & Editor-In-Chief

Mahadevan Iyer
miyer@charypublications.in

Editorial Co-ordinator

Nafisa Kaisar
nafisa@charypublications.in

Advertising Department

Director Advertisement

Pravita Iyer
pravita@charypublications.in

Advertising Manager

Yasmeen Kazi
yasmeen@electricalindia.in

Design

Nilesh Nimkar
charydesign@charypublications.in

Sub-Editor

Dhanya Nagasundaram
edit@charypublications.in

Subscription Department

Nafisa Khan
sub@charypublications.in

Accounts

Dattakumar Barge
accounts@charypublications.in

Customer Care

Sonali Pugaonkar
mktg@charypublications.in

Electrical India is also available online on www.electricalindia.in. For online enquiries contact at: dgmarketing@charypublications.in

Single Issue: ₹ 100 / Annual Subscription: ₹ 1000

Disclaimer

Chary Publications does not take responsibility for claims made by advertisers relating to ownership, patents, and use of trademarks, copyrights and such other rights. While all efforts have been made to ensure the accuracy of the information in this magazine, opinions expressed and images are those of the authors, and do not necessarily reflect the views/ collection of the owner, publisher, editor or the editorial team. Chary Publications shall not be held responsible/ liable for any consequences; in the event, such claims are found - not to be true. All objections, disputes, differences, claims & proceedings are subject to Mumbai jurisdiction only.

Printed, Published and owned by Mahadevan Iyer from 906, The Corporate Park, Plot 14 & 15, Sector 18, Vashi, Navi Mumbai 400703 and Printed at Print Tech., C-18, Royal Indl Estate, Naigaum Cross Road, Wadala, Mumbai - 400 031. Editor: Mahadevan Iyer



Manufacturing & Marketing of T&M Instruments

Test & Measurement Instruments for HV/EHV Substation Equipment

On-line Monitoring Systems for EHV Substation Equipment & Transmission Lines

Supply of complete package of T&M, Tools & Tackles and Safety Equipment to projects through dedicated Project Business Group (PBG)

Calibration & Annual Maintenance Contract Services



Simple solutions for difficult measurements®

**New Generation Wireless
Test system for Surge Arrestor
...SA 30i+**



**Discharge the battery bank
as well as monitor each cell...
...with BLUe**



- > PC Downloading and Analysis Software
- > Cell Monitoring Unit - CELLMon
- > Various models of BLUe Series are available



Corporate Office
402, Aarus Chamber, Annex - A,
S. S. Amrutwar Marg, Worli,
Mumbai 400 013, INDIA.

T : +91 22 4344 4244
E : marketing@scopetnm.com
W : www.scopetnm.com

contents

Vol. 57 | No. 5 | May 2017

ARTICLES

- 30** Energy Efficient LED Driver Concept
– Hardik Rupareliya, Aniket Goswami
- 36** Task-Oriented Luminaires
– Rajesh Chourishi
- 46** Underground Cables
– Munazama Ali
- 48** CABLE - Power Carrier
– Simmi Sharma
- 52** Online Partial Discharge Measurements on Power Cables
– Dr B Nagehwar Rao, K P Meena, R Arunjothi
- 68** Capacity Sufficient, Demand Deficient
– Salil Garg
- 71** Smart Transient Free Switching of Switchgears
– Er K K Murty

FEATURES

- New Initiatives & Policy for Power Sector 28
- Energy Chain for Extreme Dynamics with Low Noise 44
- ABB India to reinforce Bangladesh power grid ... 58
- Green DEIF World 64
- Wireless Power Transmission Safely Charges Devices Anywhere Within a Room 60
- L&T Makes its Mark in Bangladesh Power Sector . 61
- Siemens to Supply Wind Turbines for Two Projects in Northern Germany 62
- Copper Is Essential to Modern, Sustainable Electric Grids 66
- Polar Lighting Poles 72
- Villages Electrified Across the Country 78



DEPARTMENTS

- Publisher's Letter..... 04
- News 08
- Appointments 22
- Awards 24
- Statistics..... 73
- Event Calender 79
- Product Avenue..... 80
- Index to Advertisers..... 86



A multimeter for those
 who are **young** not only by age,
 but by thinking !



Pocket Size



Protective Holster
 with mounting Clip



Non-Contact
 Voltage Detection



Economical

Rishabh i Young

Compact, Handy & Trendy!

- 3999 counts measurement
- 600V AC/DC, 10 A AC/DC current measurement
- IP 52 for Instrument and IP 20 for Sockets
- Resistance, Continuity testing, Capacitance, Frequency and Duty Cycle Measurement
- 2 Variants - With Current measurement - Rishabh i young and without current measurement - Rishabh young



Measure



Control



Record



Analyze

RISHABH INSTRUMENTS PVT. LTD.

Trishala Unit, C-6, NICE Area, MIDC, Satpur, Nashik - 422007, India.

Tel: +91 253 2202371 / 028 | Fax: +91 253 2351064 | E-mail: marketing@rishabh.co.in | www.rishabh.co.in

GARV App upgraded for Monitoring Villages and Households Electrification

Grameen Vidyutikaran (GARV) App has been upgraded for monitoring the villages and households electrification in the country. This was stated by Piyush Goyal, Minister of State (IC) for Power, Coal & New and Renewable Energy and Mines in a written reply to a question in the Lok Sabha. GARV-II includes monitoring of electrification of habitations as well as households. It also provides an interactive platform for feedback and would help in expediting electrification works.



(DDUGJY) with total investment of Rs.43,033 crore in the country in December, 2014 with the objectives of, inter-alia, (i) Village Electrification; (ii) Providing access to households; (iii) Feeder Separation; (iv) Strengthening of sub-transmission and distribution network and (v) Metering.

Under DDUGJY, projects of an amount of Rs.42, 553.17 crore have been sanctioned for rural electrification works which include village electrification, access to households, feeder separation, metering and system strengthening, the Minister added. **EB**

Regarding Rural Electrification Programme the Minister stated that Government of India has launched Deendayal Upadhyaya Gram Jyoti Yojana

electrification, access to households, feeder separation, metering and system strengthening, the Minister added. **EB**

India becomes net exporter of electricity for the first time

As per Central Electricity Authority, the designated Authority of Government of India for Cross Border Trade of Electricity, first time India has turned around from a net importer of electricity to Net Exporter of electricity. During the current year 2016-17 (April to February 2017), India has exported around 5,798 Million Units to Nepal, Bangladesh and Myanmar which is 213 Million units more than the import of around 5,585 Million units from Bhutan. Export to Nepal and Bangladesh increased 2.5 and 2.8 times respectively in last three years.



power to Nepal further increased by around 145 MW with commissioning of Muzaffarpur (India) – Dhalkhebar(Nepal) 400kV line (being operated at 132 kV) in 2016.

Export of power to Bangladesh from India got further boost with commissioning of 1st cross border Interconnection between Baharampur in India and Bheramara in Bangladesh at 400kV in September 2013. It was further augmented by commissioning of 2nd cross border Interconnection between Surjyamaninagar (Tripura) in

India and South Comilla in Bangladesh. At present around 600 MW power is being exported to Bangladesh.

Export of power to Nepal is expected to increase by around 145 MW shortly over 132 kV Katiya (Bihar) – Kusaha (Nepal) and 132 kV Raxaul (Bihar) – Parwanipur (Nepal).

A few more cross border links with neighbouring countries are in pipe line which would further increase export of Power. **EB**

Ever since the cross border trade of electricity started in mid-Eighties, India has been importing power from Bhutan and marginally exporting to Nepal in radial mode at 33 kV and 132 kV from Bihar and Uttar Pradesh. On an average Bhutan has been supplying around 5,000- 5500 Million units to India.

India had also been exporting around 190 MW power to Nepal over 12 cross border interconnections at 11kV, 33kV and 132 kV level. The export of

Cabinet approves the signing and ratification of MoU for an establishment

The Union Cabinet chaired by the Prime Minister Narendra Modi has approved the proposal of the Ministry of Power for Signing of 'Memorandum of Understanding (MoU) for Establishment of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Grid Interconnection'. It will be signed among member states of BIMSTEC at the upcoming 3rd BIMSTEC Energy Minister's Meeting to be held in Nepal shortly. The BIMSTEC is an international organisation involving a group of countries in South Asia and South East Asia viz. Bangladesh, India, Myanmar, Sri Lanka, Thailand, Bhutan and Nepal.

This MoU will provide a broad framework for the parties to cooperate towards the implementation of grid interconnections for the trade in

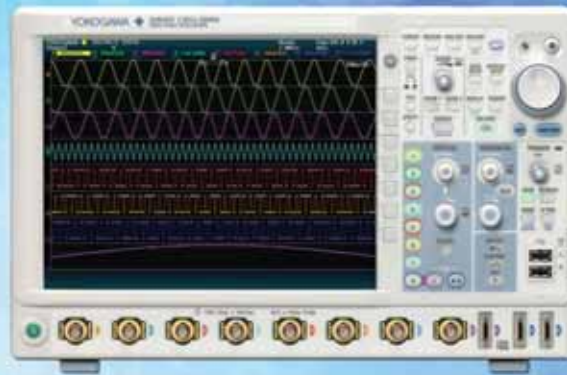
electricity with a view to promoting rational and optimal power transmission in the BIMSTEC region. This MoU will facilitate:

- (i) the optimisation of using the energy resources in the region for mutual benefits on non-discriminatory basis subject to laws, rules and regulations of the respective Parties;
- (ii) the promotion of efficient, economic, and secure operation of power system needed through the development of regional electricity networks;
- (iii) the necessity of optimisation of capital investment for generation capacity addition across the region; and
- (iv) power exchange through cross border interconnections. **EB**

When 4 channels are not enough..

DLM4000 - Mixed Signal Oscilloscope

DLM4000



Key Features:

- Eight analog input channels
- Channel 8 can be converted to 8-bit logic input
- Additional 16-bits of input logic, for a total of 24-bits (optional)
- Jog shuttle and rotary knob
- Four-direction selection button
- Two USB terminals on front panel

www.tmi.yokogawa.com

QUALITY ■ INNOVATION ■ FORESIGHT
QUALITY ■ INNOVATION ■ FORESIGHT

YOKOGAWA ◆


Power Purchase Agreement for Rewa Ultra Mega Solar Power Project signed

Union Minister of State (IC) for Power, Coal, New & Renewable Energy and Mines, Piyush Goyal, presided over the signing of Power Purchase Agreements (PPA) between Delhi Metro Railways Corporation (DMRC) & Madhya Pradesh Power Management Company (MPPMC) with Rewa Ultra Mega Solar Limited, the implementing agency for the 'world's largest singlesite solar power project', the Rewa Ultra Mega Solar Power Project (UMSPP, 750MW) in Bhopal.

Other dignitaries present on the occasion were Union Minister for Urban Development, Housing & Urban Poverty Alleviation and Information & Broadcasting, M. Venkaiah Naidu and Shivraj Singh Chouhan, Chief Minister of Madhya Pradesh.


Naidu said that Madhya Pradesh is a special state having huge resource

base that is being harnessed under Chouhan's leadership. Taking a huge step towards realising Prime Minister Narendra Modi's vision of 24x7 Affordable, Quality Power for All, Madhya Pradesh has successfully brought down the rate of solar power to Rs. 3.30/ unit, which is a huge revolution in its own right, Naidu noted.

Goyal also mentioned that with Prime Minister Narendra Modi's leadership and cooperation of all Chief Ministers of various States, in the last 3 years, renewable energy has seen a growth of over 370 %. As compared to 2,600 MW of installed solar power capacity in 2014, today in India there is a total of 12,200 MW of installed solar power capacity and the country would achieve the 20,000MW solar power capacity target 5 years ahead of schedule by the end of 2017, the Minister noted. 

Mizoram becomes 27th State to join UDAY

The Government of India and the State of Mizoram signed a Memorandum of Understanding (MOU) under the scheme Ujwal DISCOM Assurance Yojana (UDAY) recently for operational improvement of the State's Power Distribution Department. With the signing of MoU by Mizoram, the total States/ Union territories covered under UDAY will be 27. Mizoram would derive an overall net benefit of approximately Rs.198 crores by opting to participate in UDAY, by way of cheaper funds, reduction in AT&C and transmission losses, interventions in energy efficiency, etc. during the period of turnaround.


The MoU paves way for improving operational efficiency of the Power Distribution department of the State. Through compulsory Distribution Transformer metering, consumer indexing & GIS mapping of losses, upgrade/change transformers, meters etc., smart metering of high-end consumers, feeder audit etc. AT&C losses and transmission losses would be brought down, besides eliminating the gap between cost of supply of power and realisation. The reduction in AT&C losses and transmission losses to 15% and 2.50% respectively is likely to bring additional revenue of around Rs.166 crores during the period of turnaround. 

Government takes measures to improve the efficiency of coal based Thermal Power Plants

The Government has taken several measures to improve the efficiency of coal based thermal power plants and improve the air quality in the vicinity of coal based thermal power plants. Piyush Goyal, Minister of State (IC) for Power, Coal & New and Renewable Energy and Mines stated this in a written reply to a question in the Lok Sabha. The steps are as follows:

- i) Supercritical technology has already been adopted for thermal power generation. The design efficiency of Supercritical units is about 5% higher than typical 500 MW subcritical units and these (supercritical) units are likely to have correspondingly lower fuel consumption and CO₂ emissions in ambient air. A capacity addition of 39,710 MW based on supercritical technology has already been achieved and 48,060 MW of supercritical is in the pipeline.
- ii) All Ultra Mega Power Projects (UMPPs) are required to use supercritical technology.
- iii) Coal based capacity addition during 13th Plan shall be through super-critical units.
- iv) Indigenous research is being pursued for development of Advanced Ultra Supercritical Technology (A-USC) with targeted efficiency improvement of about 10% over supercritical unit. Indira Gandhi Centre

for Atomic Research (IGCAR), NTPC and BHEL have signed an MoU in August 2010 for development of 800 MW A-USC indigenous demonstration plant with main steam pressure of 310 kg/cm² and temperature of 710/ 720 deg C.

- v) A capacity of about 7751.94 MW of old and inefficient unit has already been retired till date.
- vi) To facilitate State Utilities/IPPs to replace old inefficient coal based thermal units with supercritical units, Ministry of Coal, Government of India has formulated a policy of automatic transfer of LOA/Coal linkage (granted to old plants) to new (proposed) super-critical units.
- vii) Perform Achieve and Trade (PAT) Scheme under National Mission on Enhanced Energy Efficiency is under implementation by BEE (Bureau of Energy Efficiency). In PAT cycle-II, individual target for improving efficiency has been assigned to 154 thermal power stations.
- viii) High efficiency Electrostatics Precipitator (ESP) are installed to capture Particulate Matters (Fly ash) from Flue gases.
- ix) Low NO_x burners are installed for reducing NO_x emission from flue gases.
- x) SO₂ emission control is achieved through dispersion of flue gases through tall stacks (275 metres) to reduce the concentration of polluting gases at ground level. 



Reliable Power for a Sustainable World.



Riello UPS win
New Product Innovation Award 2015
FROST & SULLIVAN

Global Leaders in Uninterruptible Power Supply Systems

Riello: 1st European manufacturer to rate its product for Eco-Energy Level efficiency

- Riello is one of largest manufacturer of UPS System
- Complete range from 1kVA - 6400 kVA
- Riello Power India has delivered over 10000 successful installations in India & Indian subcontinent
- Technical Support Team at your service 365 days 24 x 7
- PAN India presence with offices in all major cities

When it comes to expertise in Uninterrupted Power supplies Riello Power India has it all

- IGBT Rectifier / IGBT Inverter with built in galvanic isolation transformer
- Advanced Battery Management
- Very Low Total Harmonic Distortion (THDI < 3%)
- High Input Power Factor > 0.99
- High Output 0.9 (High Watt)
- Overall efficiency upto 95%

★ ★ Dealers and Distributors are Invited ★ ★



Prime Tower, Plot No: 287-288, Udyog Vihar, Phase - II, Gurgaon-122015, Haryana (India)
 Tel: +91-124-6656999 Mob:07838552211 Fax: +91-124-4871698 Email: ups@riello-power.com Web: www.riello-ups.in


Azure Power(s) defence establishments in Maharashtra

Azure Power, a well known solar power producer in India, commissioned 7 MWs of solar plant capacity in the state of Maharashtra and is the first private solar power project to be set up at defence establishments under Ministry of Defence, Government of India. The project was done in collaboration with Solar Energy Corporation of India (SECI) which is the designated nodal agency for implementation for Ministry of Defence and Para Military Forces. Azure Power won this project under the National Solar Mission. The power generated is sold to Ministry of Defence establishments under a 25-year power purchase agreement at a blended tariff of INR 5.36 (~US 8 cents) per kWh. In addition, SECI will provide viability gap funding of INR 1.73 million for this project.



Inderpreet Wadhwa

Inderpreet Wadhwa, Founder and Chief Executive Officer, Azure Power, said, "We are pleased to be the first private company to supply solar power to the Defence Ministry in the country. This project demonstrates the value of solar as an innovative and affordable resource at the point of consumption by eliminating transmission costs."

Azure Power has led the Indian solar industry with many firsts and innovative applications of solar power. Azure set up India's first private utility scale solar PV power plant in 2009, followed by India's first MW scale distributed rooftop solar power project in Gandhinagar, Gujarat, in 2013 and became the first solar power producer in the country to supply affordable solar power to border outposts in Rajasthan under the National Solar Mission. 

GMR Energy signs MoU with TNB Remaco

GMR Energy Limited (GEL), a subsidiary of GMR Infrastructure Ltd. and TNB Repair and Maintenance Sdn Bhd (TNB Remaco) has inked a Memorandum of Understanding (MoU) to collaborate and set up an O&M joint venture.

TNB Remaco, a Malaysia's premier specialist in power plant repair and maintenance with a proven track record of over 30 years, is the repair and maintenance arm of Tenaga Nasional Berhad (TNB). TNB, which is the largest power utility player in Malaysia with an integrated presence across the value chain of power generation, transmission and distribution, recently invested USD 300 mn (Rs 2,000 Cr) in GMR Energy Limited to take up a 30% equity stake in select portfolio of GEL assets on fully diluted basis.

The O&M JV between GMR Energy and TNB Remaco will provide operation and maintenance services, performance improvement services, testing and diagnostic services, repair and refurbishment services for power plants in India. For this purpose, the JV plans to setup a refurbishment/maintenance facility in India. This will be the first time that TNB Remaco shall be investing in a facility outside of Malaysia.


As per the three-year MoU, GEL and TNB Remaco will identify business opportunities in the high-potential Indian market and provide operation



GM Rao

and maintenance services to the power plants. This O&M JV is a logical business extension for GEL to leverage the significant O&M expertise of TNB. Through this JV, GEL and TNB Remaco will extend their technical expertise to the several power plants in India. This is a niche market and with increased focus on cost management by the power plants in the country, there is a vast opportunity. In addition, TNB Remaco's expertise would also facilitate GEL in improving the performance of its operational assets.

GM Rao, Group Chairman, GMR Group, said, "India's substantial and sustained economic growth is placing enormous demand on its energy resources. The demand and supply imbalance in energy sources is pervasive requiring serious efforts by Government of India to augment energy supplies.

The key objective behind signing the MoU is to optimise the operations of the Indian power plants in a bid to enhance availability, output, efficiency of power plants along with power plant life. The partnership with TNB Remaco signifies the GMR Group's commitment towards a holistic improvement of the power plants in India. It also shows that the global investors are reposing faith in the long term growth of the Indian power sector." 

NALCO dedicates 100.80 MW of Suzlon's Wind Power Plants to the Nation

NALCO dedicated 100.80 MW of Wind Power Plants to the Nation. Jual Oram, Minister for Tribal Affairs and Piyush Goyal, Minister of State (IC) for Power, Coal, New & Renewable Energy and Mines were present on the occasion at Bhubaneswar, Odisha.

Suzlon Group, a well known global renewable energy solutions provider in the world, has installed and commissioned 2 renewable projects of 50.40 MW each for NALCO at Gondikota in Andhra Pradesh and Jath in Maharashtra. Both the projects



have the potential to provide power to over 54,000 households and reduce 0.20 million tonnes of CO2 emissions per annum.

J.P. Chalasani, Group CEO, Suzlon Group, said, "It is a proud moment for us and we thank NALCO for the faith and confidence reposed in Suzlon's technologically advanced products, execution and life cycle asset management capabilities. We will continue to collaborate with NALCO and look forward to work in synergy towards our common goal of reducing the carbon footprint." 

Futuristic. Aesthetic. Luxurious.
Presenting Vimar, Italy's finest Switches.



Strategic Partner,

 **GreatWhite**[®]
THE FUTURE OF BRIGHT

HOME AUTOMATION | TOUCH SWITCHES | SCENARIO CONTROL
CURTAIN CONTROL | HOSPITALITY RANGE | VIDEO DOOR PHONE

Vimar products are available at:

Delhi-See India Electricals-23873762 • Jaipur-Madhu Traders-9414307012 • Ludhiana-Madhav Enterprises-9876619948 • Mumbai-Genuine Home Care Products-9819103330, Jlnshree Technologies-9820747450 • Nagpur-New Samrat Electricals-0241 2419211 • Noida-Aggarwal Electric Home-01202550786 • Panipat-Sanmati Electric-01802636758 • Pune-NDElectricals-9822246644 • Vadodra-Bharat Electricals-8527608039

Vimar System Integrators:

Bangalore-Defa Solution-9845337789 • Chennai -VenbaTech-9677117799 • Delhi / Noida / Raipur-Grow More Hitech Pvt Ltd.-9910012326 • Jaipur-Vow Automation-9892238012 • Kochi-Mixcraft Automation-984666111 • Mumbai / Delhi-KNX Solutions-9821822715 • Mumbai / Kolkata / Jaipur-Light & Magic Automation-9892238012 • Pune / Satara-Secure Dreams-020 24411993

RaysExperts commissions 5.5 MW Solar project for DMRC

RaysExperts, India's well known innovative solar solutions provider and one of the largest solar power EPC & Development companies, has commissioned a 5.5 MW solar project for Delhi Metro Rail Corporation (DMRC). This will be one of the largest distributed rooftop solar plants setup across India. The company's solar installation will supply power to multiple metro stations, cleaning bays, parking yards and other metro rail supporting facilities. The project has the capacity to produce 87 million units of power every year.

The entire power plant is spread across 42 different roofs. The largest installed system has a capacity of 725 KWp, while the average capacity is 131 KWp. Association with DMRC makes RaysExperts one of the most prominent solar EPC developers across India, creating a network that is both



Rahul Gupta

environment-friendly and efficient.

Rahul Gupta, Founder, RaysExperts, said, "Delhi Metro is the 12th largest public metro system in the world, serving a total of 160 stations spanning across 213 kilometres, and helping 3 million commuters daily. However, this kind of infrastructure also consumes huge amount of electricity and a major share from the city's electrical grid consumption. As a consequence, it accounts for a large amount of CO₂ gas emissions, and also becomes costlier with each passing year. Thus, to alleviate such concerns, we were compelled to find an alternative source that can optimise DMRC's power consumption, and in the process, reduce its carbon footprint. The power generated from our solar installation system has the potential to offset 7200 Tonnes CO₂ every year."

THDCIL commissions its 2nd wind power project at Dwarka, Gujarat

THDC INDIA LIMITED (THDCIL), a pioneer and Mini Ratna, Schedule A PSU under Ministry of Power, Govt. of India have commissioned its 2nd wind power project of 63 MW capacity in District Devbhumi Dwarka, Gujarat on 31.03.2017.

This 63 MW wind power project awarded to M/s Suzlon Energy Limited on 28th November 2016 with scheduled commissioning period of 4 months was actually implemented and commissioned in a record period of 3 months- after obtaining Developer Permission and Transfer Permission from Govt. of Gujarat in December 2016. In this wind power project of 63 MW capacity (30 @ 2.1 MW = 63 MW), each Wind Turbine Generator (WTG) is of 2.1 MW capacity hybrid model with WTG height of 120 metres.

This has been the toughest project in the history of



63 MW Wind Project Site at Dwarka

THDCIL and was successfully commissioned under the able and visionary leadership of D. V. Singh, Chairman & Managing Director, THDCIL. By commissioning this project on 31st March 2017, THDCIL has become entitled to receive Generation Based Incentive (GBI) of Rs. 63 Crore from Govt. of India. It is a landmark achievement for THDCIL, whose installed generation capacity has now increased to 1513 MW.

THDCIL is one of the premier power generators in the country with installed capacity of 1513 MW with commissioning of Tehri Dam & HPP (1000MW), Koteswar HEP (400MW) and Wind Power Projects of 50MW at Patan & 63MW at Dwarka in Gujarat to its credit.

Vikram Solar commissions 10 MW solar plant in Andhra Pradesh

Vikram Solar, a well known EPC solutions provider and PV module manufacturer, successfully commissioned a 10 MWp capacity solar plant in Andhra Pradesh. The project has been developed under the PPA scheme between Tirumala Tirupati Devasthanams (TTD) and Vikram Solar. The project will facilitate green power generation to cater to the energy needs of one of the most famous religious landmarks in India.

The solar plant is installed in TTD's land located in Chittoor district. The plant covers approximately 67 acres of area and has a power generation capacity of 10 MWp. Vikram Solar has used Poly-crystalline non-DCR high efficiency modules to ensure maximum yield and performance consistency. The module range



Gyanesh Chaudhary

includes 310, 312.5, and 315 Wp modules. The generated power is being evacuated at 33 kv ratio and it is being fed to Muvivedu sub-station. The plant is also expected to save about 15,143.5 metric tonnes of CO₂ annually.

Gyanesh Chaudhary, MD & CEO, Vikram Solar, commended the meticulous planning and aggressive work pace that team Vikram has shown in handling the project – "This project is yet another reiteration of our decade's experience and superior quality standards in the execution of EPC projects.

With this project, our total commissioned EPC project capacity has reached 305 MW in India, and we are looking forward to many more such projects to be executed in the near future."

Comprehensive range of surge protection solutions



NEW
LINE



Surge-Trap®

Lightning current arresters and surge protective devices
Type 1, Type 1+2, Type 2 and Type 2+3 SPD's to EN/IEC 61643



Mersen India Pvt Ltd
(EP Activity)
Plot no 19, 4th Cross,
Bommasandra Industrial Area,
Bangalore- 560099
Email: sales.ep.india@mersen.com
Tel: +91 80 27834005/4006
Website: www.ep.mersen.com

Download the new Surge-Trap® brochure on:
ep.mersen.com

MERSEN
Expertise, our source of energy

Basler Electric acquires E² Power Systems

Basler Electric, a manufacturer of excitation systems, voltage regulation products, protection relaying equipment, and genset controllers, revealed the acquisition of E² Power Systems of Littleton, CO. Basler Electric has long been respected for its ability to provide quality and reliability while focusing on its customers' needs. The acquisition of E² Power Systems allows Basler to better meet their needs with a total offering of product and engineering services.


E² Power Systems, in business for more than 30 years, provides high quality engineering and installation services to the power generation,



Gregory S. Basler, Executive Vice President, Basler Electric Company; John A. Estes, Jr., President, E²PSI; Barry A. Postl, PE, Vice President, E²PSI; Gary D. Dolbear, President and COO, Basler Electric Company

power distribution, and controls markets, and has a reputation for dependable service to a long list of satisfied customers. Their wealth of knowledge and experience includes expertise in the areas of field service, system studies, NERC compliance testing, system upgrades, and turnkey services.

The combination of experience and customer focus enhances the companies' combined goal to provide outstanding

technical support, product, and engineering services that exceed customers' expectations. Basler's reputation for quality, reliability, and world class customer service are enhanced with this acquisition. 


Beaver Valley Power Station Unit 2 begins Refuelling and Maintenance Outage

FirstEnergy Nuclear Operating Company (FENOC), a subsidiary of FirstEnergy Corp., revealed its Beaver Valley Power Station Unit 2 in Shippingport, Pa., shut down at 12:01 a.m. on Saturday, April 22, for scheduled refueling and maintenance.

While the unit is offline, one-third of the 157 fuel assemblies will be replaced and numerous safety inspections will be conducted, including inspections of the unit's reactor vessel head, turbine and electrical generator. In addition, preventive maintenance to ensure continued safe and reliable operations will be performed on major components including the plant's

three steam generators, which convert super-heated water from the reactor to steam which turns the plant's turbine to create electricity, as well as various pumps, motors, valves and the cooling tower.

More than 1,000 temporary contractor workers and FENOC and FirstEnergy employees will supplement the Beaver Valley workforce during the outage.

The 933-megawatt Beaver Valley Unit 2 has operated safely and reliably, generating more than 11.5 million megawatt hours of electricity since the completion of its last refuelling in October 2015. 

JICA joins IFC, others to support Bangladesh Address Electricity Generation Needs

IFC, a member of the World Bank Group, has brought in Japanese agency JICA to invest \$30 million in Sembcorp North-West Power Company Ltd., a joint venture of Sembcorp Utilities and Bangladesh's state-owned North-West Power Generation Company Ltd- that is building a 414MW dual-fuel combined-cycle power plant at Sirajganj, Bangladesh. The plant will significantly expand power-generation capacity in Bangladesh.

JICA's \$30 million is part of the total financing package of \$ 165 million that includes a loan from IFC's own account as well as additional loans mobilised through partners. The total project cost is estimated at around \$412 million.

Nearly 40 % of Bangladesh's 160 million population live without access to electricity. Citizens encounter frequent blackouts. Severe power shortages are a major bottleneck for the growth of the job-creating manufacturing sector, hampering economic growth and poverty-alleviation efforts.

The power plant will be the second largest power plant in the country and represents the largest foreign direct investment into this sector in recent



Tang Kin Fei

years. The success of the project will demonstrate the profitability and sustainability of public and private-sector partnerships in Bangladesh's power sector to international players, helping attract additional capital to the sector.

IFC promotes sustainable growth and private-sector development in Bangladesh by investing in critical infrastructure, boosting financial inclusion, enhancing textiles competitiveness, and supporting reforms to make doing business easier for the private sector. IFC committed \$635 million in Bangladesh, in own and mobilised funds across 13 projects, for the fiscal year ended June 30, 2016. IFC's committed portfolio in Bangladesh is about \$1 billion in 47 projects.

Tang Kin Fei, Group President and CEO, Sembcorp Industries, said, "Sembcorp's commitment towards supporting Bangladesh's vision for continued growth and development is further strengthened with support from JICA, IFC, and other global investors. Sembcorp's Sirajganj power plant will provide cost-effective and reliable energy solutions to the country for more than 22.5 years after its completion." 

A NEW LINK BETWEEN PV & GENSET POWER PLANTS

DEIF has a strong track record in developing emergency, standby and backup power solutions for mission-critical facilities and businesses.

Designed to serve as a link between photovoltaic (PV) power plants and genset power plants, DEIF's Automatic Sustainable Controller (ASC Plant Management) is an automated, safe and reliable control solution for PV/genset hybrid plants.

The ASC Plant Management solution is suitable for stand-alone applications with or without DEIF controllers and for power management applications equipped with DEIF's AGC Plant Management Controllers. It supports numerous communication protocols for inverter interfacing, including the widely used SunSpec protocol.

SPECIALIST POWER CONTROL SOLUTIONS.



UNIQUE CONTROL SOLUTION FOR PV/GENSET HYBRID PLANTS

- Simple graphical configuration
- Maximised PV penetration
- Minimum genset load requirement
- Spinning reserve demand
- Monitoring and supervision
- Record-time commissioning with DEIF Emulation



The DEIF Group: Sales, Training & Competence Centres in 16 Key Markets.

DEIF India Pvt. Ltd., 602, Town Centre II, Andheri, Kurla Road, Sakinaka Andheri (East), Mumbai 400 059 MH, India
Tel.: (+91) 22 4245 2000, Fax: (+91) 22 4245 2020, india@deif.com, www.deif.com

Smart Meters market to be worth 19.98 Billion US\$ by 2022

According to a report by MarketsandMarkets, the smart meters market is expected to grow from an estimated USD 12.79 Billion in 2017 to USD 19.98 Billion by 2022, registering a CAGR of 9.34% from 2017 to 2022. The global market is witnessing a significant growth, which is driven by government policies, energy conservation, increasing smart grid deployment, and utilities urge to enhance distribution efficiency.



time savings of energy would increase.

The North American market dominates the smart meters market during the forecast period. In North America, the growth of the smart meters market can be attributed to focus on electricity, water, & gas, monitoring & prevention of leakage, and the repair & upgrade of aging infrastructure. Lot of smart meters rollouts are taking place in countries such as the U.S., Canada, and Mexico which would impart growth

The smart meters market in this report has been classified based on application, into three segments, namely, residential, commercial, and industrial. The residential segment accounted for the largest market size, in terms of value, in 2016. The meters measure the electricity, water, and gas consumption and communicate this to the central utility system.

The installations of these devices in the residential sector helps in reducing CO₂ emissions globally as the consumer's inclination towards peak

in the North American region.

The leading players in the smart meters market are Itron, Inc. (U.S.), Kamstrup A/S (Denmark), Holley Metering, Ltd. (China), Honeywell International, Inc. (U.S.), and Toshiba Corporation (Japan).

Leading players are trying to penetrate the markets in developing economies and are adopting various strategies to increase their market share. E

Wärtsilä to power world's first LNG fuelled offshore construction vessel

The technology group Wärtsilä is to supply the engines and other propulsion machinery for a new offshore construction vessel being built at the Cosco shipyard in China. The ship owner is Belgian operator Dredging International (DEME). This will be the first vessel of its kind to be fuelled by liquefied natural gas (LNG) and in addition to the dual-fuel engines; Wärtsilä will also provide its LNGPac fuel storage and supply system and propulsion systems. The orders with Wärtsilä were booked in the fourth quarter of 2016 and in February 2017.



Offshore construction vessel being built for DEME

customs made retractable thrusters, four underwater demountable thrusters, the Wärtsilä LNGPac storage and supply system, as well as commissioning, site supervision and extended project management services. The Wärtsilä equipment is scheduled for delivery to the yard in the latter part of 2017.

The 'Orion' is expected to be delivered to the owners in 2018 and will undertake operations involving the installation of offshore windfarms in locations around the world.

This 210 metre long vessel, the 'Orion', will be powered by four 9-cylinder Wärtsilä 46DF dual-fuel electric propulsion engines, and two 6-cylinder Wärtsilä 20DF dual-fuel engines. Wärtsilä will also supply two

DEME is a long-standing customer of Wärtsilä and has, in recent years, utilised Wärtsilä solutions for numerous vessels, including three hopper dredgers, a cable installation vessel, a cutter suction dredger vessel, as well as the 'Orion' offshore construction vessel. E

World Bank to provide funds to increase power transmission capacity in Jharkhand

The World Bank has extended its support to the Government of Jharkhand with a proposed assistance program of about US\$ 600 million (approx. Rs 3,870 crore) for four new state-level projects over the next 2-3 years (All World Bank projects under preparation are subject to clearance by the World Bank Board). This was revealed by the World Bank Country Director, Junaid Ahmad with the Chief Minister of Jharkhand, Raghubar Das.

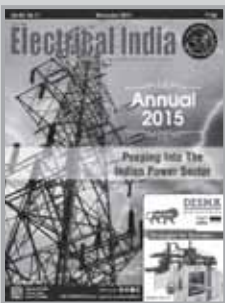
The new state-level projects will help improve infrastructure and provide sustainable urban and rural services in the areas of water supply and sanitation for the people of Jharkhand; increase the power transmission capacity; and diversify



(L2R) World Bank, Country Director, Junaid Ahmad with Chief Minister, Raghubar Das

household income through select farm and non-farm sectors.

The US\$ 150 million (approx. Rs 967.50 crore) World Bank financing for Jharkhand Power System Improvement Project will support the state in increasing the transmission of power from Jharkhand to other states of the country; increase the power transmission capacity; streamline procurement and contract management practices in the transmission company, Jharkhand Urja Sancharan Nigam Limited (JUSNL); and help the distribution company, Jharkhand Bijli Vitran Nigam Limited, (JBVNL) reduce its Aggregate Transmission and Commercial (AT&C) losses. E



Since 1961

The Subscription In-charge
Electrical India
Chary Publications Pvt. Ltd.
905-906, The Corporate Park, Plot No. 14 & 15,
Sector - 18, Opp. Sanpada Railway Station,
Vashi, Navi Mumbai - 400 703
Email: sub@charypublications.in

Yes, I would like to subscribe **Electrical India** for.....years
at ₹..... (US \$.....overseas subscribers)

Payment details :

Cheque / DD No.....Dated.....

Drawn on Bank.....Branch.....

In favour of **CHARY PUBLICATIONS PVT. LTD.**

Or charge my   For ₹.....

CARD No.

CARD EXPIRY DATE:
M M Y Y Y Y

Date of Birth
D D M M Y Y Y Y

Name.....

Designation.....

Company.....

Address.....

City.....PIN

Tel.....

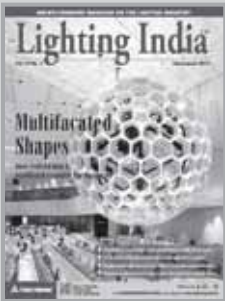
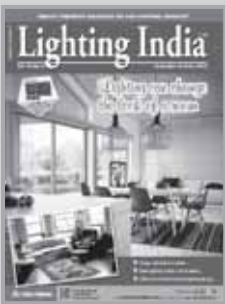
Email.....

If You are already a Subscriber
Enter the Subscription No. EI/SUB/

**Now
SUBSCRIBE/RENEW
Online
Just Log on to
www.electricalindia.in**

Signature.....

No. of Years	Amount	US \$	Tick ✓
<input type="checkbox"/> 1 (12 Issues)	1000	300	
<input type="checkbox"/> 2 (24 Issues)	1750	560	
<input type="checkbox"/> 3 (36 Issues)	2500	720	
<input type="checkbox"/> 5 (60 Issues)	4000	1000	



Lighting India
formerly The Luminaires
Bi Monthly

The Subscription In-charge
Lighting India
Chary Publications Pvt. Ltd.
905-906, The Corporate Park, Plot No. 14 & 15,
Sector - 18, Opp. Sanpada Railway Station,
Vashi, Navi Mumbai - 400 703
Email: sub@charypublications.in

Yes, I would like to subscribe **Lighting India** for.....years
at ₹..... (US \$.....overseas subscribers)

Payment details :

Cheque / DD No.....Dated.....

Drawn on Bank.....Branch.....

In favour of **CHARY PUBLICATIONS PVT. LTD.**

Or charge my   For ₹.....

CARD No.

CARD EXPIRY DATE:
M M Y Y Y Y

Date of Birth
D D M M Y Y Y Y

Name.....

Designation.....

Company.....

Address.....

City.....PIN

Tel.....

Email.....

If You are already a Subscriber
Enter the Subscription No. LI/SUB/

**Now
SUBSCRIBE/RENEW
Online
Just Log on to
www.lightingindia.in**

Signature.....

No. of Years	Amount	US \$	Tick ✓
<input type="checkbox"/> 1 (6 Issues)	750	150	
<input type="checkbox"/> 2 (12 Issues)	1350	275	
<input type="checkbox"/> 3 (18 Issues)	2000	400	
<input type="checkbox"/> 5 (30 Issues)	3000	600	

Electrical India walking hand in hand with the power industry for over 5 decades

Who can Subscribe?

Industries:

- Power Generation Equipments
- Transmission and Distribution
- Rectifiers
- Switchgears & Controls
- Transformers, Transformer Oil and Lubricants
- Financial Institutions Financing Power Plants
- Automation, Electronics and Instrumentation
- Test and Measuring Equipments
- Energy Management
- Power Generation
- Motors, Starters and Pumps
- Lighting and Lighting Components
- Safety Devices
- Nuclear Energy
- Capacitors and Condensers
- HVAC
- Circuit Breakers & Relays
- Cables, Contractors and Accessories
- UPS

... and related accessories.

Professional Readers - EI

Industries:

- Manufacturers of Electrical/Electronic Goods
- Power Generation
- Fertilizers, Chemicals and Petrochemicals
- Oil and Gas
- Paper and Pulp
- Independent Power Producers
- Military / Defence
- Textile
- Drugs and Pharmaceuticals
- Sugar
- Construction & Packaging Industry
- Renewable Energy & SEB's
- Govt. and Semi-Govt. Bodies
- Institutions

Professionals:

- Engineers & Policy Makers
- Corporate Management
- Distributors, Traders, Contractors and Suppliers
- Wholesalers, Agents, Retailers
- Advisors / Consultants
- Purchase Managers & Diplomats
- Entrepreneurs & Investors
- Technical Management and Education / Research Training
- Architects

Several Others...

“We travel nook & corner to get the world at your door step”

Who can Subscribe?

Industries:

- Shopping Plazas, Cinema Halls and Theatres
- Entertainment Industry: eg. Hotels, Restaurants, Gymnasium & Malls
- Stage & Studio Lighting
- Automobile Industry
- Manufacturers
 - Lighting
 - Neon Lamp
 - Pole
 - Decorative Luminaire
 - Glass & Glass Furnace
 - Machine
 - LED
 - Switch & switchgear
 - Electric Measuring Instrument
- Suppliers
 - Chemical
 - Starter
 - Lighting Products
 - Brass Component
 - Plastic Component
 - Gas
 - Cable Wire
 - Lamp Component
 - Electric Component
 - Steel Component
- Research & Testing Laboratories
- Electronics in Lighting
- Furnace Refractories

... and related accessories.

Professional Readers - LI

Industries:

- Top Industrialists & Manufacturers
- Lighting Engineers & Designers
- Architects & Interior Designers
- Event Managers
- Consultants, Contractors & Traders, Project Managers
- Plant Engineers of Large Companies
- Builders & Developers
- Mechanical & Electrical Engineers
- Lighting Products Manufacturers, Suppliers & Distributors
- Entertainment Industry
- Construction Industry
- Hotels & Restaurants
- Fitness Centers
- Hospitals
- Airports Authority of India
- Importers & Exporters
- Municipal Corporations All Over India
- Government Utilities:
 - Ministry of Power
 - Central Public Works Department
 - Electricity Utilities
- Non-conventional energy providers
- Manufacturers from other allied industries
- Universities, Technical & Research Institutions

Several Others...



The First True-RMS Clamp meter with Revolutionary Grab Mechanism



True-RMS measurements

Both AC/DC measurement in single Clamp meter

One of the biggest displays in market

Auto-Mode for all parameters for max. ease of use

In-rush current measurement

Clamp meter adapter for contactless current measurement

Revolutionary clamp grab mechanism for easy operation

Clamp grab for less space & grater safety

First Clamp meter measuring Power

Interface with Testo's New Thermal Imagers

Bluetooth functionality & App on smart phone



Temperature measurement With Thermocouple adapter

With Safety Alligator Clip set



CAT III/CAT IV Measurement Category



Non- Contact Voltage tester

Voltage tester

Current/ voltage tester

True RMS Digital multimeter



Testo India Pvt Ltd

Head Office:

Plot No. 23, Sind Society, Baner Road, Aundh, Pune - 411007, Maharashtra, India
Tel: +91 20 6560 0203 | Fax: +91 20 2585 0080 | Email: info@testoindia.com

Regional Offices / Representatives:

Ahmedabad | Baroda | Bengaluru | Chennai | Guwahati
Hyderabad | Indore | Kolkata | Mumbai | New Delhi | Raipur

www.testo.in



Hartek Group takes power industry veteran Jeet Chhatwal on board as Director

The Hartek Group, one of India's fastest growing concerns in the power sector, has appointed the leading management consultant and leadership trainer Jeet Chhatwal to its Board of Directors.

A noted expert with 37 years of experience in the Engineering, Procurement and Construction (EPC) domain in the oil, gas and power sectors, Chhatwal will be responsible for setting the pace for the Hartek Group's current operations and scaling up its future growth in his capacity as Additional Director. The Hartek Group will make the most of Chhatwal's rich experience to develop innovative automated systems and procedures for day-to-day activities which improve productivity and bring more efficiency.

He started his career with Indian public sector giant BHEL, where he worked for 17 years in various important capacities before switching



Jeet Chhatwal

over to internationally renowned companies like Fluor and Bechtel.

Chhatwal worked as HoD (Electrical, Control Systems) and Manager (Quality) with Fluor for nine years from 1996 to 2005 and as Project Engineering Manager and Chief Engineer (Electrical) with Bechtel India from 2005 to 2010. He took his career graph to a new high in 2010 when he joined SK E&C of the SK Group, a Fortune 100 Korean multinational giant, where he worked for six years as Executive Director and Divisional Head (Engineering).

Hartek Singh, Founder and CMD, Hartek Group, said, "Chhatwal's exposure in various multinationals in senior leadership positions will help the Hartek Group foster a world-class work culture that meets the avowed objectives of our organisation as well as the expectations of our clients." E1

Alliant Energy names David de Leon, VP of Wisconsin operations

Patricia Kampling, Alliant Energy Corporation Chairman, President and Chief Executive Officer (CEO), revealed that David de Leon has been named Vice President (VP) of Wisconsin Operations. In his role, David will lead the company's Wisconsin energy delivery and generation operations. He will report directly to Doug Kopp, Senior Vice President of Operations.

David has extensive experience in the implementation and integration of large capital projects at Alliant Energy's generating stations. He most recently served as Director of Construction and oversaw numerous Wisconsin facility performance improvements and air quality control projects.



David de Leon

David has been with Alliant Energy for 30 years and previously managed several generation facilities and served in numerous project engineering positions. He holds an MBA from Edgewood College in Madison, Wisconsin, and a bachelor's degree in mechanical engineering from the University of Wisconsin – Platteville.

David is a Wisconsin Registered Professional Engineer. He is a member of the American Society of Mechanical Engineers, a member of the Leadership Greater Madison Alumni Association and is involved in several initiatives with the United Way of Dane County. E1

CEVA appoints new VP of Marketing and Corporate Development

CEVA, a well known licensor of signal processing IP for smarter, connected devices, has appointed Ran Soffer as Vice President (VP) of marketing and corporate development for the company. A semiconductor industry veteran with more than 20 years of senior management positions at startups through to Fortune 500 corporations. Soffer brings vast experience to the marketing and corporate development roles at CEVA. He will join the executive management team, under which he will be responsible for the company's overall growth strategy, including M&A.

Soffer most recently served as the General Manager of the



Ran Soffer

Microwave Business Unit at Broadcom, following its acquisition of Provigent in 2011, where he served as VP of Marketing and Product Management. He also served as Director of Product Management for Metalink and in various engineering and leadership positions at Motorola, Redux and ECI. He earned an M.B.A and an M.S. and B.S. in Electrical Engineering from the Israel Institute of Technology.

Gideon Wertheizer, CEO of CEVA, said, "We warmly welcome Ran to CEVA's executive team. His extensive industry experience and strategic vision will prove invaluable as we seek to leverage on our business success and customer base to expand our market reach and product portfolio." E1

INDIA'S NEW SPOTLIGHT FOR EVALUATION OF LIGHTING



Electrical Research and Development Association proudly announces the establishment of new State-of-the-Art C-Type Goniophotometric Laboratory to serve the Indian lighting community by providing complete SSL testing services in accordance with IS 16106 / IES LM-79-08

Key Features:

- Size: Up to 1600mm (Diagonal) objects can be tested
- Weight: Up to 50kg of test objects
- Photometry Tests performed on:
 - Indoor Luminaire
 - Road & Street Light Luminaire
 - Flood Light / Spot Light Luminaire
- Accuracy: 0.8% (Photometric & Calorimetric),
0.1% (Electrical)
- Traceability: METAS, Switzerland

Accreditations:



Type 'C' Goniophotometer



Supporting Government of India's '**UJALA**' Yojana

ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION

Toll Free No: 1800 233 2668 | E-mail: bd@erda.org | Web: www.erda.org

Public Power's Sue Kelly is Energy and Environment Woman of the Year

The Women's Council on Energy and the Environment has chosen Sue Kelly, President and CEO of the American Public Power Association, as its 2017 Woman of the Year. The Woman of the Year Award was created in 1985 to honour a woman of recognised stature in the energy and environment fields.

Kelly has been President and CEO of the Association since April 2014. She is the first woman to hold the position in the association's 76-year history.

Before becoming President and CEO, Kelly was the American Public



Sue Kelly

Power Association's Senior Vice President, policy analysis and general counsel. Under Kelly's leadership, the Association has advocated on wholesale electric market issues, worked to strengthen cybersecurity awareness and resources for utilities and raised the profile of public power in Washington, D.C. from 1998–2004.

She said, "I am thrilled by this recognition — especially for the opportunity it gives me to tell other women that working in energy, and public power in particular, can be an exceptionally rewarding career choice." **ET**

CanWEA awards GE for work on Pan-Canadian Wind Integration Study

GE's Energy Consulting business has been awarded the 2017 R.J. Templin Award from the Canadian Wind Energy Association (CanWEA) for its work on the Pan-Canadian Wind Integration Study (PCWIS). CanWEA — Canada's leading source of information on wind energy's social, economic, health and environmental benefits for Canadian communities and provincial economies — presented the award to GE at the annual CanWEA Awards Dinner in Gatineau, Quebec.

The R.J. Templin Award, first awarded in 1985, recognises an individual or organisation that has undertaken scientific, technical, engineering or policy research and development work that has produced results that have served to significantly advance the wind energy industry in Canada.

The study considered four scenarios in which wind energy supplied



between 5 % and 35 % of the forecast system load. Based on the scenarios, GE determined that more than one-third of Canada's electricity could be generated from wind energy without compromising grid reliability. It also would be able to reduce emissions and generate new export opportunities if it were to integrate more wind power into its energy mix.

Robert Hornung, CanWEA President, said, "Anyone who has had a chance to take a close look at the Pan-Canadian Wind Integration Study knows, first, what a monumental undertaking it was, and second, how important its findings are to the continued growth of wind energy in Canada. GE Energy Consulting was a critical part of its success, leading a team of expert, specialised firms to produce a comprehensive analysis that will be a valuable source of data and information for our industry for years to come." **ET**

Siemens transformers receive iF Design Award

The new design of the Siemens transformer portfolio and its mobile resilience transformers were each presented with an iF Design Award in the Industry category. The company has established a uniform look across all product types. At the heart of the design concept is the idea of making visible the innovations hidden inside the transformer. The design was implemented by the Munich-based HYVE Agency. The first mobile resilience transformers were shipped to the United States in 2016 and impressed the customer with their functionality and the compact design which allowed them to be installed in record time. The complete portfolio will gradually be



changed over to the prize-winning design worldwide.

Beatrix Natter, CEO of the Siemens Transformers Business Unit, said, "Our new design isn't just eye-catching but also represents a promise to our customers: All transformers, no matter which type, meet the same strict standards of quality and performance. The transformer is the crucial component across all voltage levels in power transmission and distribution. Transformers are becoming even more important with increasing digitalisation, since they form the interface between the producer and the consumer and thus can collect, process and use data from both sides." **ET**



HP Lubricants

Zindagi Chale Smooth

TRANSFORMER OIL

Intensively extracted mineral oil – stable at high temperatures.

Excellent electrical insulating properties – certified by CPRI & ERDA.

HP Transformer Oil has very high oxidation stability and excellent ageing properties resulting in longer product life.

It is designed to be used in :-

- Electric Transformer
- Switch Gears
- Circuit Breakers which require insulating fluids

HP Transformer Oil is certified by Central Power Research Institute (CPRI), Bangalore and Electrical Research and Development Association (ERDA), Vadodara.

HP Transformer Oil Exceeds IS 335 : 1993 (Reaffirmed 2005) performance levels.

HPCL is :-

- India's largest lube base oil producer
- World-class blending facility
- Wide infrastructure across the country
- World-class R&D / QC facilities

For Details Log on to: www.hindustanpetroleum.com | Email: lubescare@hpcl.in
Toll Free: 1800 120 4725 / 1800 121 4725 | Phone: 022- 22637000
Follow us on : www.facebook.com/hplubricantsfromhindustanpetroleum





**SHILPA STEEL
AND POWER LTD.**

ROLLING STEEL

FABRICATION

GALVANIZING

FASTENERS

HIGH TENSILE FASTENERS

**DELIVERING
RESULTS, RELIABILITY
AND ROCK SOLID
DEPENDABILITY**

**SHILPA STEEL
AND POWER LTD.**

TLT Div.: Plot No. B-209, MIDC, Butibori, Nagpur - 440108
Ph.: 07104 - 265544 / 45 | Fax 07104 - 265657 / 43
info@shilparl.com | www.shilparl.com

Regd Office & Work Unit 1, Plot No. 1-4, Wanjara Layout,
Kamptee Rd. Nagpur - 26 Ph.: 264006 | 2640060
Fax 2640097 | shilpa_ngp@gmail.com
info@shilparl.com | www.shilparl.com

25
YEARS OF
EXCELLENCE





Nomex.

NOMEX® POWERS EVERYDAY LIFE

**CLOSE TO 50 YEARS,
DUPONT™ NOMEX® IS A TRUSTED SAFE AND RELIABLE SOLUTION
FOR MANY CUSTOMERS**

Nomex® helps make possible durable, compact, and low-maintenance transformers for wind power generation.

Nomex® helps improve the longevity and load-handling capacity of distribution transformers.

Nomex® is an essential material in residential appliances and generators.

Nomex® helps address the increased power density requirements and harsh operating conditions of motors in electric and hybrid electric vehicles.

Nomex® allows the design of rail transformers that are smaller and lighter yet offer greater operating capacities.

For more information, please contact:

E.I. DuPont India Pvt. Ltd.
8th Floor, Tower C, DLF Phase - III, Cybergreens, Sector 25A, Gurgaon
Tel: 0124 4091818 • Fax: 0124 2540889

www.nomexpaper.dupont.co.in

New Initiatives & Policy for Power Sector

Piyush Goyal, Minister of State (IC) for Power, Coal & New and Renewable Energy and Mines informs about the government's initiatives and policies for power sector in Rajya Sabha...

The Government has initiated several initiatives and policies for the development and improvement of power sector. This was stated by Piyush Goyal, Minister of State (IC) for Power, Coal & New and Renewable Energy and Mines in the Rajya Sabha. These new initiatives are as follows:

- Preparation of state specific action plans for '24X7 Power for All' covering adequacy of generation, transmission capacity and distribution system. '24X7 Power for All' documents have been signed for 35 States/UTs.
- The revised Tariff Policy was notified by Ministry of Power on 28.01.2016 with a focus on '4 Es' i.e. Electricity for all, Efficiency to ensure affordable tariffs, Environment for a sustainable future, Ease of doing business to attract investments and ensure financial viability.
- Launching of a scheme called Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) for rural areas: The scheme provides for (a) separation of agriculture and non-agriculture feeders; (b) strengthening and augmentation of sub-transmission and distribution infrastructure in rural areas including metering at distribution transformers, feeders and consumers end; and (c) rural electrification.
- Launching of Integrated Power Development Scheme (IPDS) for urban areas: The scheme provides for (a) strengthening of sub-transmission and distribution networks in urban areas; (b) metering of distribution transformers/feeders/consumers in urban areas; and (c) IT enablement of distribution sector and strengthening of distribution network.
- Operationalization of Power System Development Fund (PSDF): PSDF shall be utilized for the project proposed by distribution utilities for (a) creating necessary transmission system of strategic importance; (b) installation of shunt capacitors etc. for improvement of voltage profile in the grid; (c) installation of standard and special protection schemes; and (d) Renovation and Modernisation of transmission and distribution systems for relieving congestion; etc.
- Launching of Ujwal Discom Assurance Yojana (UDAY): The scheme has been launched for operational and financial turnaround of Discoms.
- Measures initiated for reducing the generation cost of coal based power projects:
 - Increasing supply of domestic coal
 - Coal usage flexibility
 - Rationalisation of coal linkages
- Standard Bidding Documents (SBDs) have been developed for carrying out competitive bidding for procurement of power and transmission services.
- Guidelines and Model Bidding documents on short term 'procurement of power by distribution licensees through tariff based bidding process' and 'Procurement of electricity for medium term from power stations set up on finance, own and operate (FOO) basis'.
- Approved an innovative mechanism for utilisation of stranded gas based capacity by making available Re-gasified Liquefied Natural Gas (RLNG) along with interventions by all stakeholders, including support from PSDF through a transparent and efficient manner.

The Minister further stated that whenever any major policy is formulated, like amendments in Electricity Act, amendment in Tariff Policy, formulation of Standard Bidding Documents, formulation of National Electricity Plan, etc., formal consultations are held with stakeholders, including academia, industry, NGOs etc. In addition, comments/views of the stakeholders concerned are invited by placing the proposed initiatives on website of the Ministry of Power, the Minister added.

ET





Innovative Cable Solutions



EN50618
Certified



ELECTRON BEAM IRRADIATED SOLAR CABLES

ELECTRON BEAM IRRADIATED WIND MILL CABLES

1.8 KVDC, 120° C OPERATING TEMPERATURE EB-XLPE CABLE

SOLAR DC CABLES

TUV 2PFG 1169/08.2007 certified PV1-F cables
 Annealed Tinned Copper
 XLPO Insulation and XLPO Sheath
 Zero halogen Low Smoke
 Electron Beam Cross Linked
 Ultra Violet Rays and Ozone resistant
 Rated for 1.8 KV DC operation
 Max operating Temperature 120°C
 Cable Life > 25 years



WIND MILL CABLES

Largest Supplier of Wind Mill Cables in India
 1.1 KV LT to 33 KV HT Rubber flexible cables for Nacelle application
 designed to withstand high torsion conditions
 Flexible PCP and FRLS CSP, CPE sheath options
 Electron Beam or Chemical cross linking options
 Good UV and Ozone resistance and Fire performance
 Reduced bending radius Aluminium Rubber insulated cables
 XLPE Insulated 1.1 KV to 33 KV cables
 Medium Voltage Covered conductors

OUR ESTEEMED CUSTOMERS



Other Product Range:

E-Beam

Solar PV Cables,
 Wind Mill Cables,
 Ship Wiring Cables,
 Locomotive Cables,
 Control & Flexible Cable,
 PVC Winding wires,
 Automotive Wires,
 Specialty Cables.

ELECTRICAL

PVC Cables UPTO 1.1KV,
 XLPE Cables UPTO 33KV,
 ABC Cables upto 33kv,
 Instrumentation Cables,
 Concentric Core Cables,
 Flexible cables & wires,
 FR/FRLS/LSOH Cables,
 Under Water Cables,
 Fire Survival Cables.

ELASTOMER

Trailing Cables,
 Locomotive Cables,
 Ship Wiring Cables,
 EPR Silicon & EVA Cables,
 Wind Mill Cables,
 Welding Cables,
 LFH Cables & Wires,
 Fire Survival Cables,
 Mining Cables.

TELECOM

Optical Fiber Cables,
 Armored Optic Fiber cables,
 Railway signaling cables,
 Indoor Telephonic Cables,
 Composite Cables with OFC,
 Fire Survival Cables OFC,
 Cat3/Cat 5 LAN Cables,
 Torpedo Cables,
 Tow Cables.

APAR INDUSTRIES LTD.(Unit : Uniflex Cables)

12/13, Jyoti Wire House, O. Veera Desai Road, Andheri (West), Mumbai - 400 053

Phone: 022-26740001/2/3 Fax: 022-26740600 Email: info.cable@apar.com Web: www.apar.com

Energy Efficient LED Driver Concept



Hardik V Rupareliya
Assistant Professor
Dept. of Electrical Engineering,
ITM Universe, Gujarat
Technological University, Gujarat



Aniket M Goswami
UG Student
Dept of Electrical Engineering,
ITM Universe,
Gujarat Technological University

The purpose of making this project is to make a product that takes the usual decorations and safety to a different level. This is a project where the output responds immediately to the proximity of any object or person. There are two sides of the project one is decoration while other is safety. In decoration, an array of LEDs responds to proximity of any object. While in safety, there is an alarm that rings when an unauthorized person enters the restricted area. The project can be modified and made according to the requirement of the consumer and environment.

This is a project that is applicable in many places. The concept is of energy efficient lighting that responds to the proximity of any object. Lightning decorations are an inseparable part of our life now a day. Lightning decorations are done in weddings, hotels, clubs, gaming zone, multiplex etc. In early days lamps were used in decorations. Now-a-days, lamps are replaced by LEDs as they have much more advantages over lamps like they are energy efficient better illumination, attractive, long life etc. So the LED decorations can be taken to a next level.

When any object comes in the proximity of the project led glows in that region and other all LEDs remain dark. When the object is moved, LEDs respond exactly with the object.

An array of LEDs is connected with an IR sensor and same with all sensors. When any object comes in proximity of this sensor signal is given to the microcontroller and all the LEDs connected to the sensor glow. When the object is moved from the proximity of one sensor to the proximity of another sensor the lights travel accordingly, lights starts glowing along with the movement and the previous light gets dark.

LED driver circuit makes sure that the LEDs glow with adequate intensity. The intensity of the light changes according to the distance between the object and sensor, nearer the object more is the light intensity and vice versa. The response of the LEDs is also quite fast.

Configuration Details

This project takes some time to start because it configures the surrounding atmosphere and works accordingly. The circuit configures as described below:

- When the system is started, light intensity is measured for 50 times and an average is calculated.

- This light is then filtered using low pass filter. Here operational amplifier (op-amp) lm-358 used as low pass filter.
- Operational amplifier blocks the unwanted noise and other lights.
- Uln-2803 is used as current driver IC. LED driver I is used to regulate power to an LED or a string of LEDs.
- LED driver respond to changing needs of LED circuit by providing constant quantity of power change with temperature.

Reasons for Selecting LEDs

Use of LEDs for decoration is increasing day by day. LEDs are energy efficient and also attractive. Use of LEDs can be manipulated as per the requirement. LEDs are much cooler than incandescent lights, reducing the risk of combustion or burnt fingers. LEDs are made with epoxy lenses, not glass, and are much more resistant to breakage. LEDs are directional light sources, which mean they emit light in a specific direction, unlike incandescent and compact fluorescent bulbs, which emit light and heat in all directions.

Advantages of Using at Mega Microcontroller

Atmega16 is all about high-speed prototyping and getting your project running is simplest and fastest way with the least possible part count. With Atmega16 you can get your project up and run in the least possible time with the minimum part count. Atmega16 has better RISC instruction set, most of them being single cycle execution thus faster code execution. Atmega16 has higher code memory and RAM as compare to 8051. Atmega16 is simple to program and supporting programming hardware is also easy to learn and use.



Figure 1: Prototype model of the project

Block Diagram

The supply circuit gives two different voltages. One is 5V to microcontroller and 12V to the LED array. The signal from the sensor is given to the microcontroller. According to the signal from sensor, micro controller gives command to the LED driver circuit to control the intensity of LED array.

Future Innovations

1. Security door mat

This is a security system installed in the doormats of the house of office. This door mats have alarms installed in it. Place this doormat at the door, switch on the supply at night now when any person or animal will try to enter the house, alarm will be activated and the house owner will be alerted. This system cannot be detected because it is very unusual to install security system in doormat.

2. Interactive Jewelry Display

This system is a very innovative idea of jewellery display. This is a structure in which the top surface is supported by four hollow tubes on the bottom surface. Sensors are installed in the bottom surface and high intensity LED lightings are installed on the top surface facing downwards. When any jewel is kept on the bottom surface it activates the light only on top of the jewel.

3. Interactive Table Tops With Wireless Supply

There were many table top electronic projects in the past but most of them did not

work out because of the difficulty in providing supply to the entire table. Here in this project we will be trying to provide wireless supply to all the table tops in this system. This table tops provide lights below the plates and glasses. This creates a beautiful scenario for dinner. This attracts more customers and the value of the restaurants will be increased.

4. Jewelry Theft Safety

In recent times thefts are increased and a common one in all is jewelry theft. People just steal the jewels from the display by distracting the sales person. This system can stop this theft. This system rings alarm when any unauthorized person touches the jewel. It means that the sales person can touch the jewels but not an outsider.

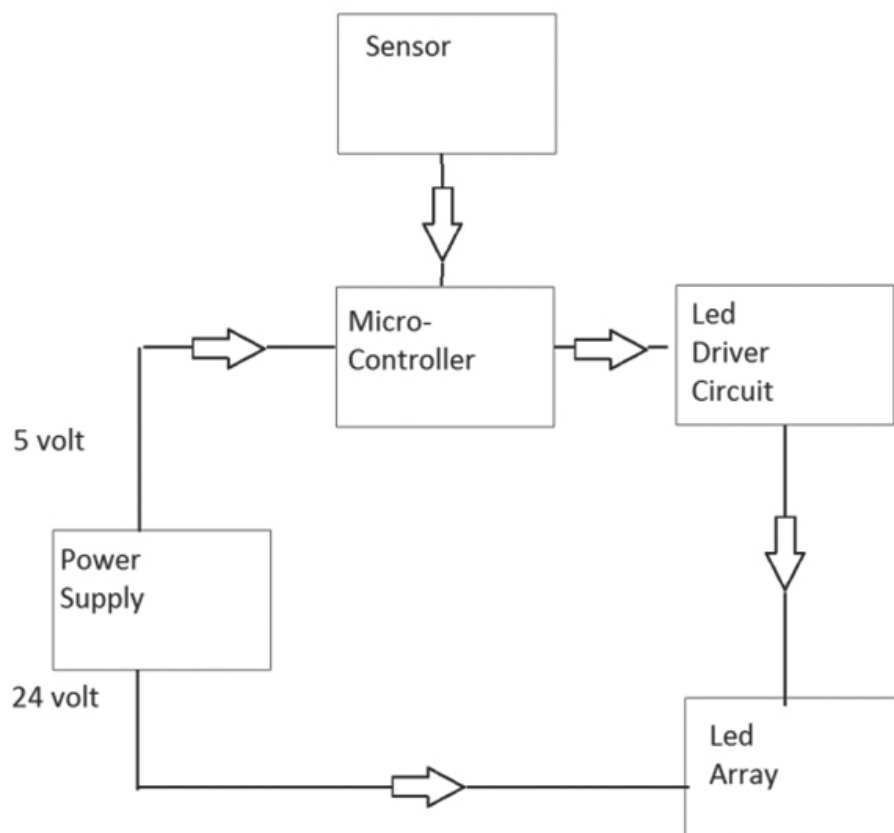
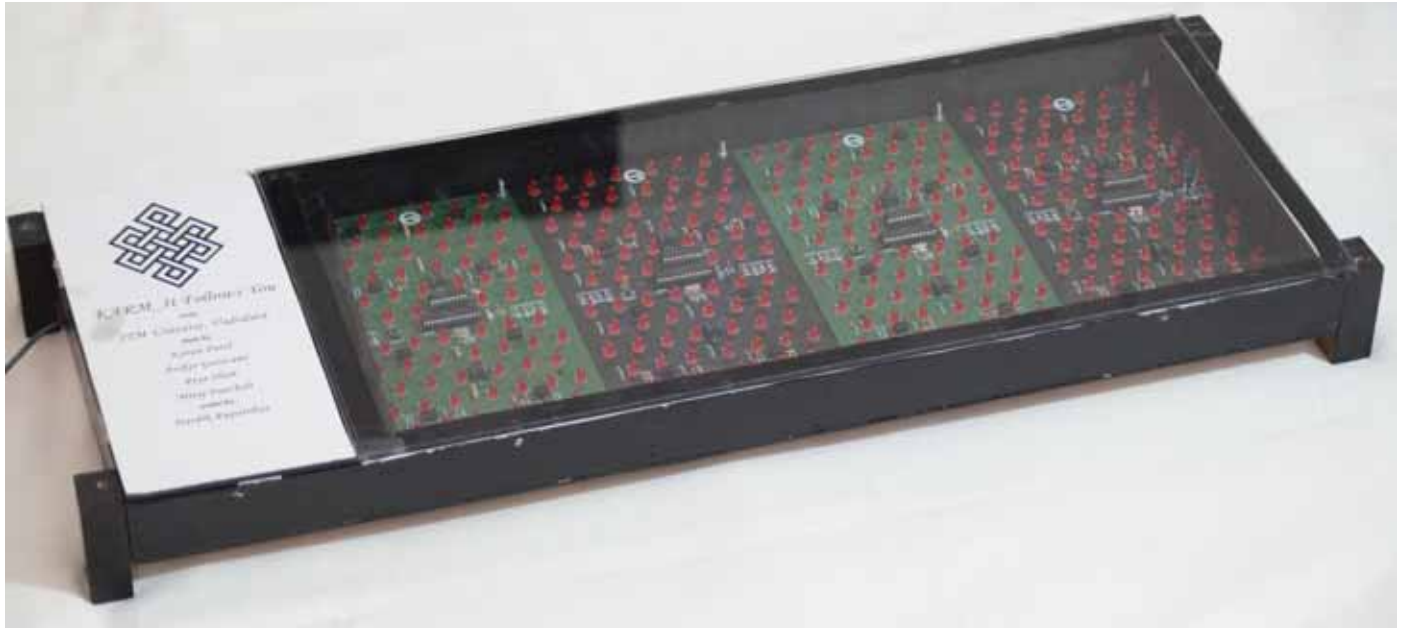


Figure 2: Block diagram of the project



This system reads an RFID tag on the wristband of the sales person and stops the alarm. So a person without wristband cannot touch the jewels.

Commercial Use of Project Clubs

Now-a-days there is a considerable increase in the number of clubs in India. Clubs, Pubs, Discos are the places where innovative LED lights are used to maximum, this type of lights can be placed at the entrance, or tables etc as decorations. If we place this light in the entrance lobby the lights follow the guest and this looks marvelous and if we place these lights on the bar counter people can spend time seeing the lights and waiter get the time to serve the drink.

Hotels

In this competitive world, hotel owners are keen to bring in any new innovation to attract the customers. This can be an innovative idea that can be exchanged with those costly and delicate chandeliers. When this project is installed in the dining table LEDs glow below the plate and glass, this will look great. This type of concept attracts more customers. The project can also be modified to run some welcome music

when any special guest enters the hotel.

Party Plots

In Indian wedding, decorations is very important, every other wedding has some innovation. This lightning near the entrance or drinks counter can help immensely, this lightning responds with the movement of the guests.

Interior Decorators

House is a thing in which people normally contribute maximum money they have got. People today wants the innovations in a house like the false ceiling, decorative lamps etc. In such scenario, this octolively table kept in the hall can give a great impact on the beauty of a house. This system can be very attractive at the border of a Swimming pool.

Commercial Offices

Octolively tables can be a very good decoration at the reception of the office. People normally keep a fish tank to catch attraction. Octolively lights can easily replace fish tanks in price and maintenance. Here the security aspect of the system can also be used. Here the GSM modem can also be used to get the SMS alert for trespassing.


Restaurants

People normally spend around an hour for dining at a restaurant. People don't like to wait for the food to be served. But if the dining table has interactive, they can spend time exploring it and the wait for food is no more boring.

Jewelers Shops

Jeweler's shops spend a lot of money in chandeliers and light decorations, the innovation of octolively lights can easily be the new trend in jeweler's showrooms. The aspect of lightning from the top can play a vital role in enhancing the beauty of the jewels.

Conclusion

The idea was to make some good product using proximity detection. The system is developed to serve two purposes; one is decorative system while the other is safety system. This system can be installed at almost all places with modifications according to requirement. Such systems will be very common form of decorations and safety in future. The future plan is to market it, manufacture in good number and sell in a good number. 

Now
Subscribe / Renew
Online

Electrical India

Just Log on to: www.electricalindia.in

HPL GLO

LED Bulb



www.hplindia.com

Brightness that lasts on and on | illuminating every corner of your life.



When it comes to LED lighting technology, there is no better alternative than HPL. The most elegant range of LEDs: low on power consumption, low on maintenance and with customer satisfaction.

FEATURES:

- SMD LED's for good quality illumination and longer life.
- Constant current drivers. | Highly efficient metal core PCB.
- Superior quality diffuser for glare free distribution.
- Extruded aluminium heat sinks with specially designed fins.

OTHER LIGHTING PRODUCTS



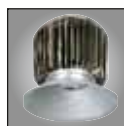
LED Tubes



LED Downlighter



LED Panel



LED Highbay



LED Street Light



long life



ECO light solution



maintenance free



compact & sleek design

Upto
20W

LOW
HEAT
generation

energy
saver

Task-Oriented Luminaires

Task oriented lighting systems are used when some task requires substantially more light than others do. A Higher level of task illumination may be provided by asymmetrical luminaire layouts that concentrate luminaires at the task. Special purpose Luminaires are used for task-oriented illumination. They are also used to provide a higher level of luminance for difficult visual tasks...



Rajesh Chourishi
Accredited Energy
Auditor & Power
System Analyst

Corporate Technical & Energy
Services, Aditya Birla Group

The luminaire is an electrical device used to create decorative light by use of an electric lamp. The term luminaire is recommended by the International Electrotechnical Commission (IEC) for technical use. In the US it is known as light fixture while in the UK it is known as a light fitting.

15th century onwards, Decorative Chandeliers as luminaires became popular in palaces, temples, mosque, cathedral, and Senate. Its enormous cost made the chandelier a symbol

of luxury and status. Therefore, it became popular in homes of nobility, clergy, and merchants also.

However, currently, decorative luminaires are being used in houses, auditorium, hotels, shopping malls, showrooms and corporate offices to improve the decor. Similarly, to make the city beautiful, decorative luminaires are being used in streetlights. Various energy saving controls are utilized to make luminaires energy efficient,



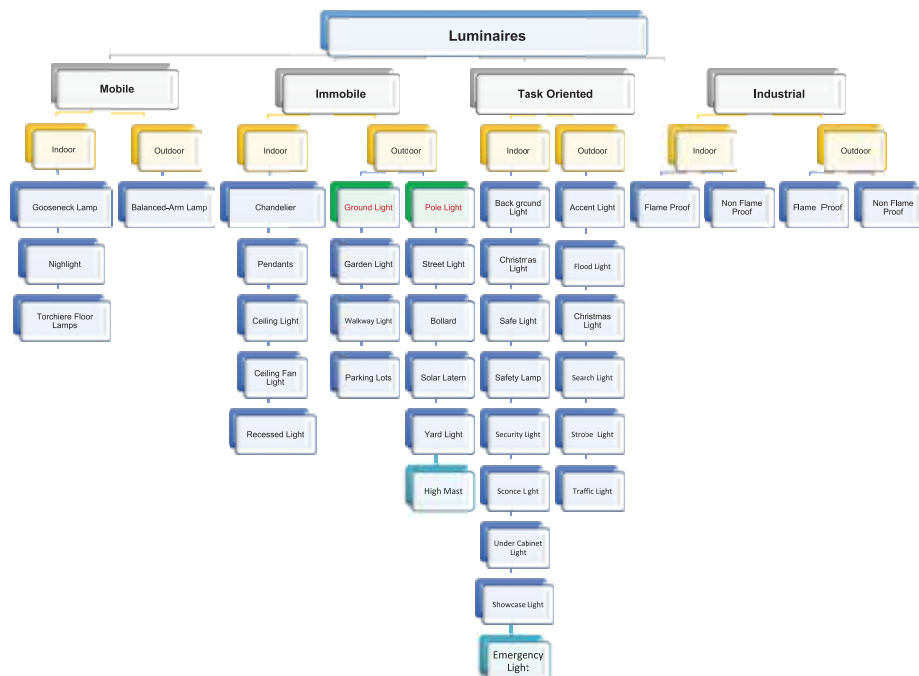


Chart 1

Type of luminaires

Luminaires are categorized according to their installation, function and illumination or type of source used with them.

A common classification based is highlighted in chart 1.

Mobile Luminaires

This category further can be classified as indoor & outdoor types. Under this category, different type of spotlight can be considered like table lamp luminaires, standard lamp luminaires, office task light luminaires, floor light luminaires. Balanced-Arm lamp can be considered.

Some of the popular spotlight luminaires are

shown below.

Balanced-arm lamp

It is outdoor type luminaires; it is a spotlight with a self-adjustable arm at an angle. It is used as mobile Streetlight.

Gooseneck lamp

A gooseneck lamp is a portable lighting luminaire in which a lamp is attached to a flexible, adjustable shaft. Gooseneck lamps are often used to provide spot illumination.

Nightlight

A nightlight is a tiny luminaire, placed in the dark area for the convenience during nights or during an emergency.

Torchiere Floor Lamps

This luminaire with an upward facing shade provides general lighting to the rest of the room.

Immobile Luminaires

Under this category different immobile or fixed type or non-movable, indoor type, ceiling mounted luminaires are classified. As per design and mounting, Luminaires can be further categorized as Chandeliers, Pendants, Flush-mounted, Island, Track, Ceiling fan, and Recessed type.

Some of the popular ceilings mounted indoor Luminaires are highlighted below:

Chandeliers

A Chandelier is the most popular as it is a distinct kind of pendant light having infinite varieties. Chandeliers are often decorative and normally use incandescent light bulbs. However, in latest design fluorescent lamps or even LEDs are being used.

It is further categorized as candle type, Crystal type, and Drum type Chandeliers.

Candle-style Chandelier

The candle-style chandelier is the most traditional form. It reflects the original construction of light sources, framed around real lit candles. The bulbs stand on cylinders gives the original look of lit candles. In modern design, lit candles have been replaced by LEDs.

Crystal Chandeliers

Crystal chandeliers are available in a huge range of sizes and complexities. It has more or less complex arrays of crystal prisms to illuminate



Figure 1: Light pole with hydraulic cylinder arm



Figure 2: Gooseneck Table Lamp



Figure 3: Nightlight



Figure 4: Torchiere



Figure 5: Candle Style Chandelier



Figure 6: Crystal chandeliers



Figure 7: Drum Chandeliers

a room with refracted light. Twinkling, eye-catching light dances through the crystal. Crystal Chandeliers are set in hallways, living rooms, and dining rooms. Recently these are getting popularity in bedrooms and bathrooms also.

Drum Chandeliers

Drum chandeliers have a cylindrical shade wrapping around the light source, giving them the "Drum" look. It is used in bedrooms and dining rooms.

Pendants Luminaires

Pendant lighting involves a lone light

luminaires hung from the ceiling. It is designed for a broad range of variety. Some specific styles are highlighted below:

Bowl Pendants

Bowl pendants are the suspended light source wrapped in a unique bowl-shaped shade.

Drum Pendants

It is like a suspended cylindrical shade around the light source, applicable for the bedroom, dining room, study room and kitchen.

Globe Pendant

It comprises a spherical housing for the light source. It is popular in dining room and restaurants

Mini Pendants

It is smaller a model that is used in groups and arranged in an array.

Ceiling Dome Luminaires

In this type of lighting luminaires, frame and glass are affixed directly to the roof. It can be categorized as full flush mounted or Enclosed Ceiling Dome, and Semi-flush mounted or Open Ceiling Dome luminaires. In full flush style luminaires, frame and glass dome fitted directly in the ceiling while in semi flush style it slightly hung below the base.



Figure 8: Bowl Pendants



Figure 9: Drum Pendants



Figure 10: Globe Pendants



Figure 11: Mini Pendant



Figure 12: Semi flush/ Open Ceiling Dome mounted luminaires



Figure 13: Full Flush/ Enclosed Ceiling Dome mounted luminaires

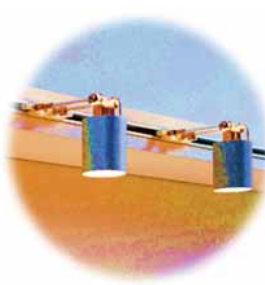


Figure 14: Track Luminaires



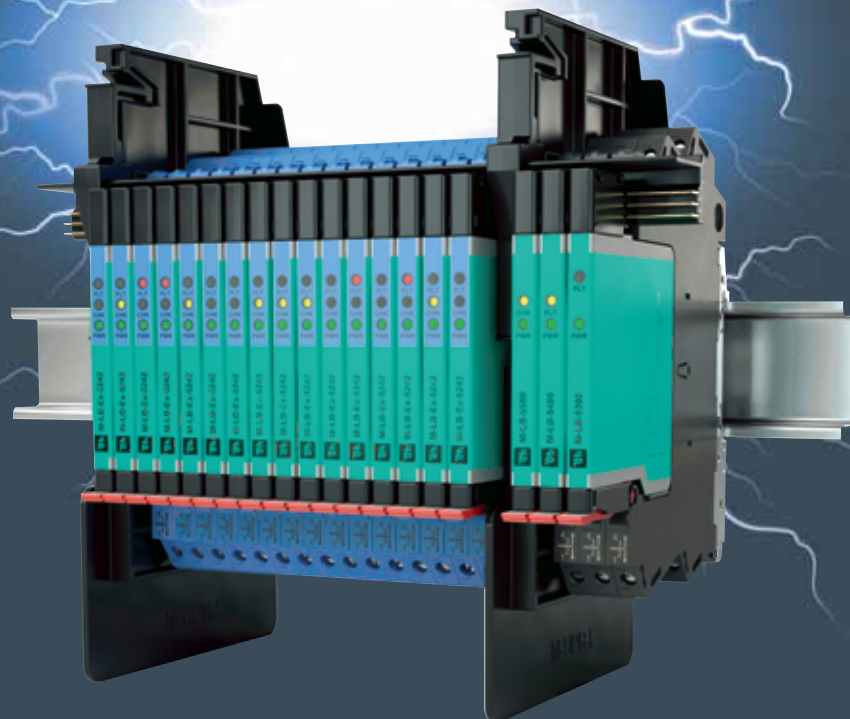
Figure 15: Ceiling fan Luminaires

**Smart.
Small.
Unique.**

Intelligent Surge Protection

- Health monitoring with status indication
- Compact 6.2 mm width for reduced installation space
- Plug-in modules for live maintenance and loop isolation

www.pepperl-fuchs.com/surge-M-LB-5000



pa-info@in.pepperl-fuchs.com

+91-80-3352 6000

Your automation, our passion.

pf PEPPERL+FUCHS



Figure 16: Recessed Gimbal Luminaires



Figure 17: Outdoor Landscape Lighting Luminaires



Figure 18: High Mast Luminaires



Figure 19: Yard Light Luminaires



Figure 20: Street Light Luminaires



Figure 21: Bollard Light Luminaires



Figure 22: Solar Light Luminaires

Track Lighting

It allows for an embedded frame in the ceiling, from which any number of Drum, Bowl, or Mini type luminaires can be installed or suspended via cables below the metallic track structure, at varying heights.

Ceiling Fans

In this category of luminaires, decorative luminaires are suspended below the ceiling fans.

Recessed Lighting

It is the delicate solutions for every home. It is the light sources hide within the ceiling structure, making for a fully clean shadow in any room. In its design, a single bulb fits within each circular or rectangular frame. In its latest model, it mounts the light source itself on a Gimbal.

Some of the popular outdoor types, Luminaires are highlighted below:

Immobile outdoor type light fixtures are further categorized in outdoor landscape lighting or ground light and pole light.

Outdoor landscape lighting Luminaires

These are used to illuminate walkways, parking lots, roadways, building exteriors and architectural details, gardens, and parks.

Pole Lighting Luminaires

Some of the important pole lighting Luminaires are illustrated below.

High-mast

It is usually pole or stanchion mounted. Normally used for landscape, roadways, and parking lots.

Bollard luminaires

It is an architectural type outdoor lighting luminaires. Typically used to provide cutoff type illumination for egress lighting. It is a short, upright ground-mounted unit in light steps and pathways or walkways.

Street light luminaires

These luminaires are accommodated HPMV, Metal halide or LED lamps used for street light. Latest generation luminaires are accompanied either by solar panel or with a wind turbine.

Yard light luminaires

It is a freestanding exterior lighting luminaire accompanied with gardens light. Typically used for an outdoor path or driveway to provide visibility in dark areas.

Special Purpose Lights and Luminaires

Luminaires used for general lighting system provides reasonable uniform illumination.

Special purpose Luminaires are used for task-oriented illumination. They are also used to provide a higher luminance for the more difficult visual task.

Task oriented lighting systems are used when task locations are widely spread within the building when some task requires substantially more light than others do. A higher level of task illumination may be provided by asymmetrical luminaires layouts, which concentrate luminaires at the task. For special application, like inspection lighting requires grazing light or reflected glare to enhance the inspection process. Therefore, specialized luminaires have to be placed at a specific location.

Special purpose luminaires are available over a wide range.

Some of the important types of luminaires used for the special purpose are highlighted below.

Accent Light Luminaires

Accent light luminaires are used to focus the light on an object or to attract attention to a particular area.

Flood Light Luminaires

Floodlights are broad-beamed, high-intensity artificial lights. Produced by LED or

Pioneer in Silicone Rubber Products in India

PRODUCT RANGE

- **Silicone Transparent Platinum Cured Tubings** • Silicone Rubber Sleeves (ITI Approved) • Transparent Tubings • Inflatable Gaskets • Cords • Strips • Squares • Sections • Profiles • Gaskets • Cables
- O Rings • Oil Seals • Sponges • TC Gaskets • Autoclave Gaskets • Corona Treater Sleeves
- Braided Hoses • Sheets • FBD Gaskets • Also available as per Drawing / Sketch / Sample / Specification • Viton Rubber Cords / Square / Strip Sheets etc.

Ask for Platinum Cure Tubings



www.sevitsil.com



SURESH
ENTERPRISES

ISO 9000-2008 Certified Company

C1/55, GIDC Phase-2, Dediyan, Mehsana-384002, Guj, INDIA.

Phone : +91-2762-224814 / 224240 | Fax: +91-2762-255239

Mob. : +91-99250 28109

Email : info@sevitsil.com, sevitsil@gmail.com



Figure 23: Accent Light Luminaires



Figure 24: Flood Light Luminaires



Figure 25: Safelight luminaires



Figure 26: Search light apparatus



Figure 27: Strobe light



Figure 28: Traffic Light

metal halide or HPMV lamp accommodated in luminaires. They are often used to illuminate outdoor playing fields.

Safe light

A safelight usually consists of an ordinary light bulb housed in luminaires having colored filter.

Searchlight

It is an apparatus having an extremely luminous source with a parabolic mirror act as a reflector to project a powerful beam of parallel rays of light in a particular direction. It is used in the military as well as in advertisements.

Strobe light

It is a device used to produce regular flashes of light, commonly called a strobe.

Traffic light

It is signaling devices positioned at road intersections, pedestrian crossings, and other locations to control flows of traffic.

Christmas lights

It does not have any specific luminaires. However, Fairy lights or twinkle lights, incandescent or led mini lights, net lights, icicle lights, and Strings, Christmas tree and Outdoor Christmas Lights are often used at Christmas for decoration.

Sconce Light

Normally used in hallways as overhead lighting to illuminate artwork and architectural details.

Under-cabinet light

Customarily mounted below kitchen wall cabinets to illuminate kitchen platform uniformly.

Showcase light

Customarily installed in the showcase to display merchandise, jewelry, grocery stores, and other items.

Emergency lighting or Exit sign

It is connected to a battery backup or to an electric circuit that has emergency power, in case the main power source fails.

Background light

Normally it is used during shooting of Film, Video, TV serial or play in auditorium. Selection of theme for background light depends on subject matter as decided by the filmmakers.

Safety lamp

It is a lamp housed in flameproof luminaires that can be used for illumination in an area having potential of explosion.

Security lighting

Usually, it is provided to increase the feeling of safety to take safety measures before starting the typical task.

Industrial Lighting Luminaires

Industrial lighting luminaires are classified as the indoor type and outdoor type luminaires. Both type luminaires are further classified as flameproof (FLP) luminaires and Non- flameproof (NFLP) luminaires.

Some popular industrial luminaires are shown below

Formally, all luminaires were used with an incandescent lamp, HPMV lamp, metal halide lamp or CF lamp but now LEDs lights are replacing all types of sources.

Energy Efficient Use of Luminaires

The primary use of luminaire is to improve decoration of the place and nearby area, where it is installed. Since these are very costly as compared to their operating power consumption, therefore mostly their power consumption is ignored. However, now for the beautification of houses, offices, shops, malls, showrooms, cities, roads and public places, use of luminaires have been increased. Therefore, their power consumption is now also considerable. Although luminaire does not consume power, it can be used efficiently.

To save energy, various energy saving measures are designed and applied. These energy saving measures make the luminaires energy efficient and more popular.

Some of the applied measures are given below.

- All first generation incandescent lamps are replaced by latest generation LED lamps.
- To improve sensitivity and energy efficiency,



Figure 29: FLP Flood Light



Figure 30: FLP Well glass light



Figure 31: FLP Tubular Light Luminaires



Figure 32: FLP Bulk Head Lighting

India's Lighting Company



Juno Quarto

Juno Midi

Juno Starry

Juno

Juno 4



Architectural Luminaires Juno Series

Designs that Redefine cityscape



K-LITE INDUSTRIES

D-10, Ambattur Industrial Estate, Chennai - 58.

Tel : 26257710, 48581950, Fax : 26257866

Cell : 95000 79797, 95000 85511

Email : info@klite.in

www.klite.in

Lighting



Figure 33: NFLP Tubular Light Luminares



Figure 34: NFLP Well Glass light



Figure 35: NFLP Hand Lamp light



Figure 36: NFLP Bulk Head Light

photo-sensors are connected in control circuits.

- Use of LED with a frequency converter reduces power consumption. Frequency converter makes it more attractive for auto-generation of different colors in the same LED.
- LED reduces luminaire weight and makes its transportation easy. In addition, its color scheme can be changed with the help of frequency converter.
- Use of LED and sound sensors in control circuits, Luminaires can sense the sound also. Therefore, they are more popular for indoor and outdoor "Sound and Light" programs. They can also be controlled by Wi-Fi and Bluetooth technology.
- Electronic dimmers are applied to control illumination
A digital control system controls smart professional dimmers. It uses negligible power as compared to the controlled load. ¹³



Largest Test Lab. Widest Choice. 36 Month Guarantee.

zero

... zero Downtime ... From #1 in moving cables.



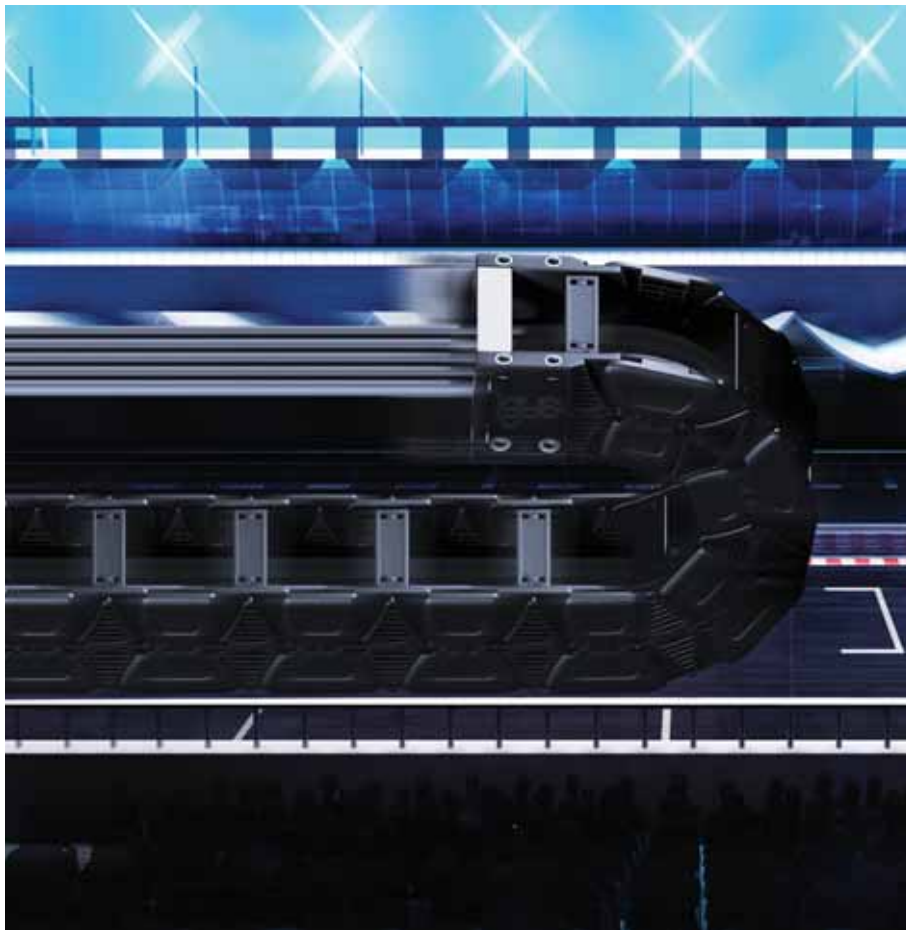
Zero Downtime solutions for your toughest moving cables: chainflex® cables are developed and tested in the industry's largest test lab. With 600 parallel tests on 2750 m², 1.4 million electric measurements and 2 billion cycles per year, you find cables that solve your toughest "zero downtime" challenge. And with up to 7 motion quality classes, you find just the right cable for your application - for less money. 1244 cables from stock make chainflex® the largest motion cable range - for torsion, motor, servo, hybrid, control, data, BUS, ethernet and FOC cables. Calculate life online and order today with a 36 month guarantee.

igus.in
plastics for longer life®

Check out more than 30 test reports here: igus.in/chainflextests

Energy Chain for Extreme Dynamics with Low Noise

For applications where an extremely low-noise running of the energy chain, very high dynamics or very low abrasion is required, the motion plastics specialist igus has developed the E6.1 series of energy chains. These chains are now available in new sizes with larger inner heights of up to 62 millimetres.



The series E6.1 e-chains are very abrasion-resistant and are characterised by their unique connector system for maximum dynamics. (Source: igus GmbH)

The company igus has developed the E6.1 series of e-chains for applications where very low-abrasion energy chains are required, for example in the clean room in semiconductor manufacture. As with the predecessor series E6, instead of a pin/bore connection, elastic polymer spring elements in the side elements serve as connectors for a dampened and very smooth running of the chain. The very small pitch and contour of

the chain links ensure that the polygonal effect is reduced to a minimum and the chain rolls very smoothly. Thanks to the narrower design compared to the E6, roughly 30 percent can be saved with the same inner dimensions. "Further advantages of this design principle are a very quiet and extremely low-vibration operation with only 32 dB(A)," explains Harald Nehring, authorised officer for e-chainsystems at igus. "This makes E6.1 series energy chains very suitable for use in stage technology or in TV studios, in addition to applications in the clean room." The e-chains of the E6.1 series can also be used for applications with speeds of up to 20 m/s. From now on, chains in four different dimensions are available from 29 millimetres up to 62 millimetres in height. An even larger version of the E6.1 with an inner height of 80 millimetres will follow in spring 2017.

Easy access for quick assembly

For all installation sizes of the E6.1, the crossbars can be removed along the inner and outer radii, so that quick filling is possible. The means that when the chain is already installed in the machine, additional cables or hoses can easily be drawn in. Almost all of the crossbars are also equipped with a grid marking, which enables the exact positioning of separators. In the size with inner height 29 millimetres, users also have the option to order the chain with swivel-open crossbars. This means easier handling and therefore shorter installation times are possible. The very smooth and interference-free interior ensures a very long service life for the guided cables and hoses.

For more details, visit: www.igus.in

19-21 September 2017

Bangkok, Thailand

www.wire-southeastasia.com | www.tube-southeastasia.com

A choice trade-focused platform to present the latest innovations, exchange first-hand knowledge and establish global connections in navigating the dynamic Southeast Asia markets.



Supported by

wire[®] Tube[®]



Underground Cables



Munazama Ali
Assistant Professor
Department of Electrical
Engineering, Islamic University of
Science and Technology, Kashmir

Underground cables offer an affordable and justifiable solution for critical parts and in some cases the entire length of overhead high voltage power lines. With appropriate technology used in appropriate places, the environment impact of underground cables can be minimised...



Underground cables are employed for transmission and distribution of electric power where it becomes impracticable to make use of overhead construction. Such locations may be congested areas where right of way cost would be excessive or local ordinances prohibit overhead lines for reason of safety, or around plants and substations or crossings of wide bodies of water which for various reasons would not permit the overhead crossings. The type of cables used will depend upon voltage and service requirement. Recent improvements in design and manufacture have led to the development of cables suitable for use at high voltages. This has made it possible to use underground cables for transmission of electric power for short or moderate distances.

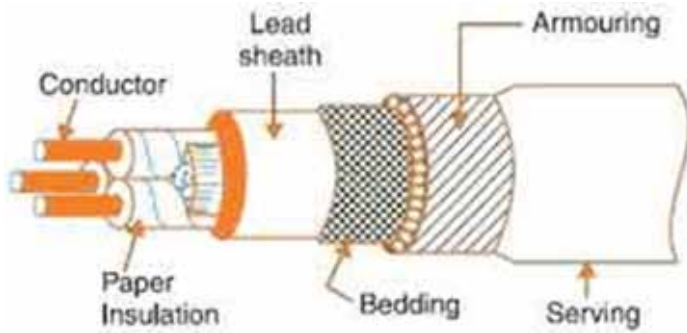
Underground cables consists of one central core or a number of cores (two, three or four) of tinned stranded copper conductors (sometimes use of aluminium conductor is also made) insulation from each other by paper or varnished cambric or vulcanized bitumen or impregnated

paper. A metallic sheath of lead or alloy or of aluminium is provided around the insulation to protect it against ingress of moisture. The initial heavy cost is the only factor which discouraged the use of underground cables for the purpose of transmission and distribution of electric power.

Construction of underground cable

The type of cable to be used at a particular location is determined by the mechanical considerations and the voltage at which it is required to operate. According to voltage these are classified as low-voltage cables for operating voltage up to 1kv, high-voltage cables for operating voltage up to 11KV, super tension cables for operating voltage up to 33 KV, extra high tension cables for operating voltage up to 66KV and extra super voltage power cables for operating voltage beyond 132KV.

The current rating of the cables apart from the above factors also depends on a large number of other factors such as method of cable laying



Construction of underground cable

to-phase or phase-to-earth) is very high. The cables should be so selected that it can withstand the stresses and the resulting increase in temperature caused by the maximum short-circuit current produced by the phase-to-phase

short circuit up to a period of 1 second.

5. Economic consideration

The cables should also give minimum operating cost (power losses, the interest on capital cost and depreciation).

Mechanism of Breakdown of Cable

There are two ways in which breakdown of cables usually occurs. One way is by a progressive coring and tracking, which always starts from the core or sheath, and ultimately bridges the electrodes. Another way is by thermal instability which occurs due to rapid increase in power factor with the rise in temperature. A marked difference between the methods of breakdown is that coring, once it occurs, will continue until the cable breaks down, another the time duration may be considerable for complete action. In thermal instability, however, no damage occurs until just before breakdown, so that if the load is reduced before breakdown the cables will not have suffered any permanent change. A very common occurrence is for coring to start and then introduce thermal instability at the centre of coring.

Causes of Failure of Underground Cables

1. The most common point of failure is at the cable sealing box mostly due to poor workmanship of the cable jointer when the end was sealed.
2. Another most common cause is the mechanical puncturing of the lead sheathing of a cable, such as by a crowbar, especially in industrial installations where excavation and building operations are carried on in areas

having several underground cables.

3. The cable may also get damaged due to vibration fatigue or overheating.

Advantages

1. Less subjected to damage from severe weather conditions (mainly lightning, wind, freezing).
2. Underground cables need a narrower surrounding strip of about 1-10 meters to install up to 30 m for 400 KV, whereas an overhead line requires a surrounding strip of about 20-200 meters wide to be kept permanently clear for safety, maintenance and repair.
3. Underground cables pose no hazard to low flying aircraft or to wildlife.


Disadvantages

1. Undergrounding is more expensive. In highly urbanized areas the cost of underground transmission can be 10-14 times as expensive as overhead.
2. Underground cables locations are not always obvious, which can lead to unwary diggers damaging cables or being electrocuted.
3. Underground cables are more subjected to damage by ground movement.

Comparison between overhead and underground systems

1. Maintenance cost of underground system is very low in comparison with that of overhead system.
2. Underground system is free from interruption of service on account of thunderstorm, lightning and objects falling across the wires.
3. In underground system there is no interference to communication circuits.
4. Underground system cannot be operated above 66 KV because of insulation difficulties but overhead system can be designed for operation up to 400 KV or higher even.

Conclusion

Underground cables offer an affordable and justifiable solution for critical parts and in some cases the entire length, of overhead high voltage power lines. With appropriate technology used in appropriate places, the environment impact of underground cables can be minimised. 

employed, spacing between the cables, number of cores and the thermal conductivity of the soil. Cable manufactures employ multiplying factors to take care of each of them. An approximate indication of the current carrying capacity for Indian conditions, which is based on a maximum conductor temperature of 80 °C for 11KV cables and above. The ground ambient temperature of 30 °C applies to most places in India.

The following multiplying factors are used:

- | | |
|---|----------------|
| 1. For a ground temperature of 30 80 °C | = 0.88 |
| 2. For 3,300 and 6,600 V cables | = 0.95 |
| 3. For 11,000 V cables | = 0.9 |
| 4. For 22,000 V cables | = 0.8 |
| | 15cm 30cm 61cm |
| 5. For 2 cables | 0.84 0.88 0.92 |
| 6. For 3 cables | 0.75 0.80 0.85 |

Selection of Cables

For selection of cable of correct size and type for a particular application, the factors to be considered are:

1. System voltage

The type of operating system such as dc (2-wire or 3-wire) or ac (Single-phase, three-phase), earthed or unearthed and operating voltage such as 415/240 V, 11, 33, 66, 132 KV etc.

2. Current carrying capacity

The current rating is the most important factor.

3. Permissible voltage drop

The cable should be selected of such a size that the voltage drop in the cable is within permissible limits.

4. Short circuit ratings

For selection of low tension cables this factor is not important but for high voltage cables, this factor is the most important. It is because in high-voltage systems the fault current (phase-

CABLE Power Carrier



Simmi Sharma
Ph.D. (persuing)
DTU, DELHI.

Cables are integral part of every technology and engineering field. Frequent research and development is required to compete with the fast growing infrastructure of other countries by improving the ratings and durability of cables so as to open new applications.

Electric power is transmitted and distributed either by overhead system or by underground cables. Cables are mainly designed as per requirement. An electrical cable is an assembly consisting of one or more conductors with their own insulations, individual coverings, assembly protection and protective coverings. Electrical cables can be made more flexible by stranding the wires. Electrical cables are used for wiring in households for solving the purpose of lighting for power and control circuits that are permanently installed. Cables are securely fastened and organized by using cable trays, cable ties or cable lacing. In building construction, an electrical cable jacket material is a source of fuel for fires. To limit the spread of fire along cable jacketing use of cable coating materials with jacketing having inherently fire retardant is used. The plastic covering on metal clad cables is stripped off at installation to reduce the fuel source for fires. Inorganic coatings and boxes around cables also safeguard the nearby areas from the fire threat associated with unprotected cable jacketing.

This fire

protection also traps heat generated from conductor losses so the protection needs to be thin.

At high frequencies current tends to run along the surface of the conductor. This is known as the skin effect. Electric cables connect two or more devices, thereby, allowing the transfer of electrical signals and power from one device to another. In this process, smaller individual wires are twisted to produce larger wires that are more flexible than solid wires of same size. Bunching of these small wires before concentric stranding provides more flexibility. Tinning is used to provide lubrication between strands. Tinning helps in removal of rubber insulation. Copper wires can be bare or they can be plated with a thin layer of another metal usually tin, gold, silver as these are less prone to oxidation than copper, which lengthens life of wire and makes soldering easier. In fiber optics, these cables

contain one or more optical fibers in a protective jacket that supports the fibers. These network cables are bendable although they



are made up of glass. They are useful in wide area network (WAN) installations where long distance underground or outdoor cable runs are required and also in office buildings that require a high volume of communication traffic.

Optical fibre is a cable with following advantages:

- Light-weight
- Immune to noise
- Low attenuation
- Tolerates data rates on the order of 100 Mbps
- Bandwidth from tens of megahertz to several gigahertz.

Undersea cables are used for long distance communication. Power cables are used for bulk transmission of alternating and direct current. Continuous-flex / flexible cables find utilization in moving applications.

A current carrying conductor radiates an electromagnetic field and a cable picks up energy from this existing electromagnetic field around it. These effects are often undesirable in transmission of energy as it adversely affects nearby equipment and its parts. This can be prevented by keeping the cable length short as pickup and transmission are proportional to the length of the cable. A cable can cause unwanted pickup of noise which can mask the desired signal carried by the cable. The cable carrying power supply or control voltages even gets polluted to such an extent that it causes malfunctioning of the equipment. The preventive measure in regard is to route cables away from disturbance point. For this three principal design techniques are proposed:

- Twisted-pair Geometry
- Shielding Geometry
- Coaxial Geometry

Shielding uses the electrical principle of the Faraday cage. The cable is encased for its entire length in a wire mesh and wires running inside this shielding layer are decoupled from external electrical fields. Simple shielding of this type is not useful in low-frequency magnetic fields. A grounded shield on cables operating at 2kV or more gathers leakage current and capacitive current thus protecting living beings from electric shock and equalizes stress on the cable insulation.

Cable Designs

1. Twisted pair has two wires of a cable twisted around each other. It is demonstrated by putting one end of a pair of wires in a hand drill and turning while maintaining moderate tension on the line. The interfering signal has a long wavelength compared to the pitch of the twisted pair. Alternate lengths of wires develop opposing voltages that cancel the interference effects.
2. Coaxial design is used to reduce low-frequency magnetic transmission and pickup. In this design the foil or mesh shield has a circular cross section and the inner conductor is placed at its centre to provide the voltages induced by a magnetic field between the shield and the core conductor to form two nearly equal magnitudes cancelling each other. They are used for radio frequency signals example in cable television distribution systems.
3. Paired cable consists of two individually insulated conductors that are generally used in DC or low-frequency applications.

4. Ribbon cable are required when many wires are to be used. This type of cable easily provides flex and it is designed to handle low-level voltages.
5. Twin-lead is a flat two-wire line. It is also called a 300 Ω line because the line has an impedance of 300 Ω. It is used as a transmission line between an antenna and a receiver like ones used in TV and radio. These cables are stranded to lower skin effects.
6. Hybrid optical and electrical cables are used in wireless outdoor fiber-to-the-antenna (FTTA) applications. The optical fibers carry information and the electrical conductors are used to transmit power. These cables are placed in several environments example to serve antenna mounted on poles or towers.

Some other types of cables are:

- Communications cable
- Direct-buried cable
- Flexible cables
- Non-metallic sheathed cable.
- Universal Serial Bus (USB) cables feature twisted pair wiring.
- Multicore cable
- Portable cord – Flexible cable for AC power in portable applications
- Shielded cable – Used for sensitive electronic circuits or to provide protection in high-voltage applications.

A Solid Future Built On Our Strong Legacy



For a century, Hammond Power Solutions (HPS) has been an innovative leader in the magnetics industry.

HPS excels at designing and manufacturing a broad range of standard products and engineered-to-order solutions to meet many demanding applications.

Our extensive and durable line of Oil Filled, Cast Resin and VPI transformers and reactors provide a complete magnetic solution.

HPS has product designs that meet a wide range of global standards and regulatory compliance (IEC, BIS, CSA, UL, IEEE, GOST, DNV, RINA).

With multiple manufacturing facilities located throughout Asia, Europe, and North America, we are able to service your global needs.



power to perform



Table 1

Name	Features	Application
PVC cable	Solid and economical	Food industry.
PUR cable	Durable and highly flexible	Production lines, machine tool manufacturing, plant engineering.
PUR U cable	Highly flexible	Production lines, machine tool manufacturing, plant engineering, assembly lines.
PUR A	Resistant to welding sparks	Automotive industry
POC cable	Specifically for welding areas	Automotive industry, steel industries.

- Single cable
- Submersible cable
- Twinax cable
- Serial and parallel cables: used in older days.
- Cross over cables : The use of Ethernet crossover cables was especially common on older home networks years ago while connecting two PCs directly together.

Earlier in homes, the electrical system was made up of single conductor wires. However, these days much of electrical wiring is done with multi conductor cables because of their ease of use. The purchase of wire is done by the foot or in spools that range from 50 to 500 feet. The most common multiconductor cable is made from metal or plastic and contains a neutral wire, a hot wire and a grounding wire. The neutral and hot wires are insulated by a thermoplastic material, the grounding wire can or can not be insulated. The wires are color-coded to guard for protection against connection errors. Neutral wires are white or gray, grounding wires are green, and hot wires are of any other colour.

The cable are also designed according to number of conductors they contain and their size. The larger the diameter, the greater the wire's capacity is to carry current.

The mostly commonly used metal for wires is copper due to its efficiency as a conductor. Wire also comes in aluminum and aluminum clad with copper but these are not efficient in conducting current. So the wires are required to be of large size to achieve the same capacity.

Power cables are mainly used for power transmission and distribution purpose. It is an assembly of one or more individually insulated electrical conductors, usually held together with an overall sheath. The assembly is used for transmission and distribution of electrical power. Electrical power

cables can be installed as permanent wiring within buildings, buried in the ground and run overhead or exposed. Flexible power cables are used for portable devices, mobile tools and machinery. These are designed and manufactured as per voltage, current to be carried, operating maximum temperature and purpose of applications desired by customer. For mining, extra mechanical strength is provided to cable with double armouring. For wind power plant customers generally require flexible and UV protected cable with mechanical tough sheath. The underground cables have several advantages such as less liable to damage through storms, lightning, low maintenance cost, less chances of faults, smaller voltage drop and better general appearance. Voltage drop is also an important factor of cable design. As $V=IR$, COPPER is preferred over aluminium due to lesser voltage drop.

A power cable consists of :

1. Conductor
2. Bedding
3. Armouring
4. Outer sheath
5. Insulation

Another important factor is the mechanical and chemical properties of the connection technologies. In many applications cables withstand intense heat and welding sparks. Some of them are tabulated in Table 1.

Conclusion

Cables are integral part of every technology and engineering field. Frequent research and development is required to compete with the fast growing infrastructure of other countries by improving the ratings and durability of cables so as to open new applications. 

Become the new face of growing Technology!

- Technological updates
- Trending news from the industries
- Versatile topics covered
- Wide exposure
- Eminent writers from the industries

Electrical India

India's oldest & reputed magazine on Power and Electrical Industry



Frontec
 HVDS & UG Cable Accessories,
 Terminations, Tee, St Jt, & X Joints,
 Heat Shrink Tubing, and Special Shapes

Frontier Technologies Pvt Ltd

Old Manesar Road
 PO Narsinghpur Factory Area
 Gurgaon 122 004

Tel: + 91-124-4263248, 4263249

mail@frontec.co.in

www.frontec.co.in



SERVING LOW VOLTAGE SWITCHGEAR & CONTROLGEAR NEEDS SINCE 1990



MOTOR STARTERS



- AIR BREAK:** • Magnetic Switch • Manual Direct
 • Air Break Dol • Manual Star-delta • Semi Auto
 Y-delta • Fully Auto Y-delta • Starter - Centrifuge
 • Starter - Reversing

- OIL IMMERSSED:** • Squirrel Cage • Slip Ring

CONTACTORS



- L Range - upto 9A
- M Range - upto 25A
- N Range - 32A & 46A
- 2CA Range - 63 To 450A

OL RELAYS



- Direct Range - Size 1 - upto 24A
- Direct Range - Size 2 - upto 68A

ACCESSORIES



- Special Terminal Blocks
- Foot Switches

SEVA SWITCHGEAR PVT. LTD.

97, Magadi Road, Metro Pillar # 219, Bangalore - 560023. India.
 Ph : +91 80 4160 8100 E-mail: lvswitchgear@sevaspl.com www.sevaspl.com

Online Partial Discharge Measurements on Power Cables



Dr B Nagehwar Rao
Additional Director

CPRI, Bangalore



K P Meena
Joint director

CPRI, Bangalore



R Arunjothi
Engineering officer

CPRI, Bangalore

Partial discharges (PD) are in general a consequence of local electrical stress concentrations in the insulation or on the surface of the insulation. Corona is a form of partial discharge that occurs in gaseous media around conductors which are remote from solid or liquid insulation...

Condition monitoring of high voltage equipment is mandatory to prevent failures, reduce maintenance and operating costs and also to extend plant life. Partial discharge measurement is an important condition monitoring technique to assess the insulation condition of high voltage equipment like power cables, generators, motors transformer's, ct's pt's etc. The partial discharge measurement is a non-destructive diagnostic test to locate incipient fault in an insulation system. Compared to all other electrical product, extruded power cables system is most vulnerable to partial discharge failures. This paper summarises the various partial discharge measuring techniques, issues and signal processing techniques available to eliminate the

interferences associated with PD signal extraction.

Definition of Partial Discharge

Partial Discharge is the localized electrical discharge that only partially bridges the insulation between conductors and which can or cannot occur adjacent to a conductor [1]. Partial discharges (PD) are in general a consequence of local electrical stress concentrations in the insulation or on the surface of the insulation. Corona is a form of partial discharge that occurs in gaseous media around conductors which are remote from solid or liquid insulation. Partial discharges are often accompanied by emission of sound, light, heat, and chemical changes. It is

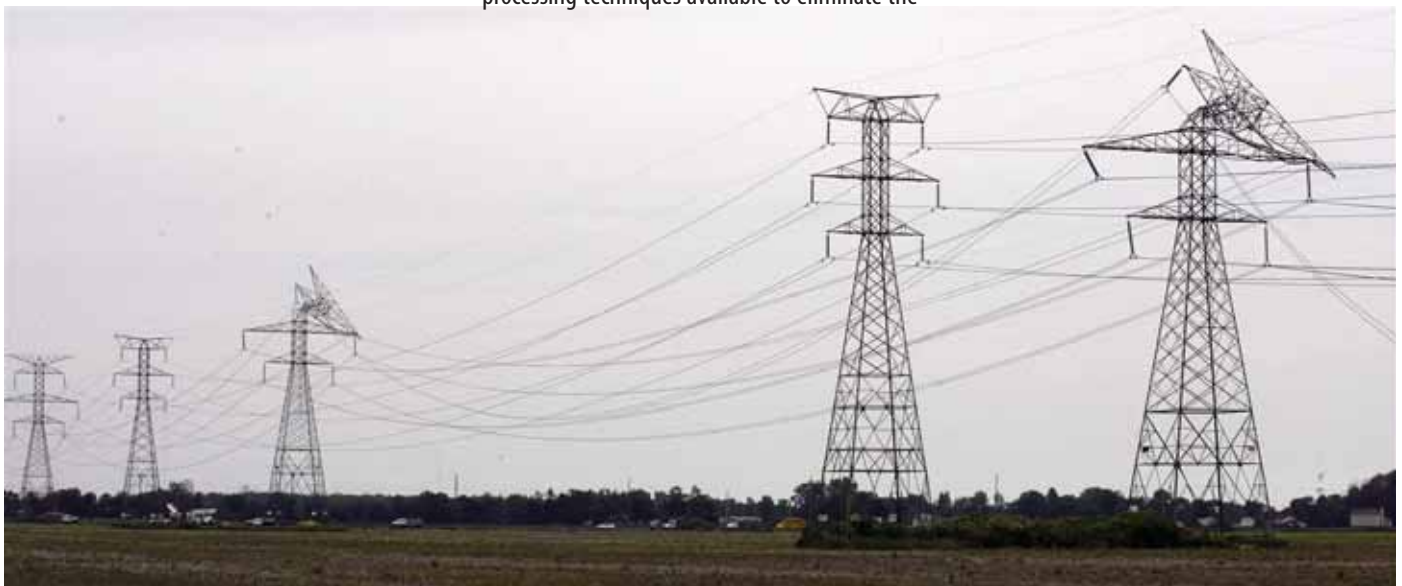


Table 1. Total Failures Due to Insulation Breakdown

Component	Percentage of Insulation failure (%)
Transformers	84
Circuit Breakers	21
Disconnect Switches	15
Insulated Switchgear Bus	95
Bus duct	90
Cable	89
Cable Joints (Splices)	91
Cable Terminations	87

measured in units of charge known as pico-Coulombs or millivolts.

Occurrence of Partial Discharges

It has been well recognised that one of the most common causes of insulation system failure occurs due to presence of void inclusions. For example, in case, extruded cables during manufacture or oil impregnated paper insulating systems such as power transformers and capacitors, voids are generally introduced due to maintenance of poor vacuum during the impregnation cycle. When the insulation system is subjected to a voltage stress such weak points occluded results in local over-stressing and undergo partial discharges activity. Although, the magnitude of such discharges is usually small they are known to cause progressive deterioration and eventually breakdown (failure) of the insulation due to their chemical effects.

Sequence of Discharges

The dielectric constant of the void inclusion usually a gas or a mixture of gases is often lower than that of the surrounding dielectric so that the electric stress in the void is higher than in the dielectric. Hence, void breakdown at a lower stress. When the void is subjected to a stress greater than its breakdown value (ignition voltage) discharge will occur regularly at each half cycle of the applied voltage wave. The number of the discharges that occur in each half cycle is mainly determined by the integer times that the applied voltage peak exceeds the ignition voltage of the void.

The insulation of all power equipment's may contain several cavities at different locations and

these in turn may contain different discharges sites. Consequently, if discharges are made visible on an oscilloscope a complex picture will appear. Constant, intermittent and irregular sequence of discharges may appear separately or superimposed. Surface discharges may also occur if there exists a stress component parallel to the dielectric surface.

Failures due to Partial Discharge

Partial Discharge leads to chemical and mechanical destruction of adjoining materials. Insulation breakdown is the number one cause of electrical failures. In medium and high voltage equipment, partial discharges are the first indication of insulation breakdown. The failure rate of Electrical equipment due to Partial discharge based on IEEE report is as given below. [2].

PD Detection in Power Cable System

Partial discharges in power cable systems are caused by various defects such as voids, shield protrusions, contaminants, improper installation of accessories, improper stress control at accessories and defects developed due to ageing. Off line and on line measurement techniques are available for PD Detection and measurement.

Off-Line Partial Discharge Testing Techniques

Offline Detection requires de-energization of the cable under test and in some cases, completely removed from the distribution system. It has the advantage of close control of the test voltage, and if necessary raising the

voltages above the normal operation voltage.

Partial discharge measurement on long length extruded cable necessitates the use of high KVA rating, PD free source transformers in order to drive higher capacitive currents. To overcome this difficulty, alternate methods like VLF (Very Low Frequency), OWTS (Oscillatory Wave Test Set), DAC etc., are used. Very-low frequency (VLF) source allows the cable to be energized at 0.1Hz therefore preventing any large capacitive current from being drawn and minimizing the size of the test set. While off line testing is a valuable resource, this method is costly due to the requirement of disconnection the cables from the substation.

On-line PD Measurements

Online PD Detection is based on detecting the discharges at operating voltage using proper sensors, without the use of any additional source. In this case, the testing is conducted during real operating conditions, under typical temperature, voltage stresses, and vibration levels. It is a non-destructive test and does not use over voltages that could adversely affect the equipment. Online Partial Discharge Testing is relatively inexpensive compared to offline testing which requires interruption of service and production.

Issues with Online PD Measurements

Compared to Off line methods, the sensitivity of PD measurements will be much poor due to higher interferences and noises. Another issue with on-line PD measurements appears when more than one source of pulse-shaped signals is present in the electric HV system under testing. In these cases, an adequate selection of the non-conventional measuring technique with the most suitable sensors and the implementation of effective signal processing tools are essential to achieve a correct evaluation of the insulation condition.

Capacitive or inductive sensors are used for Partial discharge detection to measure the high frequency pulses generated due to Partial discharges. Generally, capacitive sensors are used for offline PD detection and Inductive sensors for online detection. Typical inductive sensors are ferrite based high frequency current sensors (HFCT). The sensors provide wideband

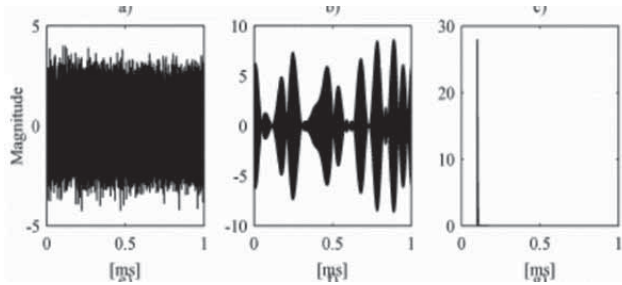


Figure 1: Typical form of disturbances in time domain
 a) Broad band noise (b) Narrow band noise
 (c) Pulse noise

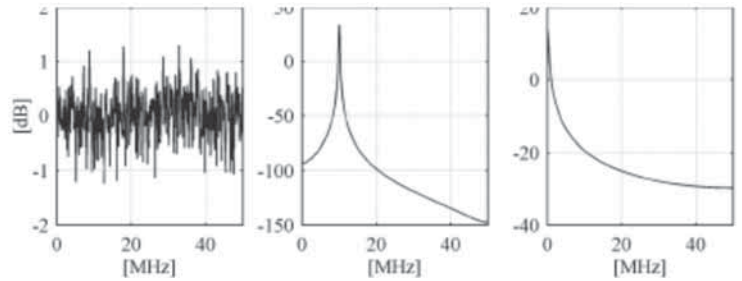


Figure 2: Typical form of disturbances in Frequency domain
 (a) Broad band noise (b) Narrow band noise (c) Pulse noise

measurements from 100 kHz to 30 MHz. These split core sensors are inductively coupled to the earth link of each phase cable.

Noises and Interferences

On-line partial discharge measurements are hampered with external and internal disturbances, which decrease the sensitivity of the measurements. There are three common types of disturbances namely (a) narrowband interference, (b) broadband noise and (c) pulse-shaped interference. Figure 1 & 2 shows the typical form of disturbances in time and frequency domain.

It can be seen from Figure 2 that a broadband signal is random in nature and its energy is equally spread along the whole frequency band. A narrowband signal is concentrated on a narrow frequency band and in time domain it is continuous and strongly oscillating. A pulse-shaped signal is discontinuous in time domain and in frequency domain its power is widespread and usually concentrated on lower frequencies.

Narrowband Interference

Narrowband interference is usually the most dominant source of disturbance in on-line partial discharge measurements and thus increases the noise level. Its amplitude can be a lot higher than the amplitude of the partial discharge pulses. The main sources of narrowband interference are radio transmitters. Broadcasting stations, mobile phones, etc. The level of these kinds of disturbances varies strongly as a function of time of day and place. Narrowband interference is picked up by the cable shield, overhead lines, badly shielded RMU components or the sensors themselves. Narrowband interference can be compressed by conventional notch filters or modern signal processing tools and through that the sensitivity of the measurement can be increased.

Broadband Noise

Stochastic broadband noise signals result from numerous natural and artificial sources like thermal noise, lightning noise, measurement instrument noise or other man-made noise.

Broadband noise is present within the entire frequency spectrum of the partial discharge signals and thus sets a fundamental limit for partial discharge detection. Most of the broadband noise is concentrated on frequencies below 30 MHz.

Pulse Shaped Interference

Pulse-shaped interference frequently occurs during partial discharge measurements. Examples of pulse-shaped interference are thyristor pulses, switching transients and partial discharges from adjacent systems. The pulse shape of this kind of interference can be identical to the partial discharge pulses from the tested cable. Thus this type of interference can lead into false results if proper discrimination between the partial discharge pulses from the measured cable part.

Noise Elimination through Signal Processing Techniques

The discrete Wavelet transform (DWT) is found to be a powerful signal processing tool to denoise the PD signals. Wavelets are mathematical functions that divide the data into different frequency components, and then study each component with a resolution matched its scale. They have advantages over traditional Fourier transform methods where the time-based signal is converted to frequency based, where all information regarding time will be lost. Since Partial discharges are non-stationary signals with discontinuities and sharp spikes, the time information is also vital in analysing the PD signal.

Wavelet Transform

The general wavelet-based denoising method proceeds in three steps: decomposing



Cooling India

Monthly

The Subscription In-charge
Cooling India
 Chary Publications Pvt. Ltd.
 905-906, The Corporate Park, Plot No. 14 & 15,
 Sector - 18, Opp. Sanpada Railway Station,
 Vashi, Navi Mumbai - 400 703
 Email: sub@charypublications.in

If You are already a Subscriber
 Enter the Subscription No. CI/SUB/

**Now
 SUBSCRIBE/RENEW
 Online
 Just Log on to
 www.coolingindia.in**

Yes, I would like to subscribe **Cooling India** for.....years
 at ₹..... (US \$.....overseas subscribers)

Payment details :

Cheque / DD No.....Dated.....

Drawn on Bank.....Branch.....

In favour of **CHARY PUBLICATIONS PVT. LTD.**

Or charge my   For ₹.....

CARD No.

CARD EXPIRY DATE:
 M M Y Y Y Y

Date of Birth
 D D M M Y Y Y Y

Name.....

Signature.....

Designation.....

Company.....

Address.....

City.....PIN

Tel.....

Email.....

No. of Years	Amount	US \$	Tick✓
<input type="checkbox"/> 1 (12 Issues)	1000	300	
<input type="checkbox"/> 2 (24 Issues)	1750	560	
<input type="checkbox"/> 3 (36 Issues)	2500	720	
<input type="checkbox"/> 5 (60 Issues)	4000	1000	

Medical Equipment & Automation

India's Premium magazine on diagnostic, medical equipment and technology

Bi Monthly

The Subscription In-charge
Medical Equipment & Automation
 Chary Publications Pvt. Ltd.
 905-906, The Corporate Park, Plot No. 14 & 15,
 Sector - 18, Opp. Sanpada Railway Station,
 Vashi, Navi Mumbai - 400 703
 Email: sub@charypublications.in

If You are already a Subscriber
 Enter the Subscription No. MEA/SUB/

**Now
 SUBSCRIBE/RENEW
 Online
 Just Log on to
 www.medicalmagazine.in**

Yes, I would like to subscribe **Medical Equipment & Automation**
 for.....years at ₹..... (US \$.....overseas subscribers)

Payment details :

Cheque / DD No.....Dated.....

Drawn on Bank.....Branch.....

In favour of **CHARY PUBLICATIONS PVT. LTD.**

Or charge my   For ₹.....

CARD No.

CARD EXPIRY DATE:
 M M Y Y Y Y

Date of Birth
 D D M M Y Y Y Y

Name.....

Signature.....

Designation.....

Company.....

Address.....

City.....PIN

Tel.....

Email.....

No. of Years	Amount	US \$	Tick✓
<input type="checkbox"/> 1 (6 Issues)	750	150	
<input type="checkbox"/> 2 (12 Issues)	1350	275	
<input type="checkbox"/> 3 (18 Issues)	2000	400	
<input type="checkbox"/> 5 (30 Issues)	3000	600	

Heating, Ventilation, Air Conditioning & Refrigeration all core subjects related to environment & life

Who can Subscribe?

Industries:

- Absorbers
- Air Handling Units
- Boilers
- Chemicals
- Cold Stores
- Condensers
- Contractors
- Cooling Towers & Parts
- Ducts & Accessories
- Environmental
- Exhaust
- Fans
- Freezers
- Insulated Doors
- Pumps
- Refrigerators
- Thermal Storage Systems
- Valves
- Water Treatment
- Air Distribution
- Air Conditioners
- Building Automation
- Chillers
- Compressors
- Condensing Unit
- Controls
- Dampers & Parts
- Energy Saving
- Evaporators
- Fan-Coil Units
- Fire
- Instruments
- Insulation
- Refrigerants
- Solar
- Transport Refrigeration
- Water Coolers

... and related accessories.

Professional Readers - CI

Industries:

- Pharmaceuticals
- Biotech
- Process Industries
- Printing & Packaging
- Hospitals
- Cold Chains
- Food Processing
- Storages
- Entertainment
- Other Allied Industries
- Institutions

Professionals:

- Top industrialists
- Manufacturers
- Consultants
- Architects
- Interior Designers
- Process Engineers
- Importers & Exporters
- Traders

Several Others...

Would you like to know all about the medical equipments and what they do to us...

Who can Subscribe?

Industries:

- Pharmaceutical Machineries
- Medical implements & implants
- Oxygen setup & Dental equipments
- Hearing aids
- Pathological equipments
- Ophthalmologic equipments, devices & solutions
- Ambulance & Air sterilization
- Surgical equipments
- Electro medical equipments / Medical technology
- Rescue & Emergency equipments
- Medical Diagnostic & hospital supplies
- Physiotherapy / Orthopedic equipments & technology
- Communication & IT
- Medical furnitures & equipments & Cardiology equipments
- Radiology & Imaging equipment technology
- Medical disposable disinfection
- Hospital utilities & supplies
- Neonatal / Pediatric equipments & patient monitoring equipments
- Electromechanical linear actuator system for hospital, beds, O.T tables, O.T lights
- Dental chairs, Blood donor coach
- Power backup systems (UPS, Inverters & SMF batteries)
- Rehabilitation aids

... and related accessories.

Professional Readers - MEA

Industries:

- Medical and Surgical Equipment & Supplies
- Pharmaceutical & Bulk Drugs
- Disposable Supplies
- Diagnostics & Laboratory Instruments
- Hospital Furnishing & Related computer software
- Rehab. & Therapeutic aids
- Ophthalmic Instruments
- Oral & Dental Equipment
- Optical Equipment and supplies
- Institutions & Other allied industries

Professionals:

- Medical Professional / Doctors
- Surgeons
- Paramedical Professionals
- Hospital Administrators
- Pathologists
- Radiologists
- Physiotherapists

Several Others...

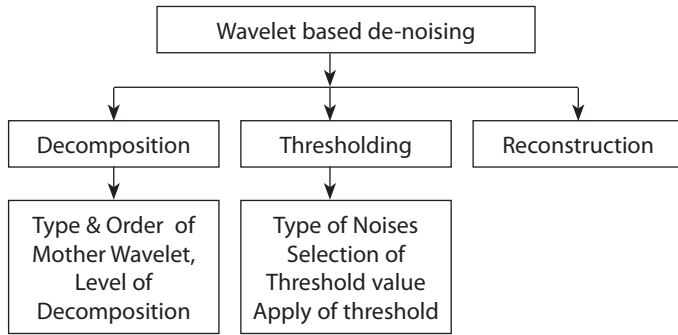


Figure 3: Wavelet-based denoising procedure

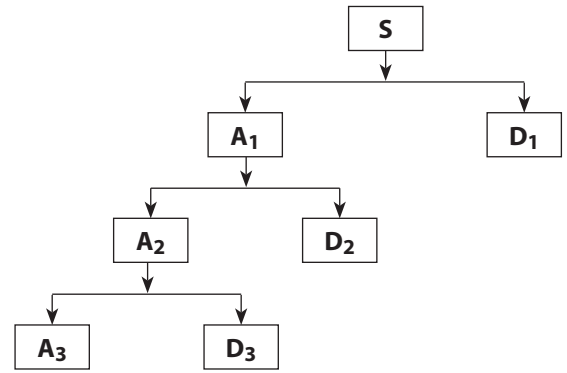


Figure 4: Wavelet Method

the noisy signal, thresholding the wavelet coefficients, and reconstructing the signal as shown in Figure 3. In the first step, the signal is transformed into the wavelet domain and represented by weighted coefficients. This stage involves defining, the type and order of mother wavelet, and the decomposition levels. The first step is to decompose the signal to a maximum level using the selected mother wavelet. The levels for decomposition need to be selected with careful analysis so that the PD signal will not get attenuated and at the same time maximum reduction of noise level is to be ensured. In each level, the signal is down sampled by 2. The tree structure of wavelet method of dividing signals to detail and approximation coefficients are shown in Fig 4.

The second step is crucial for efficient noise cancellation. In this step, it is necessary to set a proper threshold in such a way that all interferences and noises are suppressed. Wavelet denoising methods can be carried out using either hard or soft thresholding. Hard thresholding processes data in such a way that those wavelet coefficients whose absolute values

(x) are greater than the threshold (λ) are kept and those less than the threshold are set to zero. Soft thresholding sets the wavelet coefficients below the threshold to zero. The coefficients greater than threshold are kept and then shrunk towards zero. The reconstruction is defined by the inverse discrete wavelet transform which involves up-sampling and filtering steps. At the completion of this stage, the denoised signal is represented in time domain.

Wavelet Packet

Wavelet packet transform (WPT) is a direct expansion from the DWT pyramid tree algorithm where each branch of the tree has two sub-branches. It is the generalization of DWT in that both the low-pass and the high-pass output undergo splitting at the subsequent level. Therefore, WPT is seen to have the capability of partitioning the high-frequency bands to yield better frequency resolution.

The complete binary tree resulted from WPT contains many nodes. It follows that the terminal nodes (leaves) of every connected binary subtree of the complete tree form an orthogonal basis of the signal space. Therefore, to achieve the best

denoising performance, there is a need of choosing the best nodes subset (best tree) for representing a signal in wavelet packet domain.

The tree structure of wavelet packet transform is as given in Fig.5.

In wavelet packet analysis, the details coefficient as well as the approximation coefficients are split.

Conclusion

Partial discharge (PD) measurements provide valuable information for assessing the condition of high voltage (HV) and EHV Power Cable systems, contributing to their quality assurance. The availability of significant Online PD measuring techniques makes it possible to acquire the PD signals from cable system, without interruption. However in Online PD measurements apart from the signal acquisition the signal processing also plays an important role in ascertaining the actual magnitude, its significance and location. The digital signal processing technique based on wavelet technique is highly imperative in proper extraction of PD signals.

References:

- [1] IEEE Gold Book on Electrical Reliability
- [2] Ian cotton et.al, "Limitations in the application of online and offline PD measuring system, 18th conference on Electricity distribution" June 2005.
- [3] Application of HFCT and UHF Sensors in On-Line Partial Discharge Measurements for Insulation Diagnosis of High Voltage Equipment, Fernando Álvarez Fernando Garnacho, Javier Ortego, and Miguel Ángel Sánchez-Urán, PMCID: PMC4431200, 2015

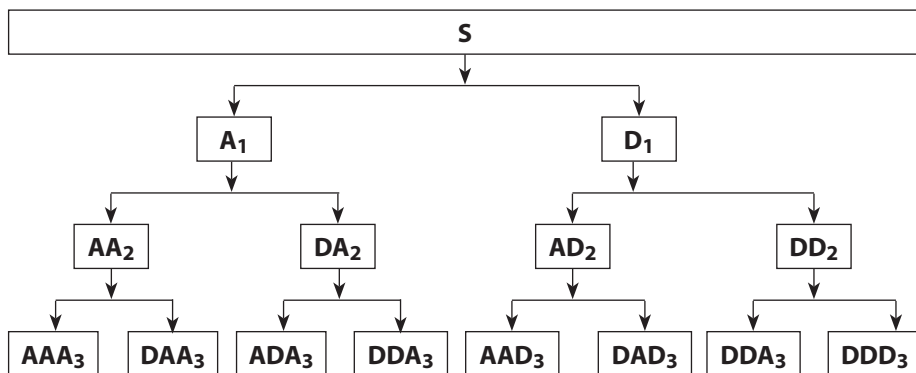


Figure 5: Wavelet Packet Method

ABB India to reinforce Bangladesh power grid

INR 178 crore substation order to enhance transmission capacity and boost electricity supply to more than 250,000 households...



ABB India will build two new substations and upgrade two existing substations, all located in the south-eastern parts of Bangladesh. The o

ABB India has won an order worth around INR 178 crore, from Power Grid Company of Bangladesh Ltd (PGCB), the country's leading transmission utility, to support the country's power infrastructure expansion and meet its growing electricity needs. As part of the project, ABB India will build two new substations and upgrade two existing substations, all located in the south-eastern parts of Bangladesh. The order was booked in the first quarter of 2017. The design, engineering, system integration and supply of key products will be executed in India, another example of making in India for the world.

The substations will add around 535 megawatts (MW) of transmission capacity – enough to power more than 250,000 households – and contribute to the government's target of providing access to electricity for its population of around 165 million by 2021. The government of Bangladesh is working towards its 'Vision 2041', which outlines plans to have a strong and developed economy by 2041. To achieve this, the country is focusing on a steady GDP

growth of over 7 percent. This economic growth ambition is also boosting the demand for electricity.

"Our long term partnering and association with PGCB for strengthening of power network in Bangladesh has been a rewarding experience," said Sanjeev Sharma, CEO and Managing Director ABB India. 'Benefiting from a young grid, the country has been adopting smart technologies like GIS with ease, to connect households to reliable power. Advanced technology solutions for secure and quality power will enable the country to tap into its potential and catalyze growth in the region,' he added.

ABB will build and commission one 132kV/33kV air insulated switchgear substation in Kachua, one 132kV/33kV gas insulated switchgear substation in Kalurghat and upgrade two existing 132kV/33kV AIS substations into GIS substations in the Comilla and Modhunaghat areas. ABB will also provide substation automation systems and fiber optic communications.

The long-term plan for Bangladesh is to generate 60,000 MW electricity by 2041 – four times its current capacity – and grow its industrial and transport sector. Bangladesh is investing in its electricity infrastructure to meet the rapidly increasing demand for power and to ensure a reliable supply of electricity. For over a decade, ABB has supported utility and industry customers in Bangladesh to help the country meet its growth plans.

ABB is a pioneering technology leader in electrification products, robotics and motion, industrial automation and power grids, serving customers in utilities, industry and transport & infrastructure globally. Continuing more than a 125-year history of innovation, ABB today is writing the future of industrial digitalization and driving the Energy and Fourth Industrial Revolutions. ABB operates in more than 100 countries with about 132,000 employees.

EB



Active Harmonic Filter - PQSine™

for ideal Power Quality 



Wall Mounted Design



Floor Mounted Design

Specifications :

- 12 IGBT's with 3 level Topology
- 32 bit Digital Signal Processor
- Selective Drive control algorithm
- Wall mounted and floor mounted construction
- Modular systems from 60Amp to 600Amps
- Independent operations of modules
- Compensation up to 50th Harmonic
- Ultra-fast response time 21μs
- 3phase-3wire and 4 wire configuration
- Voltage range 180V ~ 460V (4 wire) and 180V ~ 528V (3 Wire)
- Best suited for fast changing harmonic distortions
- Reactive power compensation against Capacitive and Inductive load
- Balancing of loads in all phases

Applications :

- Industries having Variable Frequency Drives, Inverters UPS, furnaces such as Paper, Steel Rolling, Textile, Garment, Software Parks, Automotive, Battery Manufacturing, Continuous Process Plants and Pharmaceutical Industries etc.
- Data centers, Hotels, Hospitals, Shopping malls and Office buildings
- Solar generation farms and Wind Turbines

Special features :

- Lowest active power loss (High energy efficiency >98%)
- High harmonic attenuation factor >98%
- True 4 wire system with full capacity 4th wire
- Neutral lead compensation of $3 * I_n$
- Compliant with International standards

Customer Benefit :

- Simple installation
- User friendly menu operations
- Low life cycle cost

Wireless Power Transmission Safely Charges Devices Anywhere Within a Room

Today, most wireless power transmission occurs over very short distances, typically involving charging stands or pads...



lighting system in the 1890s and proposed a system for transmitting power long distances to homes and factories, though it never came to fruition. Today, most wireless power transmission occurs over very short distances, typically involving charging stands or pads.

The QSCR method involves inducing electrical currents in the metalised walls, floor and ceiling of a room, which in turn generate uniform magnetic fields that permeate the room's interior. This enables power to be transmitted efficiently to receiving coils that operate at the same resonant

A new method developed by Disney Research for wirelessly transmitting power throughout a room enables users to charge electronic devices as seamlessly as they now connect to WiFi hotspots, eliminating the need for electrical cords or charging cradles.

The researchers demonstrated their method, called Quasistatic Cavity Resonance (QSCR), inside a specially built 16-by-16-foot room at their lab. They safely generated near-field standing magnetic waves that filled the interior of the room, making it possible to power several cellphones, fans and lights simultaneously.

Alanson Sample, Associate Lab Director & Principal Research Scientist at Disney Research, said, "This new innovative method will make it possible for electrical power to become as ubiquitous as WiFi."

"This in turn could enable new applications for robots and other small mobile devices by eliminating the need to replace batteries and wires for charging," he further added.

According to Sample, who leads the lab's Wireless Systems Group, wireless power transmission is a long-standing technological dream. Celebrated inventor Nikola Tesla famously demonstrated a wireless

frequency as the magnetic fields. The induced currents in the structure are channelled through discrete capacitors, which isolate potentially harmful electrical fields.

In the demonstration, the researchers constructed a 16-by-16-foot room with aluminium walls, ceiling and floor bolted to an aluminium frame. A copper pole was placed in the centre of the room; a small gap was created in the pole, into which discrete capacitors were inserted.

Devices operating at that low megahertz frequency can receive power almost anywhere in the room. At the same time, the magnetic waves at that frequency don't interact with everyday materials, so other objects in the room are unaffected.

Though the demonstration room was specially constructed, Sample said it likely will be possible to reduce the need for metalised walls, ceilings and floors in the future. It may be possible to retrofit existing structures, for instance, with modular panels or conductive paint. Larger spaces might be accommodated by using multiple copper poles.

L&T Makes its Mark in Bangladesh Power Sector

Larsen & Toubro Limited has commissioned gas turbines in open cycle for two large gas-based power projects in Bangladesh in quick succession during March 2017

Larsen & Toubro Limited has commissioned gas turbines in open cycle for two large gas-based power projects in Bangladesh in quick succession during March 2017.

The first 150 MW gas turbine for Bangladesh Power Development Board (BPDB)'s 225 MW Combined Cycle (Dual Fuel) Power Plant at Sikalbaha in Chittagong district was synchronized with the national grid on March 25, 2017. The second 280 MW gas turbine for North West Power Generation Co Ltd (NWPGCL) Combined Cycle Power Plant (360 MW) Development Project at Bheramara in Kushtia district was synchronized with the grid on March 31, 2017. With the successful commissioning of these two gas turbines at their full capacity, approximately 450 MW of clean and green power has been added to the generation capacity of Bangladesh.

BPDB had awarded the engineering, procurement and construction (EPC) contract for Sikalbaha project to L&T through international bidding in August 2014 and work on the project started in April 2015. L&T has supplied advanced class gas turbines and high efficiency steam turbines for this project from world renowned European OEM - Siemens AG of Germany.

NWPGCL had awarded the Bheramara project in July 2014 to Japanese company - Marubeni Corporation - through international bidding, which engaged L&T as its EPC subcontractor. In this project, L&T has supplied state-of-the-art gas turbines and steam turbines from Japanese OEM - Mitsubishi Hitachi Power Systems.

The power plants are designed to operate on natural gas as well as heavy fuel oil and work is in advanced stage to commission the steam turbines in combined cycle mode later this year. Once commissioned, the two power plants will generate more than 635 MW on full load.

Both these power plants, at Sikalbaha and Bheramara, are being executed by Gas Based Power Projects business unit of L&T Power, based in

Baroda. EPC scope in these projects includes design, detailed engineering, supply, installation and commissioning of the power plant on a turnkey basis. L&T's engineering joint venture, L&T-Sargent & Lundy, has carried out plant integration and detailed engineering for both the projects.

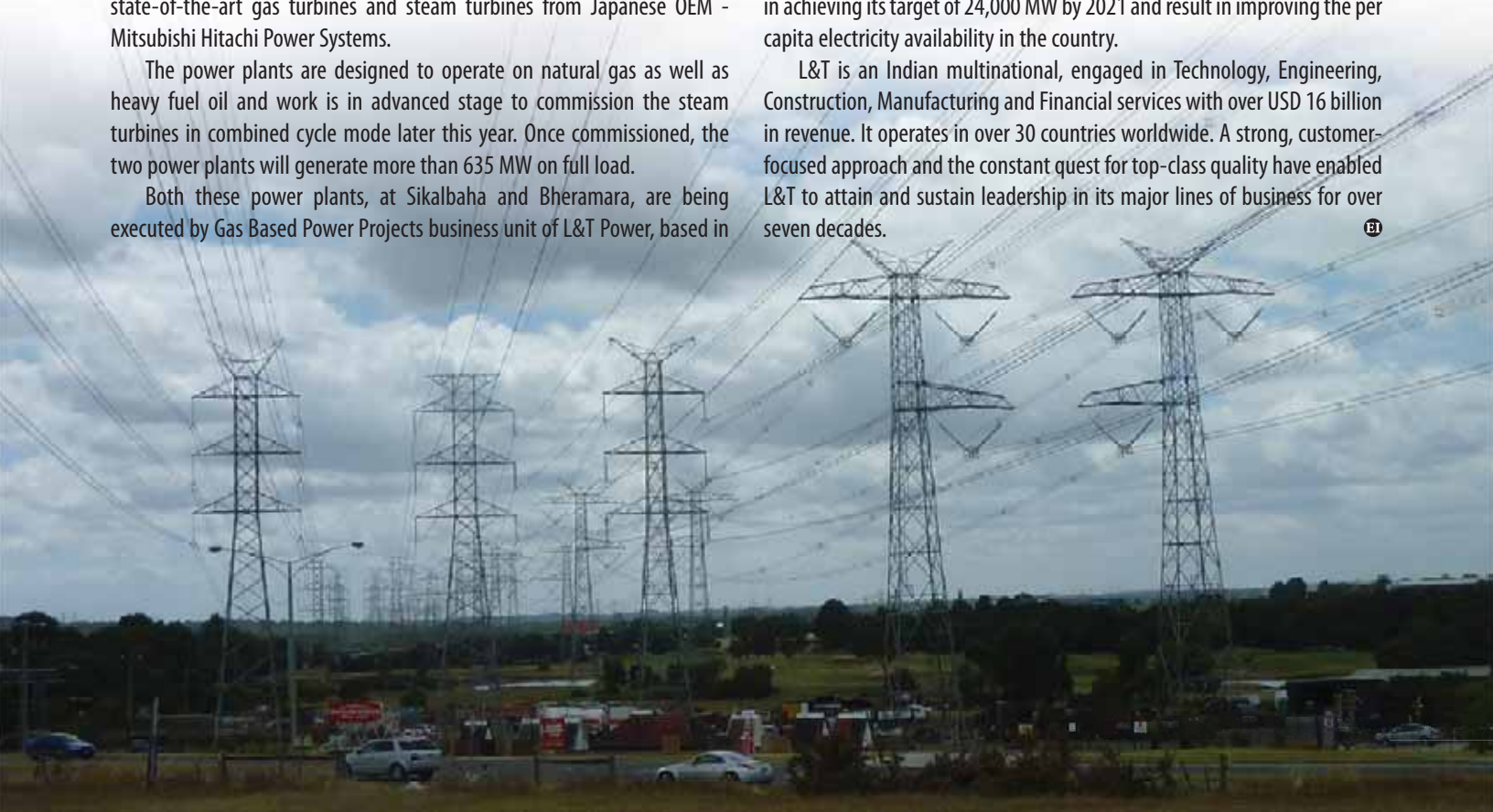
While procuring gas turbines, steam turbines, gas booster compressors, transformers and other equipment from world renowned manufacturers, L&T has also supplied several of its high quality in-house manufactured equipment such as condensers, electrical switchgears, heat recovery steam generator (HRS), etc.

L&T has engaged civil, mechanical and electrical contractors from Bangladesh for execution of its site works, contributing to the skill enhancement of the workmen and employment for the local population. During peak construction period, close to 3,000 workmen were engaged in project activities at both the sites. Despite several challenges, L&T continued with the project activities without any disruption, maintaining an atmosphere of trust and harmony with the local population.

L&T Power is also executing an EPC subcontract for another 400 MW gas based power plant at Bibiyana in Sylhet district, Bangladesh. It will be ready for commissioning in 2018-19.

Successful commissioning of these power plants will assist Bangladesh in achieving its target of 24,000 MW by 2021 and result in improving the per capita electricity availability in the country.

L&T is an Indian multinational, engaged in Technology, Engineering, Construction, Manufacturing and Financial services with over USD 16 billion in revenue. It operates in over 30 countries worldwide. A strong, customer-focused approach and the constant quest for top-class quality have enabled L&T to attain and sustain leadership in its major lines of business for over seven decades.



Siemens to Supply Wind Turbines for Two Projects in Northern Germany

Continuing success for Siemens' direct-drive onshore wind turbines in Germany...

The company has been awarded three further contracts for the supply and installation of 13 of its gearless turbines in Lower Saxony and Schleswig-Holstein. For the WPD Windpark Damme GmbH & Co. KG, Siemens will install and commission six units of the latest type SWT-3.3-130. A project in Karlum in the northern part of Schleswig-Holstein will receive seven units of the type SWT-3.0-113. The deals include a long-term service agreement for 15 and 20 years respectively.


Having made positive experiences with Siemens wind turbines, commissioned in 2016, WPD Windpark Damme GmbH & Co. KG is now expanding its Siemens fleet: According to plan, all turbines of its first project close to the A1 motorway were connected to the grid by the end of last year. The operator has now ordered six further turbines of the new type SWT-3.3-130 to repower an older project situated at Borringhauser Moor, and is offering citizens of the Damme community options to invest in the new project. The new turbines will be installed in autumn 2017 at a hub-height of 135 meters. In the framework of a full service contract, Siemens will care for smooth operation over a period of 15 years.

The citizens' wind park known as Bürgerwindpark Brebek GmbH & Co KG, situated in the northern part of Schleswig-Holstein, is

building on the success of a previous project with Siemens wind turbines. For its new expansion project in the community of Karlum, the operator has ordered seven units of the type SWT-3.0-113. The community wind farm association which will operate the project now consists of more than 280 citizens of the three municipalities in the region. Siemens will install the wind turbines in the spring of 2017 on steel towers at a hub height of 115 meters.

After commissioning in the summer, Siemens Wind Power will also be responsible for service and maintenance over a period of 20 years. Similar to the predecessor Brebek wind farm, the new Karlum project utilises the electromagnetic compatibility of the direct drive turbines to fulfill site-specific constraints to protect a neighbouring military radio station.

Thomas Richterich, CEO Onshore at Siemens Wind Power, said, "The further success of our direct-drive onshore wind turbines in the German market underlines the fact that our technology is now established as good choice for demanding sites."

"With the new generation of gearless wind turbines we have now expanded our portfolio to offer competitive solutions for inland low wind sites. This will enhance the popularity of our turbines in the middle and the south of Germany," he further added. 

Solutions For A Wired World

CALTER

CABLES • CONNECTORS • TOOLS



Ring Main Unit

Bimetallic terminals for connecting power cables with aluminum conductors to copper terminals and bus bars on equipments are made by STL. A bimetallic terminal consists of copper pin integrated to an aluminum barrel by process of friction welding. Aluminum conductors of a power cable is connected to bimetallic terminal inside the aluminum barrel and secured by compression (crimping) tools. Bimetallic terminals eliminate loss out of copper terminals crimped to aluminum conductors. Teaming of Ring Main Units (RMUs) and copper bus bars.

Ask For **Calter Bimetals & Compliment With Range Of Calter Tools For A Secure Connection**



Recently completed project in South Gujarat

Successfully Supplying To Major Utilities **Without Any Failures Across The Globe For The Last 7 Years!!**

Find full range of products on : www.calter.com or you can call us : 022 6153 2425

Jyoti

PLASTICS AND BEYOND

Simply Engineering with Plastics

Over 5 decades of expertise in import and metal substitution by plastics (since 1959)

In-house "concept to commercialization" facilities

- Family values, professional management
- Specialized in precision molding of engineering thermoplastics composites with reinforcements & fillers.
- Legacy of molding all engineering plastics such as PPO (Noryl), PP, PC, ABS, Nylon, PA, PVDF, PBT, LCP, Fluoro polymers in glass-filled and unfilled compositions
- Our expertise in "End-to-End Solution" includes:
 - Compounding of Engineering Polymers
 - Colouring
 - Product Design and Development
 - Product Re-engineering
 - FEA
 - Tooling (EDM, CNC machines)
 - Injection Moulding
 - Packaging
 - Assembly
 - Quality
 - Testing (CMM) and
 - Project Management
 - Moldflow Analysis
 - Rapid Prototyping



- ISO 9001:2008 Certified
- Lean Six Sigma
- Advantage of time-zone, cost competitiveness and talented work-force
- In-house CAD-CAM facility
- Web base access to process and plant
- SAP runs the operations
- Use of FEA Support during try outs
- Ability to work with multi-cavity high precision auto mould
- Use of QFD Friendly infrastructure
- Robotics and Automations towards Industry 4.0
- Scientific Moulding
- Two Colour Moulding
- In Mould Labelling
- Shot weight capacity : 3gms - 5500gms
- In-house design & tool room facilities
- Facilities for post molding operations
- Top Management on Management Committee of Industries / Government Bodies such as AIPMA, PLASTINDIA, PLEXCOUNCIL
- SMED
- Two Compound Moulding

Fluid Engineering

- Valves
- Centrifugal Pumps
- Sureflo-Piping Systems
- Online Filters

Automotive

- Radiator Tanks
- Fan

Industrial

- Filter System
- Water Filter

Electrical & Electronics

- Switch Assembly
- Polycarbonate Switch Plate

Building Products (Spacemakers)

- Security Cabin
- Polydoors
- Site Office

Air Conditioner

- Parts
- White Goods

JYOTI PLASTIC WORKS PVT. LTD.

94, Bombay Talkies Compound, (Post Box No - 7620) Malad (W), Mumbai-400 064, India.

Tel: 22-2882 4448, 3385 7400, Fax: 22-2882 0629, Email: salesm@jyotimail.com, Web: www.jyotiplastic.com

Green DEIF World – Words supported with actions

Climate change effects world over have resulted in transition of focus from using black to green energy solutions. Not only so, people also want to introduce a mix of green in their existing portfolio with multiple green energy sources.

Central to DEIF's vision is to be the preferred global supplier of green, safe and reliable energy control solutions, we at DEIF are committed to actively engaging in and supporting sustainable environmental policy by developing and supplying cleantech products and intelligent power management. Our goal is to help make the world a little greener every time we implement a DEIF solution. Reflecting the accelerating switch of the worldwide energy system towards more renewable and sustainable energy practices, DEIF's progressive strategies and product development focus intensely on Wind power, Hybrid Solar, Hydropower and Biogas.

Aiming to also act in an ethically responsible way across all business segments, including conventional power generation, all DEIF products and solutions are developed in accordance with DEIF's green vision. DEIF develops energy efficient products and solutions that reduce fuel consumption, maintenance intervals, thus cutting harmful emissions and costs. As a means to combat climate change, conserve natural resources and meet the challenges of global population growth, we are continuously looking for ways to increase the performance and efficiency of our partners' installations. 20% of DEIF's more than 500 highly skilled employees work in R&D in our pursuit of excellence, consistently mapping new ways in power control technology.

A DEIF solution is a greener choice because it means optimised operation: life extensions and other advanced technologies make our customers' assets more valuable and operationally more efficient. DEIF solutions being cost-effective balance your economy and conserve the environment as they are highly efficient.

Extracting more out of the Sun



DEIF's Automatic Sustainable Controller (ASC) is a solution that provides integrated solution for systems with utility, diesel and solar power source. The system provides an interface between the diesel/gas genset and solar, with or without presence of utility power - a solution that enables you to

share the load between solar PV cell and diesel/gas genset with maximum solar penetration, thus resulting in maximised savings even during utility failure. Using solar for the additional period of the year can make that period also further green and help maximize the project's overall return on investment. DEIF's solar solution will thus prove to be a boon to India's evolving solar sector.

Capturing the Wind

Needless to say that in DEIF's Wind Power Technology division every product sold is contributing to a greener world. We do not only contribute – we also optimise. Thus, the control systems of DEIF Wind Power Technology are constantly subject to optimisation of the energy generated by the wind turbines.



Advanced Graphical Interface, AGI 300



Advanced Wind Turbine Controller, AWC 500



Wind Sensor Static, WSS



Thyristor Control Module, TCM-2

Flexible and reliable control solutions being our strength, we deliver everything from complete turnkey solutions to individual components.

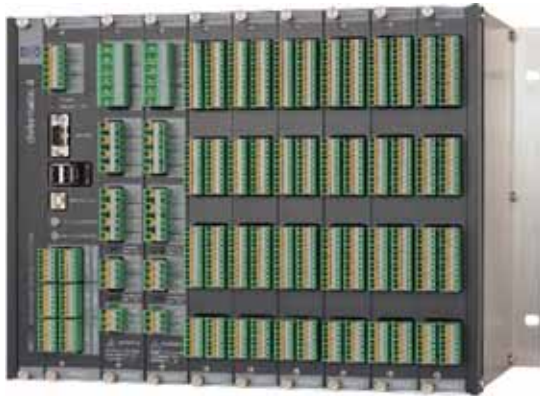
At DEIF, we continuously strive to improve the performance of the wind turbines and make necessary upgrades to the application and embedded software. As a customer you also benefit by receiving free software updates in future as well.

DEIF's wind turbine control systems are not only suitable for new installations but also can be used for retrofitting existing wind turbines to give you numerous key benefits.

Harnessing Hydro Power

Hydroelectric power plants are installed to capture energy from the flowing water and turned into electricity. Delomatic 4 (DM-4) Hydro-controlled plants offer fully automated control for stable optimised operation and require less maintenance and fewer man hours. Compatible

with all types of turbines, the Delomatic 4 Hydro is flexible and easy to adapt with simple parameter settings. Critical functions such as speed governing, generator protections and synchronising are fully integrated with password-protected features for maximum security.



The advantages to DEIF's Delomatic solution go beyond savings, wiring, construction, engineering and maintenance. It is also a flexible solution equally suited for new installations and retrofits, designed to control hydro turbine generators ranging from 2 kW to 20MW along with its auxiliary equipment.

Making the most out of waste gas

Regardless if your gas is bio, natural, landfill or other, our control solutions will enable you to convert it into energy. Irrespective of size of your application, type and make of your gas engine or turbine, DEIF's standard controllers are extremely flexible and will accommodate most of your needs. But we are also happy to develop completely unique solutions designed exclusively for your specific application. Our product DM 400 Gas is suitable for total engine control and protection whereas Automatic Genset Controller – AGC-4 Gas is suitable for power management and CHP applications. Installing DEIF solution benefits through increased operational availability of the system and enhanced cost saving by not having to pay to dispose the waste.

Transforming black to green



Equipped with features and functionalities such as fuel optimisation, load dependent start/stop, asynchronous load sharing, DEIF's Automatic Genset Controller – AGC-4 is the most comprehensive and flexible power management and protection unit in the diesel segment. The innovative solution gives you a critical market advantage that ultimately helps you produce more green power at the lowest possible cost.

Internally Green

DEIF A/S is ISO 14001:2004 certified for Environmental Management Systems. DEIF A/S also has been approved by Lloyd's Register Quality Assurance with the environmental scope as "The environmental aspects in relation to the processes, facilities and buildings for administration, development and manufacturing of control & instrumentation products."



The green focus at DEIF is not only related to product solutions but also to our internal processes as well. Internally, we focus on carbon-neutral heating and cooling; the DEIF Group's headquarters in Skive, Denmark, features advanced green energy system includes a carbon neutral Aqua Thermal Storage System: storing ground water at constant temperatures in underground wells, the system heats and cools the buildings and has an indefinite lifespan.


Our CHP plant cuts emissions – a micro CHP plant generating power for DEIF's buildings, naturally equipped with DEIF controllers, helps keep our CO2 emissions low.

DEIF wants to prevent pollution & reduce negative environmental impact by encouraging all employees to have a high environmental awareness in every relevant decision taken in the company, especially in our processes and production. We want to have a common green mind-set.

DEIF A/S is part of the CO2 neutral website initiative. The carbon emissions from both the website and the users of the site are offset through the building of new renewable energy sources, various CO2 reducing projects, and through purchasing certified CO2 offsets cleared by relevant government institutions and bodies.

The DEIF website is hosted on Hostnordics servers. As part of Hostnordics green IT strategy to minimise power consumption to take pressure off the environment.

DEIF's printed marketing material is carbon compensated according to ClimateCalc (Cert. no. CC-000033/DK). The paper used for printing is FSC certified (Forest Stewardship Council) implying that the paper comes from well managed forests that provide environmental, social and economic benefits. The printed matter also carries NORDIC ECOLABEL stamp that evaluates a product's impact on the environment throughout the whole life cycle.

We at DEIF have done our part in all aspects of product life cycle, now it's your turn to make a commitment towards green energy and safe environment. DEIF can help you achieve your green energy goals. Backed by local support team, choosing DEIF implies reliable and fast on-site service & support. 

For more details, contact: india@deif.in

Copper Is Essential to Modern, Sustainable Electric Grids

The Copper Development Association (CDA) has examined these trends in electrical infrastructure and has published a new case study, titled *Copper Connects Microgrids with Smart Grids...*

Microgrids and smart grids are becoming increasingly relied upon as the world searches for sustainable power sources and as its energy needs continue to grow. As advancements in power technology continue making electrical grids smaller, more powerful, and more energy efficient, one precious metal is behind it all: copper.


The Copper Development Association (CDA) has examined these trends in electrical infrastructure and has published a new case study, titled *Copper Connects Microgrids with Smart Grids*. This new publication offers expert insight into the latest energy technology, how it encourages renewable technology, and how copper connects it all together. The study found that modern energy infrastructure is moving away from traditional large, resource-consuming electrical grids and moving toward microgrids that make it easier to distribute power to communities, public institutions, commercial facilities, universities, and even island communities.

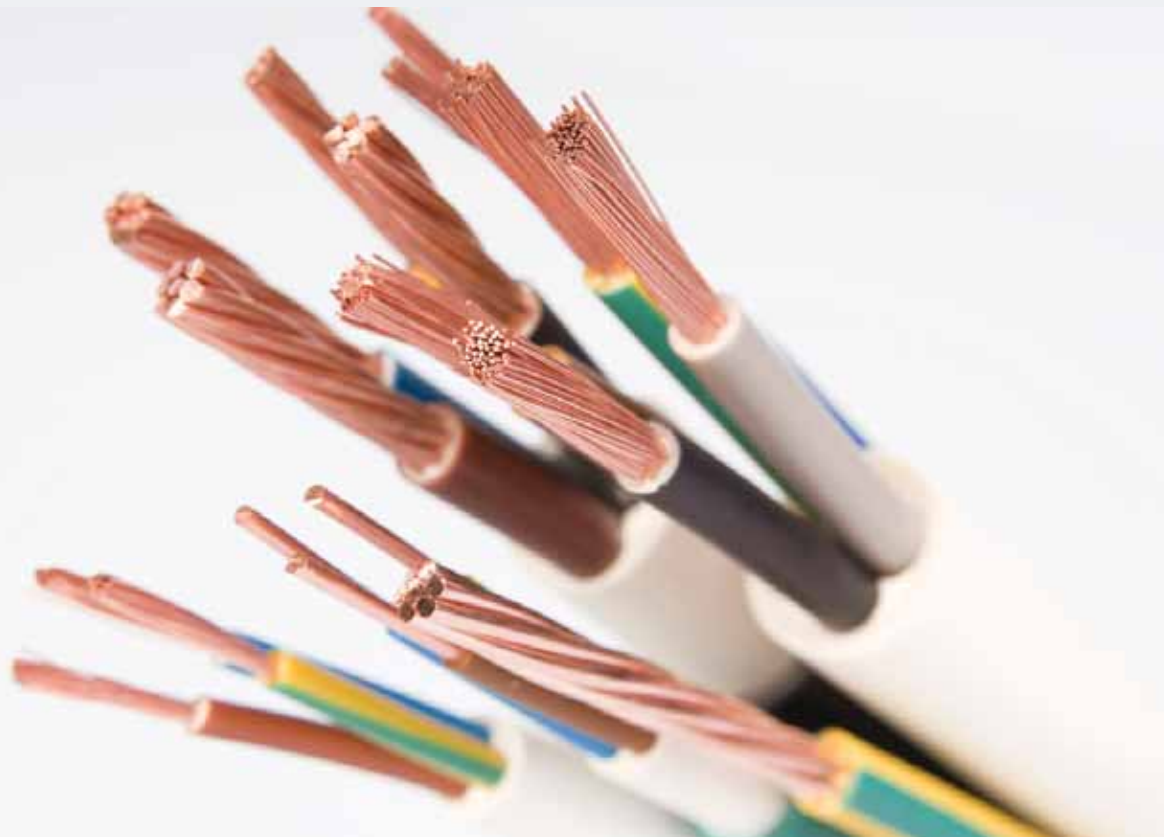
Microgrids utilise wind and solar energy systems, which also use copper to run efficiently, as opposed to traditional energy storage systems and fossil-fuel burning plants unless absolutely necessary. Microgrids are also very resilient and decrease the chances of major electrical failure.

One example of microgrids is the installation at the Illinois Institute of Technology (IIT) in Chicago. The peak load of the campus is around 10 megawatts (MW) and its on-campus DER includes two 4 MW combined cycle gas units and a small wind turbine. There are also plans to add rooftop photovoltaics (PV) as well as a 500 kilowatt hour (kWh) battery, which will bring the total DER capacity close to 9 MW. This will allow the campus to operate as an 'island' most of the time,

meaning it will not import any power from the grid. A 'smart grid' generally refers to a class of technology people are using to bring utility electricity delivery systems into the 21st century, using computer-based remote control and automation.

As these new types of electrical infrastructure become more plentiful, the technology will advance and the costs of components will drop. The new electric grid will be built around thousands of microgrids that are not totally independent but rather can share their resources to mutual advantage while at the same time not becoming too vulnerable to a single control centre. One thing is clear: it's going to take a lot of copper to make these grids operational.

Zolaikha Strong, Director of sustainable energy at CDA, said, "Microgrids are truly the future of power systems. They are smaller, more efficient, and more environmentally friendly. The copper in these microgrids is vital to their success and will continue to be relied upon throughout the lifespan of these grids, due to its resiliency." 



KUSAM-MECO[®]

INVITES

**BUSINESSES & INDIVIDUALS
TO PARTNER FOR LONG TERM &
PROFITABLE ASSOCIATION.**

ADVANTAGES OF BEING ASSOCIATE:

- Long term business relations
- Extensive & unparalleled product range
- Extensive application support
- Marketing support for your business growth
- 100% equipment checked before dispatch
- Impeccable service support
- A win-win situation for both

PLEASE CONTACT US ON:

Mr. Bhupinder Malhotra - 09819728273
bhupinder.malhotra@kusam-meco.co.in

Mr. Rakesh Mali - 09987792525
sales@kusam-meco.co.in

KUSAM-MECO[®]

An ISO 9001:2008 Company

OFFERS UNIQUE BUSINESS OPPORTUNITY

KUSAM-MECO[®] is a well established, reputed name & a market leader over last 30+ years in the field of Digital Electronic Test & Measuring equipments.

These equipments have application in all industries. Our excellent researched products, impeccable service standards, application support and support to our existing partners has resulted in an undaunted customer confidence in our products & services.

We have aggressive business expansion plans & would like to increase our existing 60+ dealers network in India.

PRODUCT RANGE

- Digital Multimeters • Digital Clampmeters • APFC Relays • Power Clampmeters
- Gas Detectors & Analysers • Power Transducer • Power Transducer
- Signal Transmitters • Portable Thermal Imaging Camera • Cable Fault Pre-Locator
- Laboratory Instruments • Power Measurement & Control Instruments
- Programmable Digital Panel Meters • Test & Measuring Instruments
- High Voltage Measuring Instruments • Digital Insulation & Earth Resistance Testers
- Process Calibrators • Environmental Testing Instruments
- Waterproof Pen Testers



G-17, Bharat Industrial Estate, T.J.Road, Sewree(W), Mumbai-400015.

Tel.: 022 - 27750662, 27754546, 27750292, 24124540, 24181649

E-mail : sales@kusam-meco.co.in www.kusamelectrical.com



MANUFACTURER & EXPORTERS OF :

- ACSR,AAA & AA Conductors
- HT & LT Aerial Bunched Cables
- HT & LT XLPE UG Power Cables
- LT PVC Power & Control Cables
- Bare & Insulated Copper Conductors
- Airdac, Communication & Concentric Cables
- Solar Power Cables
- FR/FRLS/LSZH Cables

Established in 1986 : Three decades of excellence

Widely accepted by:

Major Discoms & EPC Contractors.
NTPC , PGCIL , BHEL and many more.
Power Utility Companies.
EPC Consultants.
Industrial Projects in India & Abroad.



Dynamic Cables Pvt. Ltd.

(Govt. Recognized Export House)

-An ISO 9001:2008 Company -

www.dynamiccables.co.in | info@dynamiccables.co.in

Telephone: +91 141 2332388, 4042005 | Fax: 2330182



JAIPUR

NEW DELHI

MUMBAI

HYDERABAD

KOLKATA

Capacity Sufficient, Demand Deficient



Salil Garg
Director - Corporates
India Ratings and Research
(Ind-Ra)

Analysts –
Vivek Jain
Salil Garg
Ashoo Mishra
Rohit Sadaka

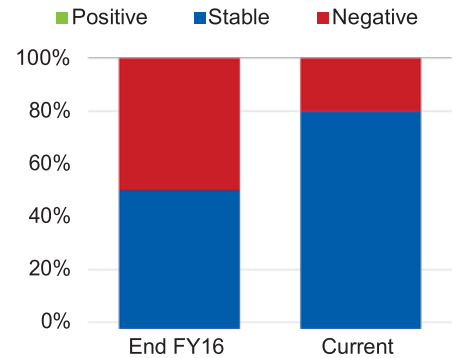
Ind-Ra has maintained a Stable Outlook on most of its rated power sector entities for FY18, as the agency expects its rated entities will continue to manage fuel and state power utility risks due to a favourable tariff mechanism, a comfortable liquidity position and support from central and state governments...

India Ratings and Research (Ind-Ra) has maintained a stable to negative outlook on the power sector for FY18, despite an improvement in coal availability, the restructuring of discom debt and the operationalisation of stuck projects. This is owing to large underutilised capacities, muted demand, bunched capacity addition, soft merchant power prices, continued investments in renewable capacities, lack of power purchase agreements (PPAs) and weak discoms.

Moreover, Ind-Ra has maintained a Stable Outlook on most of its rated power sector entities for FY18, as the agency expects its rated entities will continue to manage fuel and state power utility risks due to a favourable tariff mechanism, a comfortable liquidity position and support from central and state governments.

Sector Consolidation Likely

Credit profiles of large-sized power companies appear to have stabilised, though the sector's return on capital employed remains unattractive. However, small private companies are the worst hit. With a sub-50% plant load factor (PLF), they have a high probability of debt default. Under the current scenario, the survival of such players is not possible. There is a possibility of sector consolidation, which could be triggered by the new bankruptcy code.



Thermal PLF to Remain Subdued in FY18

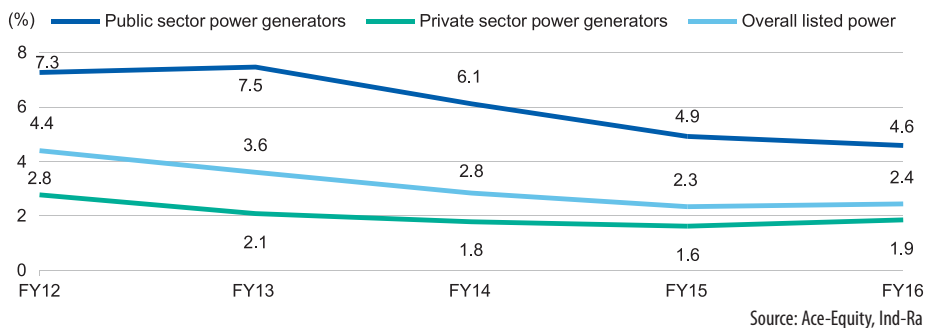
Ind-Ra expects the PLFs of coal-based plants to decline further in FY18 and rise thereafter, though they would continue to remain sub-65% until FY22. India added nearly 115GW of coal-based capacity over FY11-9MFY17. However, demand growth did not keep pace with such capacity addition. This has put pressure on the PLFs of coal-based thermal power plants. In the past, coal and discom financial health were the two key constraints to the overall PLF. However, demand, solar capacity addition and discom financial health will be the major factors putting pressure on PLF in future.

Private Sector to be Worst Hit

Ind-Ra believes nearly 45GW of private sector coal-based capacity running at sub-50%



Figure 1: Interest Coverage Levels of Top Nine Listed Thermal Power Sector Players



PLF is currently stressed, with a debt of nearly INR1.9 trillion. The private sector has been hit harder due to lack of PPAs for the entire capacity. Earlier, the private sector kept a part of the capacity untied due to high short-term prices. The PLF of the private sector's coal-based plants fell to 56.3% in 9MFY17 from 83.9% in FY10. Given short-term power prices are likely to remain benign and discoms' unwillingness to sign PPAs, these capacities are unlikely to see an increase in PLF. Moreover, according to Central Electricity Authority (CEA) estimates, 50GW of capacity has a high probability of getting commissioned over FY18-FY22. Central and state power utilities account for 60% of the 50GW capacity, followed by the private sector (40%). PPAs have been signed for the capacity belonging to central and state power utilities. This will put further pressure on the coal-based capacity of private power generators.

Significant Headroom for Solar Prices to Fall

Solar power tariffs across the world declined to USD24MWh compared with the lowest solar power tariff of USD48MWh in India. Given the wide difference, Ind-Ra believes there is ample room for domestic solar power tariffs to fall and, more so, as prices of solar panels fell 15% in 2HFY16. Solar power tariffs globally are a function of strong counterparty, higher PLF, single axis tilt use and lower borrowing cost. Moreover, battery storage advancements worldwide could alter solar power economics and make solar a more price and consumer-friendly energy source.

Discom Turnaround Now Dependent on ATC Loss Reduction

Ujwal DISCOM Assurance Yojana (UDAY), which covers 92% of discom debt and INR 1,830.84 billion

of debt issued, has been successful on the financial front. 21 states have signed UDAY. Ind-Ra believes UDAY's future success would depend on the successful operational turnaround at the discom level, primarily through ATC loss reduction and power purchase cost management. Electricity meter manufacturers are likely to significantly benefit from the ATC loss reduction drive, as the government looks at moving towards smart meters.

Outlook Sensitivities Sovereign Linkages, High Capex and Low Prices

Weakening of linkages of public sector enterprises with the government of India (GOI), debt-funded capex with low incremental profitability due to lower PLF and average realisations could have a negative impact on ratings.

Sector Consolidation Likely

The credit profiles of the top nine power sector entities engaged in coal-based power generation based on installed capacity seem to have stabilised. Their interest coverage stabilised at 2.4x in FY16 (FY15: 2.3x) (Figure 1) and net leverage improved to 5.3x (FY15: 6x) (Figure 2), driven by, according to Ind-Ra, the ability of these entities to enter into PPAs, thus ensuring

project completion and commissioning.

However, Ind-Ra notes that debt stress levels across power generators other than these top nine entities are quite significant. The reason behind this is that these entities have not been able to enter into PPAs or have not been able to achieve commercial operations for their capacity, leading to challenges with regard to debt servicing. Ind-Ra expects these relatively small capacities in the power generation value chain to be bought out by financial or strategic investors, thus leading to sector consolidation.

Ind-Ra expects acquirers to express interest only in lower asset valuations, with haircuts to be taken by bank and original promoters. This would be the case as acquirers would expect to generate return on equity (RoE) from assets. Given signing PPAs with discoms would be challenging, a buyer is likely to generate higher RoE from lower price paid for an asset than operational improvement expected. Mathematically, of the three levers available in RoE (i.e. profitability, asset turnover and leverage), the acquirer will derive maximum RoE through increased asset turnover reflected in lower purchase consideration for the asset.

The current power market is conducive for acquirers on account of significant stressed capacity levels. In addition, the ability of acquirers to purchase assets at higher valuations is limited due to their own leverage levels.

Capacity Sufficient; Demand Deficient; PLF to Remain Stressed

Ind-Ra expects India to remain a capacity sufficient country at least until FY22, driven by a low PLF (9MFY17: 60%) of existing coal-based capacity (185GW at FYE16), a high probability of 50GW thermal capacity addition during FY18-FY22 and an increase in power generation from renewable sources, particularly, solar. Therefore, Ind-Ra

Figure 2: Net Leverage Levels of Top Nine Listed Thermal Power Sector Players

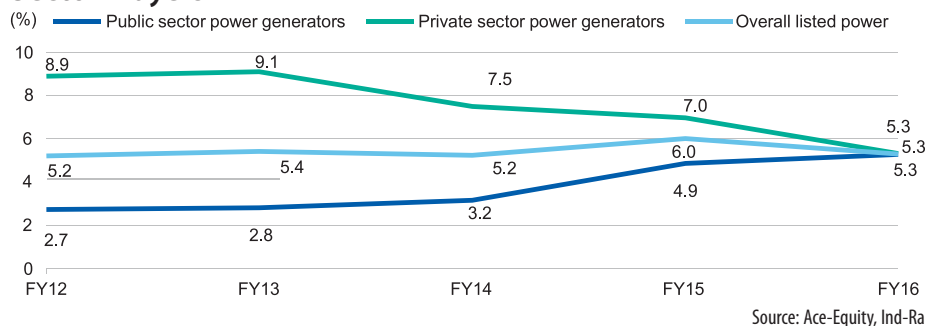


Figure 3: National Coal-Based PLF

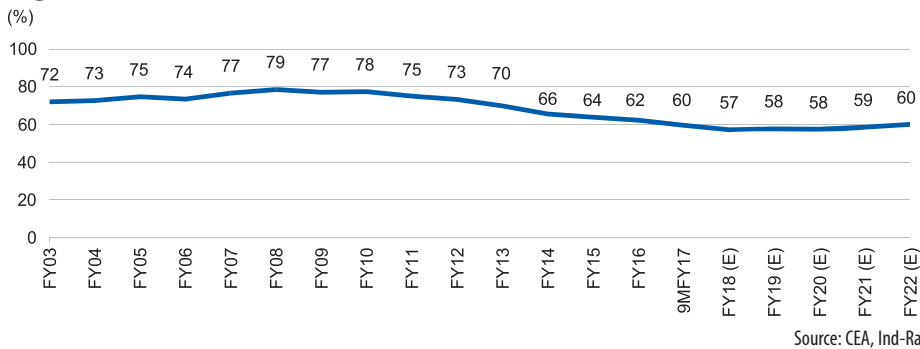


Figure 4: Average PLF over FY18-FY22

Solar Capacity Addition	Demand Growth			
	5%	6%	7%	8%
5,000	56%	58%	61%	63%
6,000	56%	58%	60%	63%
7,000	56%	58%	60%	63%
8,000	55%	58%	60%	62%
9,000	55%	57%	60%	62%
10,000	55%	57%	59%	62%
12,000	54%	57%	59%	61%

Source: Ind-Ra

estimates India's thermal capacity to reach 250GW by FY22. Solar, wind and hydro capacities are likely to reach 40GW, 50GW and 56GW, respectively, assuming 6GW, 4GW, 2.4GW of capacity addition each year over FY18-FY22, respectively.

However, in its base case, Ind-Ra projects 7% demand growth. The agency believes the PLF levels could start rising after FY18; however, they are likely to remain sub-65% over FY18- FY22 (higher than the current level of 60%).

However, thermal PLF is sensitive to two key variables: solar power capacity addition and demand growth. Ind-Ra's sensitivity analysis indicates that even in the most optimistic scenario of 8% demand growth and 12GW of solar capacity addition annually, PLF is unlikely to reach the historic level of 78.6%, both on average over FY18-FY22 (Figure 3) and on an annual basis in FY22 (Figure 4).

PPA Deficient; Price Insufficient; Private Sector Worst Hit

Although domestic coal supply significantly improved in the last 2.5 years, thermal power plants still continue to face related challenges. Private sector thermal plants are the worst hit, indicated by a PLF decline to 56.3% in 9MFY17 from 83.9% in FY10 (Figure 5). The decline is due to higher private sector capacity share in incremental capacity addition (Figure 6) during the period, lack of PPAs for the entire capacity

and willingness to keep capacity open owing to high short-term prices prevalent earlier. Given the lack of PPAs, private thermal power plants access the merchant market for the sale of power.

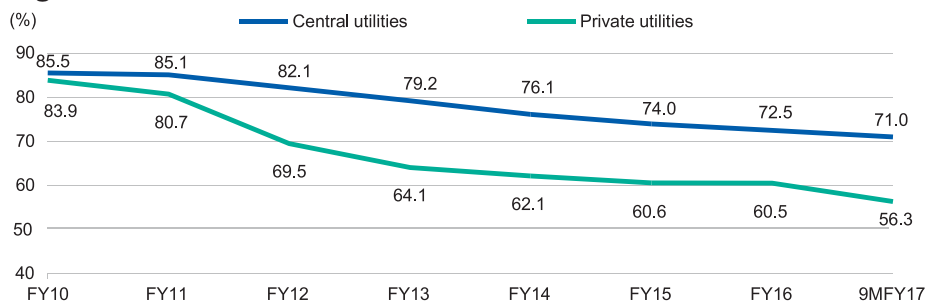
However, as prices of power on the power exchange have fallen and are unlikely to increase in FY18, profitability from merchant sales is likely to remain low in view of a rise in imported coal prices. In addition, the possibility of a PLF improvement looks bleak. Moreover, discoms are

Figure 5: FY22 Year-End PLF Estimates

Solar Capacity Addition	Demand Growth			
	5%	6%	7%	8%
5,000	56%	60%	64%	68%
6,000	56%	59%	63%	67%
7,000	55%	59%	63%	67%
8,000	55%	58%	62%	66%
9,000	54%	58%	62%	66%
10,000	54%	58%	61%	66%
12,000	53%	57%	61%	65%

Source: Ind-Ra

Figure 6: PLFs of Central and Private Coal-Based Power Plants



unwilling to sign long-term PPAs and are more comfortable procuring power through the short- and medium-term PPAs, thus, putting pressure on PLF. Ind-Ra estimates stressed private sector-based thermal coal assets at nearly 45GW, which is running at sub-50% PLF. Investment and stressed debt levels are estimated at INR2.7 trillion and INR1.9 trillion, respectively.

New Capacity to Further Stress Existing Private Capacity

As of 9MFY17, the private sector operated coal-based capacity totalling 83GW was running at a 56.3% PLF. Nearly 50GW of incremental capacity is likely to be added over FY18-FY22, with nearly 60% of the capacity likely to be added by central and state utilities. Given PPAs have already been signed for this 60% capacity, Ind-Ra expects the private sector's overall coal-based PLF to get further stressed. This is because the private sector's upcoming capacities would find it extremely difficult to be absorbed owing to lack of PPAs for the full capacity and lack of fuel linkages. Therefore, the overall PLF of private sector coal-based plants would remain lower, leading to support requirements. However, the ability of the promoters of private sector thermal plants to infuse equity for completion and at a later stage after project commissioning is questionable, as their balance sheets are already significantly leveraged owing to minimal returns from existing plants.

Figure 7: Incremental Capacity Addition by Central/State/Private Utilities

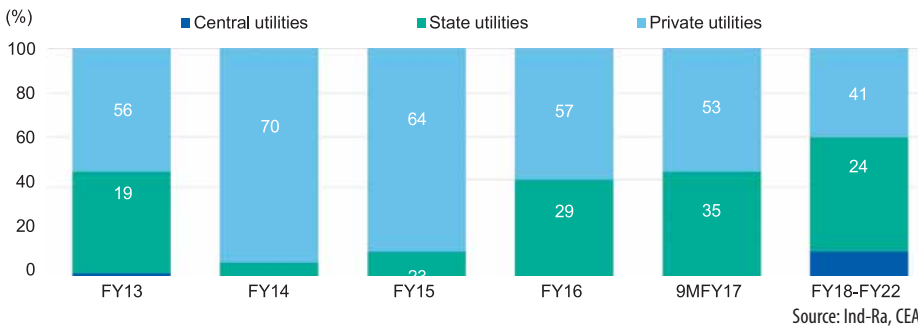
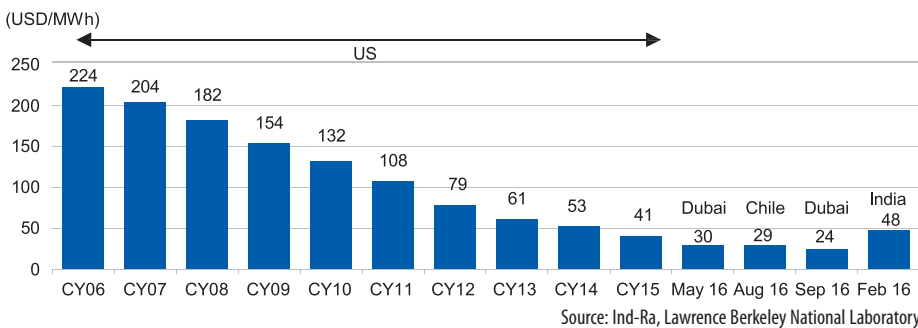


Figure 8: Levelised PPA Prices in US and Other Recent Low Tariff Bids



Global Lowest Solar Tariff 50% Lower Compared with Domestic Lowest Solar Tariff

In September 2016, a low price for energy from solar panels (USD24MWh) was bid for a 350MW solar plant in Abu Dhabi, UAE. Meanwhile, the lowest solar power tariff in India was a USD48MWh bid in February 2017, indicating a significant 50% room for fall in prices in the country. The difference between the global and domestic solar power tariffs is extremely high; however, global solar power tariffs have been driven by strong counterparty, higher PLF, single axis tilt use and lower borrowing cost.

Ind-Ra expects domestic solar power prices to continue declining in FY18 in line with global trends. The decline would be driven by a continual fall in solar module prices and the entry of new players in the solar inverter and racking markets, with aggressive pricing leading to a decline in the balance of plants cost. In 2HFY16, global solar module prices declined 15% yoy. The decline would also be supported in future by a decline in cost of funds, access to capital markets and a reduction in equity risk premium.

However, in India, the counterparty risk continues to remain the biggest challenge due to deferred payments from discoms. If the GOI can involve a strong counterparty such as Solar Energy Corporation of India Ltd. for routing

payments, risk premium building by bidders for delayed payments could be reduced.

Globally, there is a high focus on making energy storage a viable option in terms of cost, efficiency and charge cycles. If successful, solar energy adoption will accelerate at a higher rate and could lead to the disruption of peaking plants. The disruption would also spread to base load plants; however, it is likely to be gradual.

Once battery storage is successful, grid reliability concerns would be addressed.

Success of UDAY Depends on Operational Turnaround

The GOI has largely achieved financial book cleaning through UDAY, given 21 states are participating in the scheme. These 21 states represent about 92% of the overall discom debt. In FY16, states issued UDAY bonds totalling INR989.60 billion. Until date, UDAY bonds worth INR1,830.84 billion have been issued. UDAY bonds worth INR2,651.35 billion are yet to be issued.

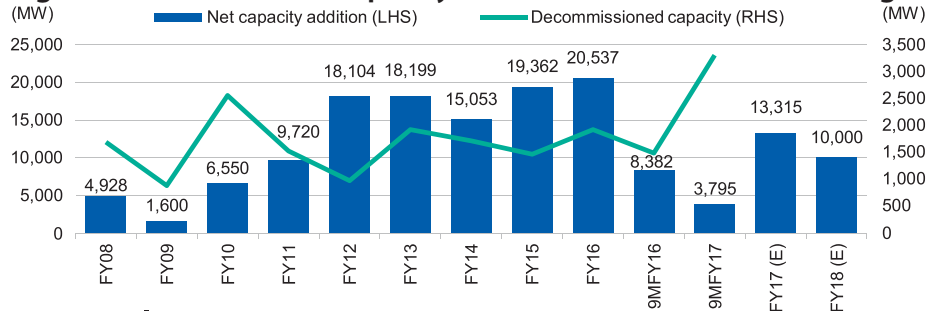
The operational turnaround of discoms is pending. This could be achieved through a reduction in ATC losses. A reduction in ATC losses is possible. In Manipur, billing and collection efficiencies improved to 100% each from 63% and 64%, respectively, after the installation of 11,000 single-phase and 1,000 three-phase prepaid electric meters. Undertaking such measures across all states under UDAY could pose a challenge owing to large capex requirements, notes Ind-Ra. However, benefits of such measures are tangible and could address the challenge of the operational turnaround of discoms. Ind-Ra has maintained a Stable Outlook on most of its rated power sector entities for FY18, as the agency expects its rated entities will continue to manage fuel and state power utility risks due to a favourable tariff mechanism, a comfortable liquidity position and support from central and state governments.

Figure 9: Impact of Prepaid Meter Installation in Manipur

Particulars	Pre-installation	Post-installation	Remark/impact
Load Profile (%)	100	56	44% reduction in load demand
Revenue (6 months)	INR31.8 million	INR60.7 million	Almost 100% rise in collection
Staff requirement	35	10	70% reduction in manpower
Billing efficiency (%)	63	100	100% billing without meter reader
Collection efficiency	64	100	Collection in advance

Source: Ind-Ra, Genus Power Infrastructures Limited

Figure 10: Thermal Net Capacity Addition and Decommissioning




Polar Lighting Poles



K-LITE surface mounted Polar Lighting Pole, integrated with LED Lighting Module is an exclusive choice of designers for city beautification lighting blended with architectural appeal. It is designed for a complete range of contemporary designs with single arm, double arm, L-arm, V-Arm, Square arm and Parallel arm.

The pole is engineered to meet the adverse conditions and the pole sections are duly welded using special grooving techniques and high end MIG/ TIG welding process. The control box is integral and built-in with service door, locking arrangement and safety chain. The galvanized pole is coated with epoxy zinc phosphate primer and finished using environmentally stable polyurethane based paint. The pole is supplied with necessary foundation hardwares for normal soil condition.

The Polar Lighting Pole lighting arms are integrated with the LED modular lighting system, which is environmental friendly under green lighting category. The LED lighting offers more lumens with lesser power consumption. The luminaire is IP 68 protected and the various models were evaluated by an extensive research and understanding of illumination requirements for urban spaces. Choice of drivers for LED takes into consideration the harmonic distortion level (not exceeding 10 %) power factor greater than 0.9 and surge protection. The LED modules are individually rated 42 watts. The control gear tray is prewired with terminal connectors, MCB and loop-in loop-out arrangement and located in the control box, integral with the pole. 



All India Installed Capacity (in MW) of Power Stations (As On 31.03.2017) (Utilities)

Region	Ownership/ Sector	Modewise breakup						Grand Total	
		Thermal				Nuclear	Hydro		RES * (MNRE)
		Coal	Gas	Diesel	Total				
Northern Region	State	16598.00	2879.20	0.00	19477.20	0.00	8543.55	663.56	28684.31
	Private	22100.83	558.00	0.00	22658.83	0.00	2502.00	9583.42	34744.25
	Central	12630.37	2344.06	0.00	14974.43	1620.00	8266.22	0.00	24860.65
	Sub Total	51329.20	5781.26	0.00	57110.46	1620.00	19311.77	10246.98	88289.21
Western Region	State	23170.00	2993.82	0.00	26163.82	0.00	5480.50	311.19	31955.51
	Private	31465.67	4676.00	0.00	36141.67	0.00	447.00	16549.95	53138.62
	Central	13657.95	3533.59	0.00	17191.54	1840.00	1520.00	0.00	20551.54
	Sub Total	68293.62	11203.41	0.00	79497.03	1840.00	7447.50	16861.14	105645.67
Southern Region	State	17832.50	791.98	287.88	18912.36	0.00	11739.03	512.55	31163.94
	Private	12124.50	5322.10	473.70	17920.30	0.00	0.00	21208.87	39129.17
	Central	13425.02	359.58	0.00	13784.60	3320.00	0.00	0.00	17104.60
	Sub Total	43382.02	6473.66	761.58	50617.26	3320.00	11739.03	21721.42	87397.71
Eastern Region	State	7025.00	100.00	0.00	7125.00	0.00	3537.92	225.11	10888.03
	Private	7451.38	0.00	0.00	7451.38	0.00	195.00	671.52	8317.90
	Central	14101.64	0.00	0.00	14101.64	0.00	1005.20	0.00	15106.84
	Sub Total	28578.02	100.00	0.00	28678.02	0.00	4738.12	896.63	34312.77
North Eastern Region	State	60.00	492.95	36.00	588.95	0.00	382.00	259.25	1230.20
	Private	0.00	24.50	0.00	24.50	0.00	0.00	21.19	45.69
	Central	520.02	1253.60	0.00	1773.62	0.00	860.00	0.00	2633.62
	Sub Total	580.02	1771.05	36.00	2387.07	0.00	1242.00	280.44	3909.51
Islands	State	0.00	0.00	40.05	40.05	0.00	0.00	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	6.15	6.15
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub Total	0.00	0.00	40.05	40.05	0.00	0.00	11.40	51.45
ALL INDIA	State	64685.50	7257.95	363.93	72307.38	0.00	29683.00	1976.90	103967.28
	Private	73142.38	10580.60	473.70	84196.68	0.00	3144.00	48041.10	135381.78
	Central	54335.00	7490.83	0.00	61825.83	6780.00	11651.42	0.00	80257.25
	Total	192162.88	25329.38	837.63	218329.88	6780.00	44478.42	50018.00	319606.30

Figures at decimal may not tally due to rounding off

Abbreviation: SHP=Small Hydro Project (≤ 25 MW), BP=Biomass Power, U&I=Urban & Industrial Waste Power, RES=Renewable Energy Sources

Note : 1.RES include SHP, BP, U&I, Solar and Wind Energy. Installed capacity in respect of RES (MNRE) as on 31.12.2016 (As per latest information available with MNRE)

*Break up of RES all India as on 31.12.2016 is given below (in MW):

Small Hydro Power	Wind Power	Bio-Power		Solar Power	Total Capacity
		BM Power/Cogen.	Waste to Energy		
4333.86	28700.44	7856.94	114.08	9012.69	50018.00

- ENNORE TPS U-1,2,3&4 (60,60,110&110 MW) have been retired from the State Sector of Tamil Nadu.
- MAUDA TPS U-4 (660 MW) has been commissioned and added to the Central Sector of WR states as per their allocation.
- BONGAIGAON TPP U-2 (250 MW) has been commissioned and added to the Central Sector of NE states as per their allocation.
- KUDGI STPP U-2 (800 MW) has been commissioned and added to the Central Sector of SR states as per their allocation.
- MUZAFFARPUR TPS U-4 (195 MW) has been commissioned and added to the Central Sector of ER

states as per their allocation.

- KUDANKULAM U-2 (1000 MW) has been commissioned and added to the Central Sector of SR states as per their allocation.
- UNCHAHR TPS U-6 (500MW) has been commissioned and added to Central Sector of NR states as per their tentative allocation.
- BHAVNAGAR TPP U-2 (250MW) has been commissioned and added to State Sector of Gujarat.
- YERMARUS TPP U-2 (800MW) has been commissioned and added to State Sector of Karnataka.
- KASHANG INTEGRATED HEP U-3 (65 MW) has been commissioned in January, 2017 and added to State Sector of Himachal Pradesh.
- State Sector of Andhra Pradesh and Telangana have been revised as per their respective state generating companies.
- Share from Central Sector generating stations has been revised as per latest allocation available.
- Share of Power Grid, Railways etc. in Power Plants has been added to respective states.
- Share from Private Sector generating stations has been added to beneficiary states as per PPA information available.
- Untied capacity of Private Power Plant has been considered in the home state.

Smart Transient Free Switching of Switchgears



Er K K Murty
Chief Engineer

(Testing & Communication) Rtd,
M P Power Transmission Co Ltd
Jabalpur

In this article a basic duty of a “Controlled Switching Device” in back to back switching of a shunt capacitor banks has been explained. The Transients developed are very high in nature and are very injurious to the circuit breaker used for this duty. A case study, highlighting the need for implementing such device for back to back switching of shunt capacitor banks is also described.

In a large EHV Grid system, the circuit breakers are the most important equipment. Failure of any EHV circuit breaker may cause disastrous disturbance in the grid system leading to even grid failure. The failure of circuit breaker may take place due to the transient conditions developed while switching-in and/or switching-out conditions of the circuit breakers used for following equipment or transmission lines.

- Shunt capacitor banks
- Shunt Reactors
- No-Load transformers
- No-Load Overhead transmission lines
- Shunt and series compensated Transmission lines, etc.

Use of “Controlled Switching Device”, an intelligent and smart IED is the only answer to obviate such conditions and to safe guard the circuit breakers against failures due to switching transients.

In this article a basic duty of a “Controlled Switching Device” in back to back switching of a shunt capacitor banks has been explained. The Transients developed are very high in nature and are very injurious to the circuit breaker used for this duty.

A case study, highlighting the need for implementing such device for back to back switching of shunt capacitor banks is also described.

Smart Controlled Switching Device

In order to safeguard the catastrophic failure of EHV circuit breakers and ill-effects on the

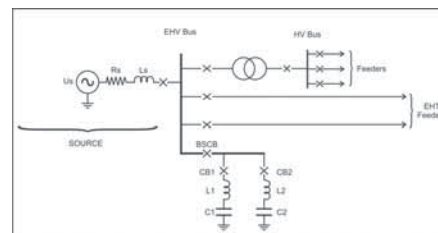


Figure 1: SLD showing Shunt Capacitor banks, C1 & C2 connected to the common EHV Bus

associated EHV equipment while performing switching-in/off duties particularly in case of back to back switching, a modern smart device named as “Controlled Switching Device” has been innovated which has an IED (intelligent Electronic Device) through which the programmed command is given for switching-in/off of the circuit breaker contacts at the point “0” position on the voltage wave. This shall safe guard the Circuit Breakers from ill-effects of Switching Transients.

Phenomenon of In-rush transients in Back to Back Switching

The figure 1 shows the basic schematic single line diagram of a power system feeding EHV bus, on which Capacitor banks C1 & C2, each having individual circuit breakers, CB1 & CB2 are connected through bus-section circuit breaker BSCB.

While Capacitor bank C1 is already connected to the energized EHV bus, the second capacitor bank C2 is now switched-on to the same bus in parallel to the existing Shunt capacitor bank C1. The inrush high frequency transient Currents shall rush to the 2nd Capacitor bank C2 through the circuit breaker CB2. indicated by the following formula;

$$i(t) = \frac{Us \max(peak)}{Zo} . \sin(\omega o. t)$$

Worst case occurs when the switching is takes place at U max in the (+) half of the cycle or at Umax in the (-) half of the cycle.

The peak value of inrush current will be,
$$I_o = \frac{Us \max(peak)}{Zo}$$

Where, Zo the Surge Impedance = $\sqrt{\frac{Leq}{Ceq}}$

Natural frequency of un-damped oscillation
$$\omega o = \frac{1}{\sqrt{Leq.Ceq}}$$
,

where $Ceq = \frac{C1.C2}{C1 + C2}$

The inrush current to the tune of 40 to 100 times

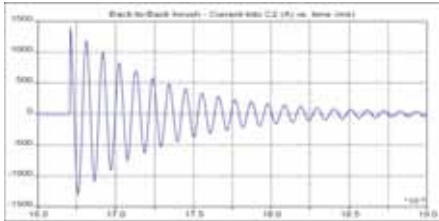


Figure 2: Curve showing transient inrush current

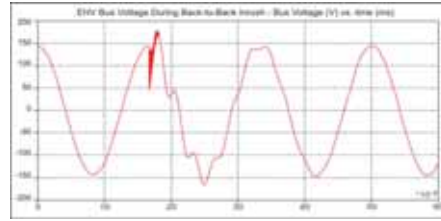


Figure 3: Curve showing Transient voltage dips and over voltages on the EHV Bus



Figure 4: Functions of Controlled Switching System for effectively eliminating switching transients

of the rated current at frequency 20 to 2000 KHz shall rush into C2 (ref.fig.2 showing wave shape) and also the bus shall experience voltage dips and transient over voltages. The transient phenomena of the inrush currents and the voltages may produce high mechanical and dialectical stresses on the circuit breaker which may result into its break-down, the Capacitor banks, and the other power equipment in the vicinity thereof shall also experience the ill-effects of back to back switching (Ref. fig. 2 & 3 depicting wave shapes of the transient currents and the transient voltages).

Eliminating Switching Transients through smart Controlled Switching Device

This equipment has been developed consisting of an Intelligent Electronic Device (based on the digital technology) which receives the input voltage signal from the bus and is programmed to delay the switching command such that the actual contact making of the circuit breaker takes place at the voltage '0' position on the sinusoidal voltage wave, thus eliminating the switching transients.

Principle of operation of

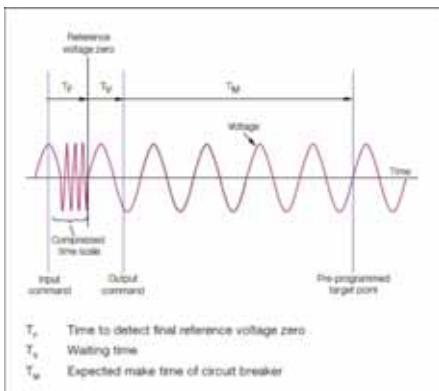


Figure 5: Ref. fig.4 : voltage vs time for effective elimination of switching transients

Controlled Switching Device/scheme

The principle of operations of the Controlled Switching System has been explained through a block diagram showing functions/operations involved therein, as depicted hereunder;(ref.4).

It is observed as follows,from fig.4 & 5 that

- T_F – time to attain input voltage to '0', from the instant of giving switching command (input Command) at some point on the voltage wave.
- T_V – the waiting time with reference to voltage '0' to that of, out-put command.
- T_M – pre-programmed make time of the Circuit breaker to make contacts at voltage '0'.

By means of the Controlled Switching System, the circuit breaker closing command is controlled with regard to point '0' position on the voltage wave at the instance when the Breaker contacts make the contact (touch each other), followed by time taken for complete Closing action, therefore no harmful transients will be generated due to such switching operations.

Schematic diagram of Individual operated Circuit breaker.Such circuit breakers are known SPR breakers(Single Pole Reclosure Breakers).(Ref fig.7.)

6.0 In case of 3-pole

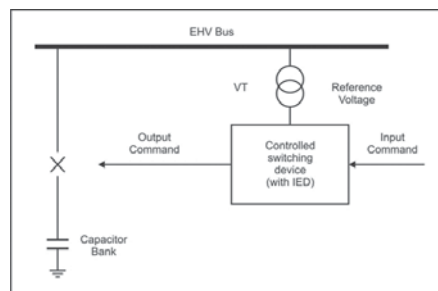


Figure 6: Basic schematic diagram of Capacitor Bank switching in-conjunction with Controlled Switching System

operated Circuit breakers

It is essential to stagger the poles (mechanically to be adjusted) of the Circuit Breaker such that if one the poles closes at voltage '0' the other 2-poles should close simultaneously at voltage '0', instant.This is effected through mechanically staggering the circuit breaker poles (Ref.fig 8) w.r.t the different phases of the bus voltage such that they are adjusted to electrical degrees as shown below;

Phases as per configuration in the Bus	Circuit breaker Poles	Staggering of closing instant, Electrical degrees.
R	C1	+60°
S	B1	0°
T	A1	+120°

Table:1 Connection of Breaker poles to the Bus as per phase-wise configuration and phase difference in electrical degrees

Care should be taken to connect the circuit breaker poles such that R-ph,S-ph & T- ph (or R,Y& B phases as per Indian convention) of the bus-voltage should be connected to C1,B1 A1 poles respectively of the circuit breaker.

- It is observed from the fig.10,
- when the S-ph voltage wave passes through '0', at this instant, B1 pole of the Circuit

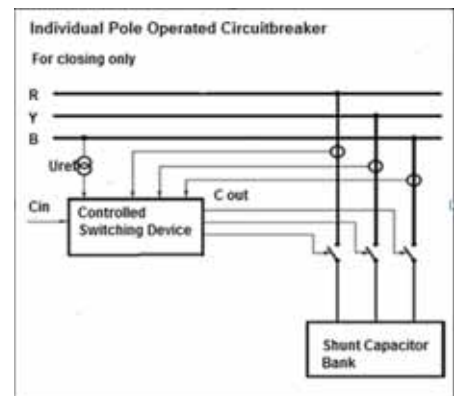


Figure 7: Schematic diagram of Individual pole operated circuit breaker.(closing operation)

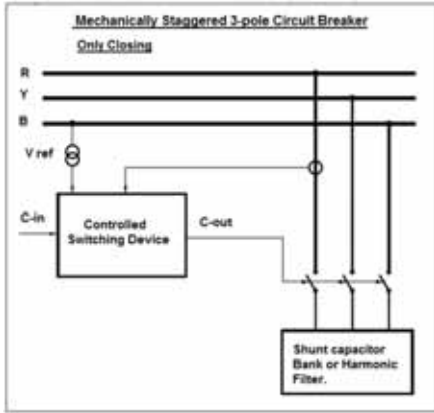


Figure 8: Schematic diagram of Mechanically staggered 3-pole Circuit breaker (closing only)

breaker contacts make.

- At this instant the R –ph voltage wave shall be lagging behind by 240° ele and T - ph Voltage wave shall be lagging behind by 120° el to the S-ph voltage wave.
- Thus the R-Ph voltage wave shall cross the point "0" position at 60° ele while traversing from –ve to +ve cycle.
- The T-ph voltage wave shall cross the point "0" position at 120° ele. while traversing from +ve to –ve cycle.
- Had the poles of C1 & A1, not staggered and adjusted, the voltage waves of R ph would have crossed the '0' crossing after *3.33 ms and the T-Ph voltage wave would have crossed the '0' crossing after after *6.66 ms as per prevailing system frequency of 50 Hzs in INDIA.
- Since the Stagerring of the Breaker poles is done resulting into closing all the 3-Ph contacts of the circuit breaker at the same instant.i.e at voltage '0' position for all the 3 Phases.

Note:

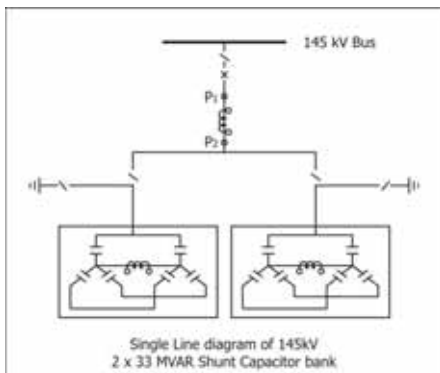


Figure 11: Single line diagram showing 2x33 MVAR, 145kV.Shunt Cap. Banks, Controlled by 1- No. 145kV, SF6 CB only

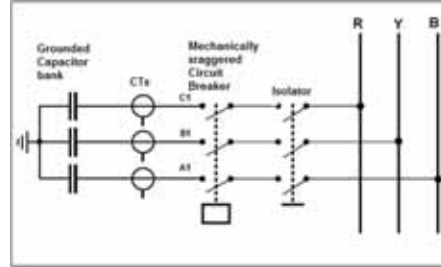


Figure 9: Connection of Breaker poles to the Bus as per phase-wise configuration

- 1) The constraint of connecting the Circuit breaker poles to individual phase as tabulated in the Table .No1 is essential in case of grounded Shunt capacitor banks.
- 2) In case of un-grounded shunt capacitor banks such constraint is not there.
- 3) It is recommended that for Shunt Capacitor bank applications, 3-Pole operated Circuit breakers should be preferably used.

***Calculations to arrive at 3.33 ms and 6.66 ms.**

Since 360o ele = 1 cycle = 20 ms,(since 50 cycles in 1 sec ie in 1000 ms).
 $\therefore 60^\circ \text{ ele} \text{ ----- } [(20 \times 60)/360] = 3.33 \text{ ms. \&}$
 $\therefore 120^\circ \text{ ele} \text{ ----- } 3.33 \times 2 = 6.66 \text{ ms.}$

Essential Conditions For Successful Operations

- The System is programmed in such a manner that the closing command to the individual

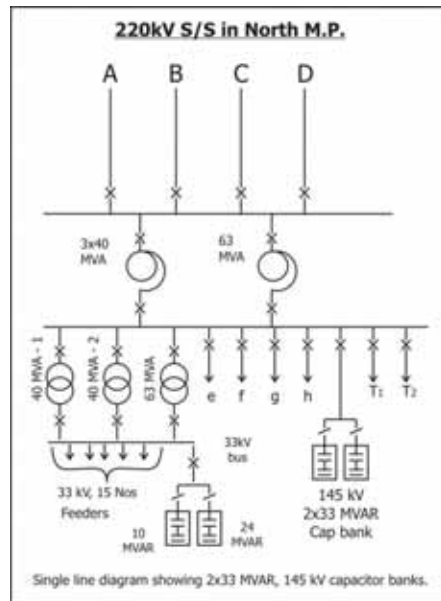


Figure 12: S.L.D of 220kV & 132kV buses at 220kV S/s Gwalior under study in M.P.

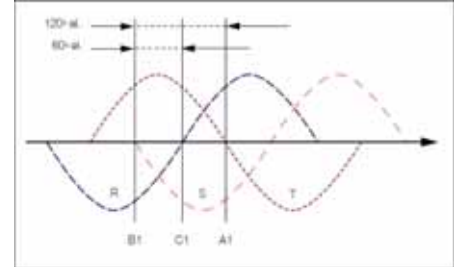


Figure 10: The effect of staggering of breaker poles w.r.t. bus voltage-wave with referene to table no.1, above.

- poles of the Circuit breaker is targetted to make the contacts of the poles at voltage '0'. The Closing command to individual closing coils of the individual poles is given accordingly as per difference of electrical degrees between them, by the Controlled switching Device (IED).
- Thus,it is essential that all the three poles of the Circuit breaker should have individual operating features (Closing & Opening).
- This system to function satisfactorily, it is essential that the accuracy limit at the instant of '0' crossing of the system voltage (phase-wise) and the making of individual Circuit breaker poles should have an accuracy limit of $\pm 1\text{ms}$ (approx.).
- The Circuit breaker should have rapid RDDS

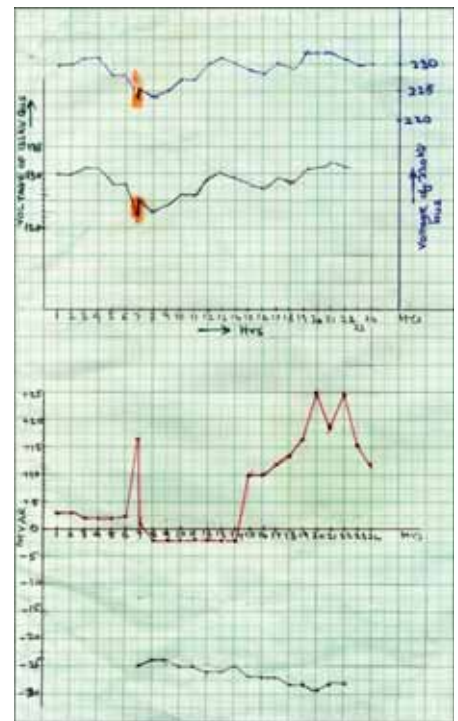


Figure 13: Curves pertain to the date: 27.11.2013 at the 220kV S/s Mahalgaon M.P. under study

(Rate of Decrease Dielectric Strength) ie on closing operation, the dielectric strength of the Circuit Breaker should rapidly decrease from high starting value to zero value.

- This system has an inter-lock for preventing the switching close-command to pass to the closing coil for 10 minutes. This feature takes care for the dis-charging time of the Capacitor banks.

A case-study of 2x33 MVAR, 145kV, Shunt Capacitor Banks at a 220kV S/S Gwalior in M.P. w.r.t. installation of 145kV SF6 Circuit breakers with Controlled Switching Device for each 33 MVAR Shunt capacitor bank.

2x33 MVAR, 145kV, Shunt Capacitor Banks were connected on to 132kV bus at 220kV S/S Gwalior in M.P.

Please refer to the following figures;

- 1) Fig: 11.. - Single line diagram of 2x33MVAR Capacitor bank with 1No. 145kV, SF 6 Circuit Breaker.
- 2) Fig 12.- Connection of 2x33 MVAR,145kV, Shunt Capacitor Bank on to the 132kV bus at 220kV S/S Gwalior in M.P.).
- 3) The 2x33 MVAR 145kV Capacitor banks are un-grounded banks having double star configuration.

The scenario has since been changed over a period of say 6 to 8 years due to the addition of 400kV and 765kV long Transmission lines (long and lightly loaded EHV Transmission lines generate Reactive Power) in the WREB Grid, now, only 1No-33 MVAR Shunt Capacitor bank is taken into service as and when required in this 220kV S/s Gwalior, under- study.

To highlight the benefits of taking the 33 MVAR Shunt capacitor bank into service, the readings taken on dated 27.11.2013 (reference: the S/S control room log-sheets) have been considered. The curves showing improvement in the voltage profile of 132kV bus, 220 kV bus and the MVAR injected by 1 No-33 MVAR, 145kV, Shunt capacitor Bank and its effect in terms of MVAR support on 132kV bus have been shown in the fig.13.

Note: (refer fig.13).

Curves from top to bottom are designated serially in numerical order and are as follows;

- Curve No.1: 220kV bus voltage.
- Curve No.2: 132kV Bus voltage.
- Curve No.3 (red): Reactive loading in MVAR, on the 220/132kV Transformers on 132kV Bus.
- Curve No.4 (black): Injection of Reactive MVAR generated (MVAR Support) by 1x 33MVAR 145kV shunt Capacitor bank.

- As per convention, Reactive Support from Capacitor bank has been taken as (-) negative and Reactive loading (inductive) has been taken as (+) positive

As could be seen from the curve No.3 (red) that, though reactive compensation (capacitive) was being injected into the System, from 08.00 hrs to 14.00 hrs with a resultant of (-) 2 MVAR (Capacitive) at 132kV bus, suddenly Reactive MVAR loading increased to 12 MVAR (inductive) between 14.00Hrs to 15.00 Hrs and thereafter the inductive/reactive loading further rose to 25 MVAR (inductive).

The curves shown in fig.13 have been judiciously drawn (on the basis of actual meter readings taken from the control room log-sheet) and looking to the same, another Switched 33 MVAR Shunt Capacitor bank should have been connected on to the 132kV Bus at 15.00hrs on 27.11.2013. However, the same could not be exercised, as out of the 2 Nos of 33 MVAR capacitor banks, only 1 No. Capacitor Bank was in service (The other 1No.Capacitor bank was kept out of service by isolating the same through a manually operated 145kV Isolating Switch).

To overcome such situations, an additional 145kV SF6 Circuit breaker (ND type) should be installed exclusively for controlling the 2nd-33 MVAR Shunt Capacitor Bank. The proposed Circuit Breaker's control circuit should be equipped with **Controlled Switching Device** for eliminating the hazards of the transient inrush currents and the transient over voltages, which otherwise would have generated, as such a switching is categorized as Back to back Switching of Capacitor banks.

Conclusion

As could be seen from the above case-study, the M P Power Transmission Co Ltd should consider to install separate 145kV, SF6 Circuit breakers {ND-Type (Normal duty type)} with **Controlled Switching Device**, on the 2nd, 33 MVAR 145 kV Shunt Capacitor banks at the strategic 220kV S/Ss for switching-in onto the 132 kV bus as and when the system demands (as back to bank switching).

Since the 145 kV, SF6 Circuit breakers are suitable for Capacitor Bank opening/tripping applications by way of having Re-strike free characteristics, the facility for tripping on faults /opening of Circuit breakers through Controlled switching Device is not essential. The other State Transmission Utilities and also the Govt. & Private entrepreneurs should follow the suit, wherever required.



Villages Electrified Across the Country

Source: <http://www.ddugjy.gov.in/mis/portal/index.jsp?location=IN-PY>

Out of 597,464 census villages, 593,133 villages (99.2%) have been electrified. State wise details are given below:

Jammu & Kashmir

102 villages yet to be electrified. Out of 6,337 census villages, 6,235 villages (98.3%) have been electrified.

Himachal Pradesh

0 villages yet to be electrified. Out of 17,882 census villages, 17,882 villages (100%) have been electrified.

Punjab

Out of 12,168 census villages, 12,168 villages (100%) have been electrified.

Uttarakhand

58 villages yet to be electrified. Out of 15,745 census villages, 15,687 villages (99.6%) have been electrified.

Haryana

Out of 6,642 census villages, 6,642 villages (100%) have been electrified.

Uttar Pradesh

6 villages yet to be electrified. Out of 97,813 census villages, 97,807 villages (99.9%) have been electrified.

Rajasthan

1 village yet to be electrified. Out of 43,264 census villages, 43,263 villages (99.9%) have been electrified.

Madhya Pradesh

52 villages yet to be electrified. Out of 51,929 census villages, 51,877 villages (99.8%) have been electrified.

Chhattisgarh

337 villages yet to be electrified. Out of 19,567 census villages, 19,230 villages (98.2%) have been electrified.

Jharkhand

597 villages yet to be electrified. Out of 29,492 census villages, 28,895 villages (97.9%) have been electrified.

West Bengal

5 villages yet to be electrified. Out of 37,463 census villages, 37,458 villages (99.9%) have been electrified.

Assam

573 villages yet to be electrified. Out of 25,372 census villages, 24,799 villages (97.7%) have been electrified.

Arunachal Pradesh

1,229 villages yet to be electrified. Out of 5,258 census villages, 4,029 villages (76.6%) have been electrified.

Nagaland

4 villages yet to be electrified. Out of 1,400 census villages, 1,396 villages (99.7%) have been electrified.



Manipur

77 villages yet to be electrified. Out of 2,379 census villages, 2,302 villages (96.7%) have been electrified.

Mizoram

18 villages yet to be electrified. Out of 704 census villages, 686 villages (97.4%) have been electrified.

Tripura

0 villages yet to be electrified. Out of 863 census villages, 863 villages (100%) have been electrified.

West Bengal

5 villages yet to be electrified. Out of 37,463

census villages, 37,458 villages (99.9%) have been electrified.

Odisha

585 villages yet to be electrified. Out of 47,677 census villages, 47,092 villages (98.7%) have been electrified.

Andhra Pradesh

Out of 26,286 census villages, 26,286 villages (100%) have been electrified.

Telangana

Household Electrification (as per GARV) (Nos. in Lakhs)

Total Rural Households - 59.73

Households electrified - 49.24

Balance Rural Households to be electrified as on 31.03.2017 - 10.48

Maharashtra

Out of 40,956 census villages, 40,956 villages (100%) have been electrified.

Goa - NA

Karnataka

25 villages yet to be electrified. Out of 27,397 census villages, 27,372 villages (99.9%) have been electrified.

Tamil Nadu

Out of 15,049 census villages, 15,049 villages (100%) have been electrified.

Kerala

Out of 1,017 census villages, 1,017 villages (100%) have been electrified.

Tamil Nadu

Out of 15,049 census villages, 15,049 villages (100%) have been electrified.

Kerala

Out of 1,017 census villages, 1,017 villages (100%) have been electrified.

Gujarat

Out of 17,843 census villages, 17,843 villages (100%) have been electrified.

Puducherry - NA

Delhi - NA

Forthcoming Events At A Glance

National

Intec 2017

Venue: CODISSIA Trade Fair Complex, Coimbatore, India
Date: 1-5 June, 2017
Website: www.intec.codissia.com

Automation 2017

Venue: Bombay Convention & Exhibition Centre, Mumbai
Date: 09-12 August, 2017
Website: www.automationindiaexpo.com

Renewable Energy India Expo 2017

Venue: India Expo Centre, Greater Noida
Date: 20-22 September, 2017
Website: www.renewableenergyindiaexpo.com

Intersolar India 2017

Venue: Bombay Exhibition Centre, Mumbai
Date: 5-7 December, 2017
Website: www.intersolar.in

International

Wire & Cable Guangzhou

Venue: China Import and Export Fair Complex, Guangzhou, China
Date: 9-11 June, 2017
Website: www.wire-cable-china.com

18th POWER Sri Lanka 2017

Venue: Sri Lanka Exhibition & Convention Centre (SLECC)
Date: 14-16 July 2017
Website: <http://cems-powerseries.com/powersri/>

Vietnam ETE 2017

Venue: SECC, Ho Chi Minh City
Date: 19-22 July, 2017
Website: www.vietnam-ete.com

12th International Wire & Cable Trade Fair for Southeast Asia

Venue: BITEC Bangkok, Thailand
Date: 19-21 September 2017
Website: <http://www.wire-southeastasia.com/>

AUTOMATIC CAPACITANCE & TAN DELTA BRIDGE FOR CABLE TESTING AT RATED VOLTAGES



ACTS BRIDGE

- Cable testing at line frequency at voltages of upto 500 kV in UST mode.
- ACTS Bridge can be used with your existing Tettex or other SF6 3 Terminal Standard Capacitors & high voltage power supply.
- Industry proven performance of testing CTs, PTs, CVTs, Motor, Generator and EHV coils at rated voltages.
- Fully automatic measurement.
- In-built data storage and windows software provided for data transfer to PC and analysis of test data.



Etel Industries, established in 1983, is a market leader in the development and manufacturing of test instruments for electrical power industries and utilities. **We are pleased to announce the NABL-accreditation of the Etel Industries – Calibration Laboratory (including on-site calibrations) in electro-technical discipline in accordance to ISO/ IEC:17025/2005.**

ELTEL INDUSTRIES
www.eltelindustries.com

311 Embassy Centre, Crescent Road, Bengaluru 560 001, India

TEL: +91-80-22255467, 22205686, 22284253, 22284298
 FAX: +91-80-22252733 EMAIL: marketing@eltelindustries.com



Megger releases the fourth generation of battery discharge tester

The TORKEL 900 is Megger's latest battery discharge tester, which gives the most comprehensive results when testing battery capacity.

The TORKEL concept was released in the 80's as the first portable battery discharge tester that had automated resistance regulation to be able to keep constant current. The TORKEL 900 series is the 4th generation product and with that a new way to regulate the discharge current is introduced, with the benefit of a world leading dynamic power/voltage range. Furthermore, the new design has enhanced safety features including spark free connection and emergency safety fuse.

Stationary back-up batteries are present in substations but also many other areas. TORKEL 900 series is used to perform load tests or discharge tests which is the only way to determine a battery systems actual capacity. Tests can be conducted at constant current, constant power, constant resistance or in accordance with a pre-selected load profile. Together with the cell voltage logger, BVM, now connected directly to the TORKEL 900, it becomes a complete stand-alone discharge test system.



The TORKEL is connected to the battery, the discharge current and the alarm levels (voltage, capacity, time) are set. After starting the discharge TORKEL keeps the current constant at the preset level. When the voltage drops to a level slightly above the final voltage, TORKEL issues an alarm. If the voltage drops so low that there is a risk for deep discharging the battery, TORKEL shuts down the test. All values are stored in TORKEL and can easily be transferred via an USB-stick to a

PC for evaluation.

Testing can be carried out without disconnecting the battery from the equipment it serves. Via a DC clamp-on ammeter, TORKEL measures total battery current while regulating it at a constant level. Furthermore, the high discharge capacity of TORKEL gives the opportunity to shorten the test time. Discharging can take place at up to 220 A, and if higher current is needed, two or more TORKEL units or extra load units, TXL, can be linked together.

For further information: en.megger.com

Adara Power unveils Adara Pulse

Adara Power, a privately-held Silicon Valley company committed to providing safe, reliable, intelligent, and connected energy storage, unveils its second-generation energy storage system, the Adara Pulse. The Adara Pulse is an intelligent, stackable to 20kWh residential energy storage solution driven by Adara's iC3 Smart Controls technology. The Adara Pulse can be ordered now to take advantage of the California Self Generation Incentive Program (SGIP), a ratepayer-funded rebate program available to customers of the major California investor-owned utilities (PG&E, SCE, LADWP, & SDGE). The Adara Pulse will be scheduled for nationwide delivery and installation during the third quarter of 2017.

The Adara Pulse supports AC coupling for off-



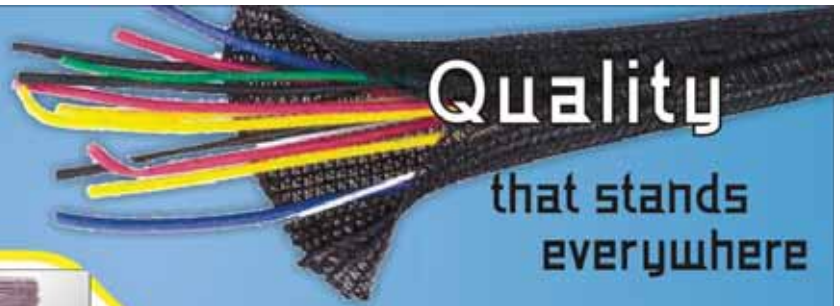
grid and grid-tied applications. It can be installed with a new solar installation or retrofitted with an existing system. Adara's peak-shifting, solar-charging and self-consumption/non export algorithms ensure compliance with the Federal Investment Tax Credit (ITC) and adaptability for a wide range of energy storage use cases. This advanced technology minimises a homeowner's electricity bill in regions subject to Time of Use (TOU) rates and support new net metering programs such as California's NEM 2.0. And unlike many other energy storage systems currently available, the Adara Pulse has a UPS mode utilising an 8 millisecond internal automatic transfer switch to keep house loads powered when the grid goes down for maximum back-up power.

For further information: www.adarapower.com



Flostar®

Wires • Cables • Sleeves • Cords



Quality

that stands everywhere

Braided Expandable Protection Sleeves

REFRIGERENT RESISTANT CABLES
DMD, DDM, DMMDD
APPLICATION :
HERMATICALLY SEALED COMPRESSORS

FIBRE GLASS CABLES
CLASS - 'B' & 'F'
APPLICATION :
ELECTRIC MOTORS, HEATERS, ALTERNATORS Etc...

SUBMERSIBLE WINDING WIRES & FLAT CABLES
POLY INSULATED WIRE & CABLES

OTHER PRODUCTS

BRAIDED COPPER FLEXIBLE
MATERIAL :
• BARE COPPER
• TINNED COPPER

BRAIDED CORDS
ROUND & FLAT
MATERIAL :
• POLYESTER
• FIBRE GLASS

STAINLESS STEEL BRAIDED FIBREGLASS CABLES
APPLICATION : HEATER, PLASTIC PROCESSING, MACHINES ETC...



Material :

- POLYESTER
- NYLON
- NYLON-66

FEATURES:

- FIRE RETARDANT
- EASY TO USE
- TEMPERATURE PROTECTION
- MECHANICAL PROTECTION
- ABRASION RESISTANCE
- TEMP RANGE [—] 40°C TO [+] 250°C

APPLICATIONS:

- ALL TYPE OF WIRE HARNESS
- AUTOMOTIVE HOSES
- ELECTRONIC & ELECTRICAL EQUIPMENTS
- TELECOMMUNICATION SYSTEMS
- X-RAY MACHINES
- TESTING INSTRUMENTS ETC...



FLOSTAR WIRES

UDYOG NAGAR, BANSIWALA, VRINDABAN - 281121 (U.P.) INDIA
Tel: +91 565 3290501, 2442775 • Mob: +91 9412280635, 9997235635
Fax: +91 565 2444379 • E-mail: flostar@rediffmail.com

DEALERSHIP ENQUIRIES SOLICITED FROM ALL OVER INDIA

Wood Moisture Content Meter

KUSAM-MECO has introduced Digital Wood Moisture Content Meter for measuring moisture content range 5% ~ 40%. This is useful for the rapid determination of the moisture content of wood/timber. It has large LCD display for easy readout.

It is compact, light weight & easy to operate. Data hold function is available to freeze the desired value on display. It has in built moisture sensor. It operates on 9V battery. It is useful for Architects, Wooden furniture manufacturers, Wood merchants and buyers of wood for industrial applications. It is supplied with Battery, Carrying case & Instruction Manual



For further information: www.kusamelectrical.com

Allied Moulded Products, Inc. offers NEMA 4X vent kit for electrical enclosures

Allied Moulded Products, Inc., an industry leader in non-metallic electrical boxes and enclosures, is expanding its line of premium enclosure accessories with NEMA 4X ventilator kits for electrical enclosure applications.

The vent kits are designed to provide thermal cooling for instruments or electronics installed inside electrical enclosures plus rain-tight protection for the air flow passages through the enclosure walls. The vent kit features a strong and rigid design as they are moulded of polycarbonate thermoplastic material and maintains a NEMA 4X seal with the use of a Formed-In-Place (FIP) polyurethane gasket system. They are well-suited for outdoor applications plus UL listed for use on a flat surface of NEMA 4X enclosures. The mounting procedure is relatively simple plus the internal baffle system ensures zero water infiltration when exposed to rain in outdoor applications.



For further information: www.alliedmoulded.com

AEG Power Solutions unveils its new outdoor storage converter

AEG Power Solutions, a well known provider of power supply systems and solutions for all types of critical and demanding applications, unveils its latest version of their Protect SC. 600 Storage Converter, now with a new outdoor enclosure which reduces global installation costs and simplifies system usage, for any type of battery storage energy application, on or off-grid. The Protect SC.600 bi-directional power converter from AEG Power Solutions with IGBT technology is based on their highly successful Protect PV solar inverter platform. The core element of any battery energy storage system, the converter charges and discharges batteries to store or provide power according to the application requirement such as frequency control, peak shaving, energy shifting (temporary storage to re-inject power when maximising profitability), or voltage control (often used to balance the voltage instability generated by integration of renewables in the grid). Protect SC. 600 provides an outstanding conversion efficiency factor for both the charging and discharging phases.

The enhanced Protect SC.600 version allows a seamless transition between off-grid and on-grid mode. This function is available as an option. This extends the battery energy system's usage beyond its core functions, such as peak shaving for system back-up in the event of a grid blackout. This presents an additional benefit for any industrial or commercial customer who invests in battery systems primarily to



decrease their energy costs and have an all-in-one installation that also integrates the security of their power supply. This new option is a must when battery energy storage is used in remote areas or islands where grid reliability is uncertain or for full off-grid applications in similar geographies.

Protect SC. 600 can be easily implemented in a turnkey solution including batteries and medium voltage transformers. The new outdoor enclosure has been designed to house one Protect SC.600, an optional AC low voltage circuit breaker, a communication interface as well as an auxiliary power supply.

The outdoor enclosure replaces the usage of containers whose weight and size make it difficult to transport and handle. With Protect SC.600, up to four units of the new outdoor system can be loaded onto a truck, and transported where on site, the complete units can be moved with a forklift truck replacing the need for heavy load cranes. The outdoor enclosure decreases the cost by 20% compared to container solutions. Combined with outdoor transformers this is a smart solution for building battery storage installations. The new Protect SC. 600 is currently running at several sites around the world in various types of energy storage installations, operating successfully with lead-acid, Lithium-ion or redox flow batteries, and already establishing records for its reliability and efficiency.

For further information: www.aegps.com

The first clamp meter with revolutionary clamp mechanism

The three instruments in the testo 770 clamp meter family are ideally suited for current measurement in switching cabinets.

One of the two pincer arms can be fully retracted into the instrument. This unique grab mechanism means that cables in tight switching cabinets can be easily grabbed. The automatic measurement parameter detection also ensures reliable work: in the current and voltage area, all three instruments detect direct and alternating current and select other parameters such as resistance, continuity,



diode and capacitance automatically. The testo 770-1 model is the standard version for daily measuring tasks, including starting current measurement.

In addition, the testo 770-2 contains both a μA area as well as a temperature measurement by means of an optional thermocouple adapter type K. The testo 770-3 also calculates all output ratings, has a Bluetooth interface and the possibility of connecting to the testo Smart Probes App to show the measuring profile as a graph or to document it directly in a report.

- Unique grab mechanism makes it easier to work at tight measuring points
- Auto AC/DC for current and voltage
- Large two-line display
- True root mean square measurement - TRMS
- With additional functions, such as starting current, power and μA measurement
- Bluetooth and testo Smart Probes App

For further information: www.testo.in



Surge Protection for PV Systems



HAKEL Ltd.
Bharti Stefanu 980
500 03 Hradec Kralove
Czech Republic
t: + 420 494 942 300
e: info@hakel.cz
www.hakel.com



ALLIED POWER SOLUTIONS
T - 4, 5 & 6, Third Floor
Pankaj Plaza - 3, I.P. Extn.
Patparganj, Delhi - 110 092
t: +91 11 2224 7322
e: info@alliedpowersolutions.com
www.alliedpowersolutions.org
Bengaluru: +91 98869 63195, 98860 08218
Kolkata: +91 83348 95599

**** DEALERS ENQUIRY SOLICITED ****

Leviton unveils stainless steel enclosed disconnect switches

Leviton launched its Powerswitch non-fused disconnects in stainless steel enclosures intended for use in food and beverage processing environments where sanitary conditions are critical, as well as wastewater treatment, chemical processing, and other harsh industrial applications. This new line of enclosures is certified by NSF International, as they have mounting feet that provide a 3/4" standoff from the wall, making each enclosure easy to clean. The enclosures have also passed IP69K testing and are proven to endure rigorous high pressure, high temperature washdown.

Leviton's new family of Powerswitch stainless steel disconnects includes 30/32A, 60A, 80A and 100A configurations. Each disconnect enclosure features a watertight, high visibility red and yellow over-mold



Powerswitch Stainless Steel Disconnect Switches

handle built for strength and durability, with three provisions for padlocks to ensure OSHA compliant lockout and tagout capabilities.

The disconnect enclosures are constructed of Type 304 non-magnetic stainless steel, have debossed ON/OFF markings on the cover for

clear identification and feature a side-hinged removable cover door for easy access to the switch for installation and servicing. Type 316 stainless steel enclosure options are available upon request. The enclosures are watertight and dust-tight rated to IP66, IP67, IP68 and IP69K and UL50E Type 3R, 4X, 12 and 13. Leviton Powerswitch non-fused disconnect switches in stainless steel enclosures will be available in May 2017.

For further information: www.leviton.com/ss-switch

Motwane offers Smart Street Lighting Solutions to its customers

Motwane, a well known Test & Measurement company in India serves diversified customer base across various customer segments with its indigenous research & development products known for quality and reliability.

Towards Motwane's efforts to provide value added assets to its customers impacting directly on their profitability with direct cost saving, automation, ease of operation, etc. and to contribute towards clean environment, the company has developed through its own Research & Development efforts, a Smart Street Lighting Solutions, which shall help its customers across various segments like Smart Cities, Townships & Parks, Industrial Lighting, Pathways/Highways/Roadways/Ports/Airports etc., Bridges & Tunnels, Defense/Railways etc.



This solution provides Return on Investment (ROI) within 14 months to 20 months to the customer with 50%+ reduction in energy usage and it also provides huge saving on maintenance efforts with automation of various maintenance parameters & enabling pro-active decision making, reduces big CO₂ emission helping better environment etc.

The key features of the solution are as follows

- Remote control and operation of each light pole as well as logical groups of light poles.

- Preferred Dimming options for additional saving.
- Pre-programmed schedules and real-time management for routine and special conditions.
- Proactive and simpler maintenance supports real-time inventory management for reduced costs and improved performance.
- Secure and Encrypted communication at each layer of communication.
- Pre-configured and freely assignable parameter like events and status for Alarms via SMS and Email alerts.
- The web-based central management and control software works in conjunction with our lighting controllers provides accessibility from any browser.
- Exhaustive and customised reports on various parameters of operation, performance and consumption.
- Integrates with google map for pin pointing of the location.
- Data backup facility at each controller so no loss of data in event of Power or Communication loss.
- Availability of historical live data for 2 years and archived data for 7 years with cloud services.

The smart street lighting solution is modular and can be integrated to other smart solutions for Smart city projects.

Being 100% indigenous the designed platform has capability to integrate and interface various other sensors and solutions of event based intelligent control, Security and Augmentation of specific features based on the unique requirements for the project.

For further information: www.motwanelighting.com

CBS ArcSafe RRS-3 SecoVac Remote wins EC&M Magazine 2017 Product of the Year Award

The CBS ArcSafe RRS-3 SecoVac (IEEE) Application Specific Remote Racking System (RRS) line has won Electrical Construction & Maintenance (EC&M) magazine's 2017 Product of the Year Award in the Specialty Products category.

The RRS-3 SecoVac (IEEE) is designed for General Electric SecoVac VB2+ vacuum circuit breakers with current ratings from 1200A–3000A. Typical usage of the VB2+ breaker is for control and protection of medium-voltage transmission and distribution systems.



The CBS ArcSafe RRS-3 system allows technicians to remotely rack in or out of low- and medium-voltage power circuit breakers while standing up to 300 feet away.

Installation and operation of the CBS ArcSafe RRS-3 SecoVac (IEEE) is quick, simple, and does not require any modifications to existing equipment. By automating the racking procedure, the CBS ArcSafe RRS-3 systems reduce operator fatigue and increase operator safety.

For further information: www.cbsarcsafe.com

Perle launches RS232 Serial Interface Isolator

Perle Systems, a well known global provider of serial device networking hardware, recently announced the launch of RS232 Serial Interface Isolators.

Known for its very low signal power, the RS-232 interface is an asymmetric voltage interface with common signal ground, connected to the grounded chassis housing, for all signals. This results in very little immunity to interference and a maximum range of 15 meters. Using the PSM-ME-RS232/RS232-P Serial Isolator, considerably higher immunity to interference can be achieved.



The PSM-ME-RS232 Serial Isolator effectively protects RS232 devices and data transmissions by isolating the TX/RX data channels and the RTS/CTS control lines. Their high-grade 3-way isolation also protects expensive termination devices against damage. John Feeney, COO at Perle Systems said, "RS232 communication is very susceptible to EMI, RFI, transient surges, ground loops and noise interference. This can cause real issues when transmitting critical data in a laboratory, factory, retail or industrial system."

For further information: www.perle.com

DILO introduces Two-in-one solution

DILO's lock valve has been specially developed for emission-free verification of density monitors. It is possible to verify density monitors directly at the gas compartment or to disassemble them for external tests without having to release gas.

The connection to the circuit breaker can be realised with different connections. The lock valve is equipped with a DN20 connecting coupling and a connection to the density monitor whereas the arrangement of the coupling and the connection to the density monitor can be provided according to customer requirements. Due to its design the valve is automatically open and is only closed mechanically during the testing procedure.



Consequently, there is a permanent connection of the density monitor to the gas compartment. For verification the covering cap of the valve has to be unscrewed and the separate lever must be screwed on.

In conjunction with the DensiControl IN (B178R51) density monitor testing device it is also possible to verify the density monitor switching points without having to disassemble the density monitor and without releasing SF6 gas.

The verification of density monitors on high voltage switchgear can thus be carried out in accordance with the (EU) 517/2014 directive (F-gas regulation).

For further information: www.dilo-gmbh.com

Index to Advertisers

Company Name	Page No.
Allied Power Solutions	83
Apar Industries Ltd.	29
Bhavya Polymers_Suresh Enterprises	39
Calter Ltd_STI Industries	63
DEIF India Pvt. Ltd.	17
Dynamic Cables Pvt. Ltd.	67
Dupont India Pvt. Ltd.	27
Electracon Paradise Ltd.	3
Electrical Research & Development Association	23
Eltel Industries	79
Epcos India Pvt. Ltd.	59
Flostar Wires Pvt. Ltd.	81
Frontier Technologies Pvt. Ltd.	51
Greatwhite Global Pvt. Ltd.	13
Hammond Power Solutions	49
Hindustan Petroleum Corporation Ltd.	25
HPL Electric & Power Ltd.	33
Igus India Pvt. Ltd.	43
Jyoti Plastic Works Pvt. Ltd.	63
K-lite Industries	41
Kusam Electricals Pvt. Ltd.	67
Larsen & Toubro Ltd.	IFC
M/s.Ramakrishna Electrical Winding Works	88
Mersen India Pvt. Ltd.	15
NextGen Equipment Pvt. Ltd.	87
Pepperl+ Fuchs (India) Pvt. Ltd.	37
Riello Power India Pvt. Ltd.	11
Rishabh Instruments Pvt. Ltd.	7
SCOPE T&M Pvt. Ltd.	5
Seva Switchgear Pvt Ltd	51
Shilpa Steel & Power Ltd.	26
Siemens Ltd	BC
Testo India Pvt Ltd	21
The Motwane Mfg Co Pvt Ltd	IBC
Wire & Tube Aisa	45

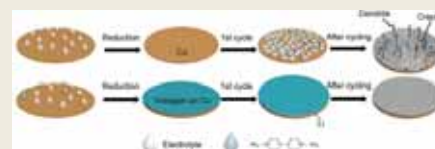
Battery Coating May Improve Smart Phones & Electric Vehicles

High performing lithium-ion batteries are a key component of laptops, smart phones, and electric vehicles. Currently, the anodes, or negative charged side of lithium ion batteries, are generally made with graphite or other carbon-based materials.

But, the performance of carbon based materials is limited because of the weight and energy density, which is the amount of energy that can be stored in a given space. As a result, a lot of research is focused on lithium-metal anodes.

The success of lithium metal anodes will enable many battery technologies, including lithium metal and lithium air, which can potentially increase the capacity of today's best lithium-ion batteries five to 10 times. That would mean five to 10 times more range for electric vehicles and smart phone batteries lasting five to 10 times more time. Lithium metal anodes are also lighter and less expensive.

The problem with lithium ion batteries made with metal is that during charge cycles they



uncontrollably grow dendrites, which are microscopic fibres that look like tree sprouts. The dendrites degrade the performance of the battery and also present a safety issue because they can short circuit the battery and in some cases catch fire.

A team of researchers at the University of California, Riverside has made a significant advancement in solving the more than 40-year-old dendrite problem. Their findings were just published in the journal Chemistry of Materials.

The team discovered that by coating the battery with an organic compound called methyl viologen they are able to stabilise battery performance, eliminate dendrite growth and increase the lifetime of the battery by more than three times compared to the current standard electrolyte used with lithium metal anodes.

Chao Wang, an adjunct assistant professor of chemistry at UC Riverside who is the lead author of the paper, said, "This has the potential to change the future. It is low cost, easily manipulated and compatible with the current lithium ion battery industry."

The researchers designed a new strategy to form a stable coating to enhance the lifetime of lithium-metal anodes. They used methyl viologen, which has been used in other applications because of its ability to change colour when reduced.

The methyl viologen molecule used by the researchers can be dissolved in the electrolytes in the charged states. Once the molecules meet the lithium metal, they are immediately reduced to form a stable coating on top of the metal electrode.

By adding only .5 % of viologen into the electrolyte, the cycling lifetime can already be enhanced by three times. In addition, methyl viologen is very low in cost and can easily be scaled up.

The stable operation of lithium metal anodes, which the researchers have achieved with the addition of methyl viologen, could enable the development of next generation high-capacity batteries, including lithium metal batteries and lithium air batteries.

Wang cautioned that while the coating improves battery performance, it isn't a way to prevent batteries from catching fire.

The paper is called: "In Situ Formation of Stable Interfacial Coating for High Performance Lithium Metal Anodes." In addition to Wang, the co-authors are: Hai P. Wu, Yue Cao, and Lin Geng, all of UC Riverside. The UCR Office of Technology Commercialisation has filed a patent application for the inventions above.

For further information: www.prbx.com

Electrical Test & Measuring Solutions

Turns Ratio Meter

Winding Resistance Meter

Automatic Transformer Observing System

Digital Microhm Meter

Static Frequency Converter (EPS)

Automatic Transformer Test System

75 KV AC High Voltage Test Set

Cast Resin Standard PT

Standard CT

SURGE TESTER

AUTOMATIC PORTABLE HV TESTER

OUR PRODUCT RANGE

Winding Resistance Meter
Turns Ratio Meter
Digital Microhm Meter
Contact Resistance Meter
Motor Tester

Standard Current Transformer
Standard Voltage Transformer
Transformer Loss Measuring System
Automatic Transformer Test System
Rotor Tester

Static Frequency Converter (EPS)
Mobile EPS
High Voltage PD Filters
Coupling Capacitor/ HV Dividers
Stator Tester

Oil BDV Test Set
AC HV Test Set
AC / DC HV Test Set
Battery Analyzer
Surge Tester

Branch Office: 35-B, Ashiana Duplex, Tandalja, Vadodara – 390012 , Gujarat

Ph : +91 9979888269, +91 9374904404, +91 9811004404 **Email :** info@ngepl.com

Regd. Office : 279-D, Defence Colony, Jajmau, Kanpur -208010, U.P.



Ramakrishna Electrical Winding Works

Opp. Boat Club, Pithapuram Road, Kakinada - 533003. (A.P)

Tel: 0884 - 2374185, 2352103, 2373795 Fax: 0884-2348022

Email: rkelecworks2003@yahoo.co.in Visit us : www.rkeww.com



- ❖ **36 MW, 10.5 KV, 3000RPM, Bergmann - Barsig Germany make**
- ❖ **Complete rotor rewinding carried out for M/s. Sardha Energy & Minerals Limited**

An ISO 9001:2008 certified company

Field of activities

- ❖ Repair, Rewinding, Overhauling & testing of rotating electrical machines (Steam/Gas/Hydro) Generators of lower, higher voltages & power ratings more than 250 MW & Power Transformers (220 KV)
- ❖ Manufacturing of Transposition coils and remaking the same.
- ❖ Commissioning of all electrical equipments.
- ❖ Dynamic balancing of Rotors, Fans & Impellers.
- ❖ Generators Redesigning & uprating of capacity of existing machines without disturbing the rotor winding.
- ❖ Redesigning of cooling systems like air cooled to water cooled and vice versa.
- ❖ Redesigning with change in voltage like 415V to 660 volts or 3.3KV to 6.6KV or 11KV to 15KV & vice versa.

Profile

- ❖ RKEW is one of the premier and experienced service outfit in the field of electrical motors, generators and transformer repair in India.
- ❖ RKEW an exclusive expertise in executing Repair/Rewinding & Refurbishment of worst damaged industrial steam generators, motors & power transformers. It extends expert service to various locations of its large industrial clients spread across the globe.
- ❖ RKEW team that includes management, technical & skilled man power understands the urgent need of its clients and is well prepared to deliver faster services (with no limitations on size of the machine) to client's satisfaction.

Authorised Service Centre for



One **Click** Solution for **MANAGING, MONITORING & SAVING**



FEATURES

- Upto 50% energy saving
- ROI in 14 to 24 months*
- Centralised Remote Control & Monitoring
- Analytical & Savings Reports
- Reduce Maintenance cost & Time
- Eco-Friendly



APPLICATIONS

Smart Cities | Highways & Bridges | Industrial & IT campuses | Township & Parks | Airports & Universities

STREET LIGHT AUTOMATION

GPRS/GPS Cloud Connectivity | Individual Light Dimming | Multi Parameter Metering | Cloud Based Software

* T&C apply

THE MOTWANE MFG. CO. PVT. LTD.

Gyan Baug, Nashik road, Nasik - 422 101, Maharashtra, India | Toll Free : 1800 233 7766 | +91-253-2463752 / 2463753
Email : sales@motwanelighting.com | Website : www.motwanelighting.com

SIEMENS

Ingenuity for life



SINAMICS V90

The performance-optimized and easy-to-use servo drive system

SINAMICS V90, the single-axis servo drive, is designed to address basic servo applications. Together with the SIMOTICS S-1FL6 servomotor, a seamless drive system for motion control applications is guaranteed. This system offers positioning as well as speed and torque control and ensures optimized servo performance. It allows for easy integration into the automation landscape with PROFINET, PTI, USS and Modbus RTU.

For more information call us on 1800 209 1800

[siemens.com/sinamics-v90](https://www.siemens.com/sinamics-v90)