

SPE NEWS LETTER

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THE SOCIETY OF POWER ENGINEERS (INDIA)

Vadodara Chapter (Estd. 1996)

FF-48, Avishkar Complex, Near Vidyut Nagar Colony, Old Padra Road, Vadodara-390 007

Tel: 0265- 2322355

E-mail: spevadodara01@rediffmail.com • Webpage: www.spevadodara.in



MAKE IN INDIA

Happy Republic Day

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MEMBER IN NEWS



Er. Hitesh R Karandikar, Life Member of Society of Power Engineers(I), Vadodara Chapter has taken over as Director of Electrical Research and Development Association (ERDA), Vadodara.

He is a Graduate Electrical Engineer from Gujarat University. He has completed his MBA on Finance and Marketing from Sikkim Manipal University and has obtained a Post Graduate Diploma in Human Resources from Maharaja Sayajirao University of Baroda, Vadodara. He brings with him 27 years of industry experience from erstwhile GEB, DNV, KLG Systel, Bureau Veritas and GETRI. In his last assignment he was working as Director GETRI (under GUVNL).

SPE(I) Vadodara Chapter is proud of his achievement. It is hoped that under his leadership, ERDA will scale big heights.

Congratulations to Er. Karandikar for his new assignment and best wishes to him.

FUTURE EVENTS

- **1-Day Seminar on “Maintenance of Electrical & Mechanical Equipment in Industries & Utilities” on 27 Feb 2019 at Rajkot**
- **Monthly lecture on “Premature Failure of Transformers- Causes and Preventive Measures” by Shri P Ramachandran, Technical Advisor, ABB-Vadodara on 20 Feb 2019 at Vasvik Auditorium**

Executive Committee, Advisory Committee, Office Administration Committee and Editorial Board of SPE NEWS LETTER wish all the Members, Readers, Patrons and Well Wishers a VERY HAPPY NEW YEAR 2019



At the outset I wish you all a Very Happy and Prosperous New Year 2019 and thank you very much for all your support extended during last year. In Oct-2012 News Letter of SPE, I have written the article on Higgs Boson also named as God Particle that was discovered at Large Hadron Collider (LHC) experiments by CERN, Geneva. The discovery of Higgs boson was declared as historic milestone in the human history. The discovery explains the condition immediately after the Big Bang and its role in creation of Universe. This long-sought particle Higgs boson is expected to complete the Standard Model of physics by explaining why objects in our universe have mass and why galaxies, planets and life exist.

LHC is the largest particle accelerator built by collaboration of mostly all the countries in the world. LHC is 27km long tunnel, buried beneath French-Swiss border containing several numbers of magnets and coils accelerating beams of protons with the nearly speed of light and then colliding within particle detector. The protons collision will create Higgs boson as the collision byproduct. India has contributed significantly in LCH project in terms of hardware, software and manpower including physicists and engineers.

The world of physicists was predicting that once the finding of Higgs boson is confirmed, more activities will be started, and much more powerful particle accelerator will be developed to reach near to the goal in finding the origin of the universe. During the last few years of finding and confirmation of Higgs boson, many remarkable discoveries were made and necessity for more powerful particle accelerator became evident.

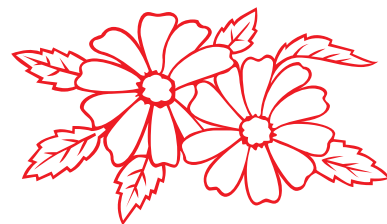
Today, why I remember that great discovery, is the news that international team of physicists involved in LCH unveiled the concept design for the new and very powerful particle accelerator called "Future Circular Collider (FCC)". It will be 100km circumference tunnel buried in earth and encircling the city of Geneva and surrounding countryside. Existing LHC which is 27km long will feed particles into FCC. This will create the collusion of particles with the energies around seven times higher allowing physicists to explore particles beyond limits of LHC. The FCC's goal is to provide a 100-kilometre superconducting

proton accelerator ring, with energy of up to 100TeV, that is much higher than existing energy of LHC.

This project is proposed to start functioning from 2040 and will reach operational by 2050. The cost of the project is estimated to around 25 billion euros i.e. nearly Rupees Two Lac Crore. FCC offers deep study of Higgs boson that has the potential to explore new physics beyond the Standard Model and thus is of paramount importance in understanding the universe.

The expenditure has also raised the criticism that the money could be used for other purposes benefitting the society. But the physicists involved in the project advocate that besides the invaluable benefits of the fundamental knowledge of particle physics, FCC will push the development of innovative technologies to solve many new challenges faced by the society. These technologies are applied to a wide range of fields like Industry 4.0 (Industry 4.0 is blend of advance analytics, Big Data, Robotics and Automation, Artificial Intelligence, IoT etc.), collaborate with large companies, SMEs and recent start-ups. They provide novel solutions in the field of digital science, power electronics, R.F. technology, robotics, super conductors, radiation protection, industrial controls, magnet technology, optoelectronics, cryogenic, ultra-vacuum, aerospace applications and many other high technology fields. They are also contributing the expertise in medical and bio-technology, safety management and wide range of emerging technologies. It would also provide exceptional training for a new generation of researchers and engineers from India who will be readily available for development of many mega projects in science and technology that India is undertaking. Let us welcome this development wholeheartedly as a gift of **New Year 2019**.

Thanking you,
G V Akre
Chairman





Dear Reader,

At the very outset, the Editorial team conveys its greetings to all members and their families for the New Year. We wish you all and your families "A Very Happy & Prosperous Year 2019".

The Market Potential to sustain the GDP Growth rate of India @ 8% plus per annum needs the power sector to grow at 1.8 - 2 times the GDP rate of growth as espoused by economists, planners and industry experts. This would mean a year on year capacity addition of 18,000 - 20,000 MW to achieve this ambitious plan of moving India to a Developed Economy status, as an Economic Global Powerhouse.

The power situation in India is characterised by demand in excess of supply, high Transmission and Distribution (T&D) losses, low Plant Load Factor (PLF), peak demand and energy shortages, poor financial health of the State GENCOs, TRANCOs and DISCOMs and severe resource crunch. The Ministry of Power has been making continuous efforts for promoting reduction of T&D loss. In addition to this, the central and all the State Governments are encouraging the energy conservation activities in all the sectors like industrial, domestic, commercial, agricultural etc. The electricity regulatory commissions, as a part of the reforms, have been working to exercise adequate control on power tariffs. Implementation of electrical energy conservation projects / programmes at various sectors will also help in reduction of peak demand along with the financial gains through reduction

of energy consumption.

Looking at the power scenario at present, lot needs to be achieved in order to ensure power surplus in the country. Private Public Partnership (PPP) model will be useful for quality power generation, transmission and distribution. The government's efforts to invest in Renewable sources in a big way clearly indicate that the future of power sector in India belongs to the 'Green Energy'.

In order to provide continuous and quality power supply to the industry, agriculture and households apart from investments in the current capacity expansion projects, there is an urgent need to switch to the alternative sources of power. Keeping this in view government has proposed India Smart Grid Forum which will be a non-profit voluntary consortium of public and private stakeholders with the prime objective of accelerating development of Smart Grid technologies that ensure more sustainable power. These technologies will be mainly focused on providing increased access to renewable energy resources such as solar and wind. Therefore, investments in Renewable energy resources will be the focus in coming years.

We will be extremely happy to receive your views, opinions and suggestions. Please feel free to reach out to us.

Happy Reading!

(AWADHESH KUMAR SINGH)

CHAPTER'S ACTIVITIES



STRUCTURES".

➤ **On 26 Oct 2017, Chapter** organized a joint lecture programme with IE(I) Vadodara in the Vasvik Auditorium of IE(I), Vadodara Local Centre. The topic was "**ADVANCED NDT in REMEDIAL ENGINEERING including POWER PLANT**

The presentation was made by an engineer personality in the field of rehabilitation and retrofitting of Civil Structures namely **Er. Kaizad**

Engineer, Director, Ushta Infinity Construction Pvt. Ltd. & Engineering Solutions INC. Vadodara.

The brief of lecture is as follows:

Speaker presented a case study of repairs of foundations of 400kV D/C tower which included retrofitting of reinforcement. He explained the use of Ground Penetrating Radar (GPR) in getting the details of objects and strata below the ground including concrete slabs. The case study of repairs and repositioning of RCC Lift Pit was very interesting. The speaker elaborated on the

method of repositioning of long columns of the lift pit without damaging the brick walls.

Next item of presentation was condition monitoring of road bridge. The bridge was found to be normal after monitoring work.

The best part of his presentation was rehabilitation of 500-year old Udaipur Palace. He went on to give details of repairs of each wall without any damage to the fort structure.

Structural monitoring by 3D printing was explained by him in details. The repairs of building in a chemical plant without shutdown, was one more topic. He mentioned about the repairs of Kolkata City Hall.

In the beginning, the speaker was introduced by **Er. SM Takalkar**, Vice-Chairman, SPE(I) Vadodara. **Er. Brar**, Chairman, IE(I) Vadodara expressed his happiness about the topic being discussed and the level of knowledge of the speaker. He was happy to note that there were students in good number in the hall. He emphasized the need of reaching out to the students for their better career.

Er. RS Shah, Secretary, SPE(I) Vadodara presented vote of thanks.

➤ **On 24 Nov 2018, Chapter** celebrated **Power Day** by organizing **Get-together & Cultural Programme(Musical Evening)** for

members with spouse at Auditorium of Baroda High School, Alkapuri, Vadodara.

Shrirang Karkar & Party of Vadodara presented the cultural programme. Singers and Instrument Players (Musicians) of the group conducted musical evening for the entertainment of audience present. Er. RS Shah honored the head of group by offering Bouquet. The singers in the group were Shri Shrirang Karkar, Smt. Amruta Devata, Smt. Heena Darji, Smt. Krutika Sangamnerkar, Shri Swarit Kelkar and Shri Chirag Rathod. The musicians were S/Shri Piyush Bhatt, Devdutta Dekorkar, Ashish Solanki, Siddhartha Solanki and Nandan Bhole. The entire musical evening was anchored by Er. Mrugen G Mehta, Advisory Committee Member of Vadodara Chapter. In last Ku. Vaidehi Shah (a 10-year-old girl) presented National Anthem by playing flute. More than 70 members with their spouse enjoyed the Cultural Program.

➤ **On 20 & 21 Dec 2018, 2-Day NATIONAL CONFERENCE ON “RENEWABLE ENERGY TECHNOLOGIES AND ITS INTEGRATION WITH GRID”** was organized by Central Board of Irrigation and Power-New Delhi, CIGRE-India and Society of Power Engineers (India) at Vadodara. SPE(I) Vadodara Chapter extended whole hearted support to make the event a grand success. Report of the event is brought out in this issue.

RS Shah

ENERGY LOSSES IN AC ELECTRICAL MACHINES

1. Flow of electric current in conducting circuit finds obstacle in the path. Some energy is spent to overcome the obstacle and make the way. Extent of oppose depend upon the atomic structure of material used for conductor. This obstacle to current in conductor is identified as Electrical Resistance. The energy so consumed is wasted and hence known as loss.

Conducting material used is mostly copper. Therefore loss occurring in it is named as copper loss. However circuit may be of any conducting material like Gold, Silver, Copper, Aluminum, Iron, etc. Even then it is known as copper loss.

This type of loss is not fixed but varies with the load and hence called variable loss.

Quantum of energy lost is proportional to product of square of load current and resistance and hence identified as I^2R loss. This loss is negligible in case of no load (open circuit) test. Often referred to as load loss, it is related to load (Full load). Occasionally other terms used are resistive loss as it is due to resistance of the circuit, short circuit loss as it is estimated by short circuit test, series loss hence this element is in series with the load in equivalent circuit.

2. Magnetizing force is produced by flow of current through coil around the core to establish flux in it. For ease of establishing the flux, core is made of material having high permeability. Some energy is spent in aligning the dipoles to get the effect. When direct current is applied, this is for very short

time only at the start. Once the dipoles are aligned, no more energy is required. But when alternating current is applied, dipoles go on realigning forward and backward continuously consuming energy. Energy consumed for this activity is a loss. The response of the dipoles to magnetizing force is dwindling and diverse. Hence after removal of magnetizing force some magnetism persists. This magnetic memory is known as residual magnetism. This loss is known as hysteresis loss.

Residual magnetism when magnetizing force is removed after reaching saturation, is called retentivity of the core material and is indicative of hysteresis loss level.

Alternating current in the coil produces oscillating magnetic field in the core hence due to electromagnetic induction, electromotive force (emf) is generated amongst the points in core itself. This results in circulating current within the core material and causes energy loss. As this is the result of whirling of the current, it is known as eddy current loss.

Both above losses are occurring due to magnetic effect hence known as magnetizing loss. It is also known as **“core loss”** as it occurs in core. Mostly core material is iron so it is referred to as iron loss also. This loss is estimated by no load (open circuit) test hence identified as no load (o/c) loss also. Some time called winding loss also as magnetism is due to current in the winding. This loss is fixed and does not vary with load, so it is a constant loss. But it is proportional to the square of applied voltage. In short circuit (blocked rotor) test for motors applied voltage is very low to control short circuit current to full load, so the loss is negligible in that case. Occasionally referred to as shunt loss hence element appears across supply in equivalent circuit.

3. Current is meant to flow through the conducting path in the machine. Dielectric material known as insulation, is provided around conducting path to block the diversion of the current. However, like a naughty boy, some current breaks the queue and makes the way through insulation. This is the leakage current. This very small current flowing through very high resistive path causes energy loss in insulation. Obviously, it

is known as leakage current loss or dielectric loss.

Quantum of this loss depends upon the type, thickness and area of the insulation. Rather than absolute value, increasing trend is serious. This is monitored as health check of machine known as dissipation factor test or tan delta test. Tan delta is ratio of leakage current to capacitive current.

4. Similarly magnetic flux meant to flow through the high permittivity path known as core. But small part of the flux disobeys the discipline and escapes the designated path and wanders through surroundings, particularly body of the machine. This altering flux has similar effect there as it is in core. Energy loss on this account is stray loss or leakage flux loss. This will heat up the surrounding including body of the equipment. This diversion of flux can be controlled by shielding core with material of high reluctance.
5. When two materials may be solid, liquid or gaseous, slide one with respect to other, there is retarding force. Some energy is used to overcome this loss. It is known as friction loss when both materials are solid and known as windage loss when one of them is in gaseous form say air. In the motor this is due to friction of air with fan blade and uneven surface of rotor. In large generator there is no fan but cooled by hydrogen instead of air.

Friction and windage losses are associated with moving (rotating) machines and not with static devices like transformers. But large power transformers have extra fans for oil cooling. Energy consumed by these fans cannot be considered as windage loss but is auxiliary loss. These friction and windage losses are also known as mechanical losses.

Loss is wastage of energy reducing net useful energy for work at output. More loss reduces the efficiency hence uneconomical. It is the task to manage heat disposal at appropriate rate else temperature may rise resulting in damage to machine or equipment. Machine capacity is related to safe temperature rise criteria.



N. D. Makwana

2-DAY NATIONAL CONFERENCE ON RENEWABLE ENERGY TECHNOLOGIES AND ITS INTEGRATION WITH GRID

A 2-DAY NATIONAL CONFERENCE ON RENEWABLE ENERGY TECHNOLOGIES AND ITS INTEGRATION WITH GRID was organized by Central Board of Irrigation and Power-New Delhi, CIGRE-India and Society of Power Engineers (India) on 20-21 December 2018 at Vadodara.

GUVNL & GEDA were co-organizers, GETCO was Knowledge Partner and ABB Vadodara was Technology Partner of the Conference. The event was sponsored by ABB, ERDA, SITAC and GEDA. The Vadodara Chapter of Society of Power Engineers(I) worked actively for organizing the Conference. Vadodara Chapter of SPE(I) took leading part in organising the Conference.

During the inaugural session of the conference, the dignitaries on the dais were: Chief Guest of the Conference-Shri Joshi, IAS, MD, GUVNL; and Guest of Honors-Er. BB Chauhan, MD, GETCO; Er.Pitamber Shivnani, VP, ABB-Vadodara; Shri Harish Mehta, Suzlon and Er.VK Kanjlia, Secretary, CBIP-New Delhi. The proceeding of the National Conference was released by dignitaries on the Dais.

Er. Kanjlia spoke on "About Society of Power Engineers and CBIP", Er. PP Wahi, Director, CBIP- New Delhi spoke about the Conference. A speech on the occasion was delivered by Shri Joshi, IAS. He informed about the importance of Renewable Energy and gave the comparison of Power position between Gujarat and California. Shri Mehta of Suzlon explained about the role of RE in the present power scenario. He talked about the role of Power Electronics in RE. The vote of thanks was presented by Er. GV Akre, Chairman, SPE(I)-Vadodara.

About 24 papers were printed in the proceedings and 36 papers were presented during the Conference. More than 200 delegates attended the Conference.

The digital presentation was organized by Er. Keval Velani, Executive Member, SPE (I)-Vadodara Chapter. Entire event was anchored by Er.Mrugen Mehta, Advisory Member, SPE (I)-Vadodara Chapter and Ms.Venu Birappa, EE-GETCO,

The conference was a grand success due to the active involvement of Er. BB Chauhan, MD-GETCO, Er. BB Mehta, CE, SLDC-Gotri and all

the concerned engineers of GETCO/SLDC.

The list of papers presented is as under:

1. Theme Paper
2. Waste to Power – A step towards Swachh Bharat
3. Renewable Energy Scenario
4. Bio-Energy – An enabler for a sustainable future
5. Waste to Energy
6. Wind Energy Industry – Road ahead
7. Renewable Energy Integration – Present Grid Code, Challenges & Opportunities
8. Renewable Energy & Grid Code
9. Effect of Inverter based Generators (IBG) on Grid Code compliances
10. Ancillary support to Grid with Renewables
11. Energy storage integrated Renewable Energy Hybrids
12. Ancillary services in Indian perspective and Energy Storage
13. Solar Thermal Air Conditioning -A rising solution to efficient Grid Management and climate change
14. Dynamic modelling of DFIG for improvement in power quality issues of Wind Farms
15. Offshore Wind – towards Renewable Energy development
16. Modelling & Harnessing flexibility from Grid resources
17. Integrating Offshore with the Grid
18. Quantity impact of Renewable Energy on Real time Power System Operation
19. Role of forecasting in Grid integration of Renewable Energy
20. Issues & Challenges being faced by Solar projects under current DSM regime
21. Operational challenges in Wind Power forecasting and scheduling
22. Renewable integration in Southern Region: Operational experience
23. Implementation of RE framework at Interstate level – NR experience
24. PV generation-based Load scheduling – A survey at LDCE
25. Distributed Solar with Agriculture
26. Peer to peer electricity exchange within solar based DC Micro-grids for Rural Electrification
27. Potential of various RE generation sources and Micro-grids in India and comparison of various model

28. Trends in Micro-grids
29. Floating PV solar power stations an economical solution for power generation
30. Synchro-phasor technology: Addressing integration challenges for Renewable Energy
31. Integration of Renewable Energy sources in Distribution network – Experiences & Case studies
32. Voltage control using Reactive capability of DFIG based Wind turbines – A case study
33. Application of Drone for RE
34. Natural Ester transformers for Renewable Energy
35. O&M aspects to improve reliability of substations
36. Performance analysis, Data analytics for Renewables and decision making

OBITUARY



Er. Rohit S Gandhi, Retd. Executive Engineer, Gujarat Energy Transmission Corporation Ltd. and **Life Member** of Society of Power Engineers(I), Vadodara Chapter passed away on 21 Nov 2018.

In his death, the Chapter has lost a well-wisher and active member.

May God give peace to the departed soul.



Er. (Prof.) Smita Anil Kanitkar, Retd. HoD, Elect. Engg., Faculty of Technology & Engineering (Kalabhavan), MS University of Baroda, Vadodara and **Life Member** of Society of Power Engineers(I), Vadodara Chapter passed away on 10 Jan 2019.

She had done extensive work on High Voltage and Partial Discharge. With her active support, the Chapter had organized many events in her college and elsewhere. She has also given her services as an Advisory Committee Member of the Vadodara Chapter of Society of Power Engineers(I).

In her death, the SPE(I) Vadodara Chapter has lost an active member and a well-wisher.

May God give peace to the departed soul and give strength to her family members to bear the impact.

Glimpses of National Conference on “Renewable Energy Technologies and its Integration with Grid” on 20 & 21 Jan 2018 at Vadodara



Er. PP Wahi briefing about Conference



Er. SM Takalkar presenting paper



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Glimpses of National Conference on “Renewable Energy Technologies and its Integration with Grid” on 20 & 21 Jan 2018 at Vadodara



Delegates at Registration Counters



Delegates for Registration at Registration Counters



Lighting of Lamp by Dignitaries during Inaugural Session

Er. VK Kanjlia delivering inaugural speech



Glimpses of National Conference on “Renewable Energy Technologies and its Integration with Grid” on 20 & 21 Jan 2018 at Vadodra



Unveiling of Proceedings by Shri Pankaj Joshi-IAS along with Er. BB Chauhan (MD-GETCO) & Er. PP Wahi (Director - CBIP)



Dignitaries on dais during Inaugural session L to R Shri Mehta-Suzlon, Er. BB Chauhan-GETCO, Shri Pankaj Joshi-GUVNL, Er. VK Kanjlia-CBIP & Er. Sodhi-ABB



Address by Shri Pankaj Joshi, IAS, MD-GUVNL Chair Person, Inaugural Session



Anchors of the Conference Er. MG Mehta & Er. Venu Birappa



Delegates at the Conference



Er. Nihar Raj-ABB speaking in the Concluding Session

Glimpses of National Conference on “Renewable Energy Technologies and its Integration with Grid” on 20 & 21 Jan 2018 at Vadodara



**Vote of Thanks by
Er. GV Akre, Chm. SPE(I), Vadodara**



Working committee of the Conference



Exhibition Stall at the Conference



Book Stall of CBIP, New Delhi



Book Stalls of CBIP & SPE(I) Vadodara



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**Sweet Memories of Melodious Evening
& Get-together for Members & Spouse
of SPE(I) Vadodara on 24-11-2018**



Vice-Chm., Chm. with spouse & Secretary enjoying musical evening



Er. MG Mehta anchoring Musical Evening



Chirag presenting a song



Swarit & Krutika presenting a duet

**Sweet Memories of Melodious Evening
& Get-together for Members & Spouse
of SPE(I) Vadodara on 24-11-2018**



**Mrs. Amruta Devta & Shrirang
presenting a duet**



Mrs. Heena Darji presenting a Song



**Members enjoying the melodies
of the evening**



**Members enjoying the melodies
of the evening**

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