# ELECTRICAL INSTALLATION ENGINEER

## NEWS LETTER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE (Regn. No. 211/1992)
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|---|---|---|---|---|

# EVENTS

## 1. RENERGY 2013 - International Renewable Energy Conference and Exhibition

RENERGY 2013
International Renewable Energy Conference and Expo, Tamil Nadu

Organised By
Tamil Nadu Energy Development Agency

**Event Profile:** Special emphasis on Solar – PV and Thermal – as the TN state has the most ambitious Solar Policy in India. **5 Workshops** – 3 on Solar, 1 on Energy Efficiency, 1 on Biomass / Biofuels. Each workshop will be for 3 hours. **1 Innovation Session** – Will comprise Companies, Scientists and Engineers at the forefront of Renewable Energy Innovations.

**Date** : 9th - 11th May 2013
**Venue** : Chennai Trade Centre, CTC Complex, Nandambakkam, Chennai, Tamil Nadu, India.
**Website** : http://www.teda.in/site/index/id/8N8u2B6P1a

## 2. MENASOL 2013

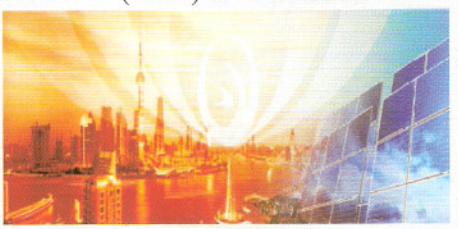
**5th Middle East & North Africa Solar Conference & Expo**

**Event Profile:** MENASOL 2013 is the leading Solar event in the Middle East and North Africa region. As 2 conferences in one - covering PV and CSP, MENASOL will help solve your critical challenges and connect you to local decision-makers to secure a sustainable MENA pipeline. You will meet over 300 top attendees and answer your biggest questions on one of the hottest PV opportunities in the world!

**Date:** 14th - 15th May 2013
**Venue:** Hyatt Regency, Dubai
**Website:** http://www.csptoday.com/menasol/

## 3. Solar Power Brightens the Future

SNEC 7th (2013) International Photovoltaic Power Generation Conference & Exhibition



**Event Profile:** It is an opportunity that Industry people cannot miss to stay up to date on the technology and market, build contacts with Chinese and Asian PV business partners, access the fast-growing Asian markets, and present the technology accomplishments and services to the industry

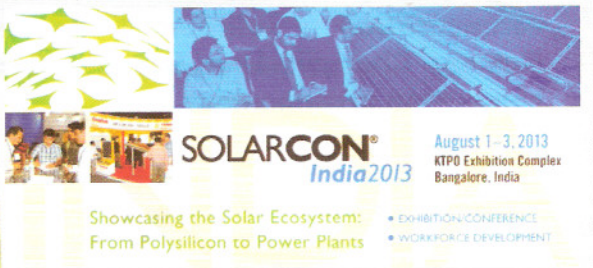
**Date:** 14th – 16th May 2013
**Venue:** Shanghai New International Expo Centre, Shanghai, China
**Website:** http://www.snec.org.cn/Default.aspx?lang=en

## 4. CIPV EXPO - 2013

CIPV EXPO CHINA — Power from the Sun

**Event Profile:** CIPV EXPO, as an integral part of Clean Energy Expo China (CEEC), is the first and only platform for the industry in China which focuses on the Industry's New Technology, Materials, Products and Equipment amongst its comprehensive exhibit scope of all the Solar PV related products spanning the entire range from large-scale PV station construction to BIPV (Building Integrated PV).

**Date** : 3rd – 5th July 2013
**Venue** : Beijing, China National Convention Center, China
**Website** : http://www.cipvexpochina.com




## 5. SOLARCON INDIA 2013

**Event Profile:** SOLARCON India is organized by SEMI India and is the only event that reinvests its revenues into programs and services that support the growth and expansion of the Solar/PV Industry in India

**Date** : 1st - 3rd August 2013
**Venue** : KTPO Exhibition Complex, Bangalore, India
**Website** : http://solarconindia.org/

# EDITORIAL

Dear Members, Fellow Professionals, Friends and Well wishers,

BEST WISHES FOR A HAPPY AND PROSPEROUS "VIJAYA VARUSHAM"

SEASONS GREETINGS TO ONE AND ALL !

April marks the commencement of a new Financial Year for all businesses as well as for the Government. This also marks the commencement of Indian Calendar Year named as "VIJAYA" which itself means Success. Let us Hope and work towards making this year much better than last year which was a year of lot of crisis, including drought in many parts of the Country resulting in shortfalls in all production including food grains and slow down in GDP growth. Tamilnadu was in much more serious problems of all kinds including shortages of Water as well as Power. Power situation continues to be very grim and the Solar initiatives could not materialize in full measure. This is where probably the private initiatives to get large scale 'Roof Tops' even utilizing the Factory roofs could be pushed fast with attractive "Pay and Use" Models, where Government can support and motivate and stand guarantee for Investors. Another important area is Bio Energy with lot of potential and lot of development in terms of Technology. Encouragement of Private Initiatives for studying and taking up Taluka Level Distributed Generation of few MW capacities can help substantially. Focus on Electricity in particular which is the core of development, not only provides us with abundant opportunities but also increases our responsibility. Let us all, therefore, resolve to adhere strictly to Quality, Safety and Efficiency in all our Practices.

April 22 is also celebrated globally as "Earth Day" reflecting the concerns to preserve the Earth and Environment. 'Global Warming' concerns are more than well known to every one now and one of the basics is "Conservation". The principles of Conservation revolve around, avoiding wastages and using efficiently of Energy and Sources of Energy. Lot of focus is very rightly given to Renewable Sources of Energy like Solar, Wind, Biomass etc, as Fossil Sources of Coal and Oil are fast depleting.

***We thank all those members who have helped us by participating in the advertisements appearing for the issue March 2013 – Elmeasure India Pvt. Ltd., Bracecorp Publications Pvt. Ltd., Prolite Autoglo Ltd, Hensel Electric India Pvt. Ltd., Easun Reyrolle Ltd., Power Links, Universal Earthing Systems Pvt. Ltd., Intrans Electro Components Pvt. Ltd., Pentagon Switchgear Pvt. Ltd., Cape Electric Corporation, K-Lite Industries, Symtec Engineers Pvt. Ltd., Wilson Power and Distribution Technologies Pvt. Ltd., Sun Sine Solution Pvt. Ltd., OBO Bettermann India Pvt. Ltd., Galaxy Earthing Electrodes Pvt. Ltd., Ashlok Safe Earthing Electrode Ltd.***

**EDITOR**

# CONTRIBUTION TO NEWSLETTER (Rs.1,000/- per year)

204. Power Care Enterprises (2012-2013)
205. Gopi Electricals (2010-2011)
206. Creative Energy Savers (2013-2014), ***Non-Member***
207. Sri Lakshmi Electricals (2013-2014)
208. Delta Engineers (2010-2013)
209. Crown Electricals (2013-2014), ***New Member***
210. Mr. B. Ramesh Krishnan (2013-2014), ***Non-Member***
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212. Swan Electric Contracts (P) Ltd. (2012-2013)
213. B. Jhonsons Electrical Tradings (2013-2014), ***New Member***
214. Everest Electrical Enterprises (2012-2013)

We request other members also to arrange to send their contribution for NEWSLETTER early.

(***Please help us to serve you better***).

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# CONTENTS

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Let us continue further.

**5.4.2** Another approach is to replace certain piece of equipment across the board. To quote an example for this approach is the programme adopted at one of the utilities in U.S.A. They have replaced all the AV Circuit Breakers with an operating life of 35 years or more. Nearly 600 breakers were proposed for replacement over a 10 year period. Such an approach was justified mainly on a reliability basis due to the operation-failure met with older breakers.

**5.4.3 EQUIPMENT UPGRADE**

When the substations are found to be overloaded, this approach is generally adopted. To start with, an engineering study should be conducted. The result of this study should be compared with the original design basis. i.e. the present operating conditions of the station should be compared with the one prevailed before its commissioning. This comparative study will show the changes that take place during the intervening period and also whether the whole substation concerned is subjected to "over-dutied" both on a full-load and short circuit basis or only particular pieces of its equipment like transformer and circuit breaker are "over-dutied or over worked". If individual items are "over taxed" then the replacement of such equipment will solve the problem. One example would be the replacement of over-dutied bulk oil or minimum oil circuit-breakers. These equipment can be replaced with puffer type $SF_6$ circuit Breakers. The existing breakers may be retro filled with new vaccum interrupters. Similarly the pressure on the overloaded transformers can be reduced by improving their temperature withstand capability by adding improved cooling methods or its rewinding using high temperature insulation such as "Nomex". The over-dutied buses and other equipment in the substation can be replaced with new busbars/uprated equipment. When need arises, the voltage uprating or upgradation can also be examined. If the situation warrants the substation itself should be abandoned and its loads can be transferred to the neighbouring substations or nearby newly formed substations. Thus the proposed option depends on the site conditions and the availability of efficient equipment methods and also on the specific substation.

**5.4.4 ECONOMIC JUSTIFICATION**

Economic justification plays an important role in life extension and expansion projects since these programmes are mainly for enhancing the reliability of existing facilities and not for the addition of new facilities. Justifying a project on a reliability basis is always difficult. Several approaches have to be made to justify them.

(i) In one approach, the annual maintenance and operating cost of the existing old equipment will be compared with the possible annual maintenance, running cost and the total cost of the new equipment that is programmed to replace the old one for the period for which the old equipment is expected to exist. The period is related to the replacement of old equipment with the new equipment at some point of time in the future.

(ii) In the other approach, a risk analysis is made by calculating the annual cost based on the failure rates for equipment multiplied by the cost of failure. Based on the above approaches necessary funds have to be allocated for the replacement of the old equipment and also adequate assessments have to be made to establish which equipment will be replaced every year.

**5.5 LIFE EXTENSION AND ASSESSMENT**

**5.5.1** When applied to power plants, these terms are defines as follows

**(i) LIFE EXTENSION**

It is the work that needs to be attracted so as to keep a unit operating economically beyond its expected life with optimum availability, efficiency and safety. One of its principle requirements is "remaining life assessment"

(ii) **LIFE ASSESSMENT**

It is nothing but the estimation of the residual life. This helps utility to predict a failure before a defective component causes a forced outage.

*For a righteous Man falls seven times and rises again* - **SLOVAKIA QUOTES**

**5.5.2** The guidelines available for the life extension of power plant electrical equipment are useful in this regard. The objectives of these guidelines are

- To assist utilities in structuring a life-extension programme of adequate scope
- To suggest a logical data-supported approach to make the necessary run/refurbish/retrofit/replace decisions.
- To recommend and practice systematic data acquisition needed for efficient life-assessment.

Among the methodologies for performing a life extension study are

- Preparation for the study
- Performance of the study and
- Implementation of its recommendations

The critical phase of this process is the actual life assessment study. The available guidelines generally recommend a process with four decision levels:

- Examination of historical data
- Visual inspection
- Physical examination
- Availability and the present status of control and monitoring equipment.
- Results of various diagnostic tests

Each level helps to proceed further with progressively more detailed investigation. At each level the data available for the equipment under review are compared with the industry-wide information concerning similar equipment. A quantitative assessment is then made to estimate the remaining life in the equipment using average life expectancies. For example when estimating the remaining life of transformers, the data would be examined for age, loading, maintenance, tests, inspections, over voltage surges and other threats due to the hostile operating environment in which the equipment operates.

Kindly stay tuned for the next article.

***(To be continued…)***

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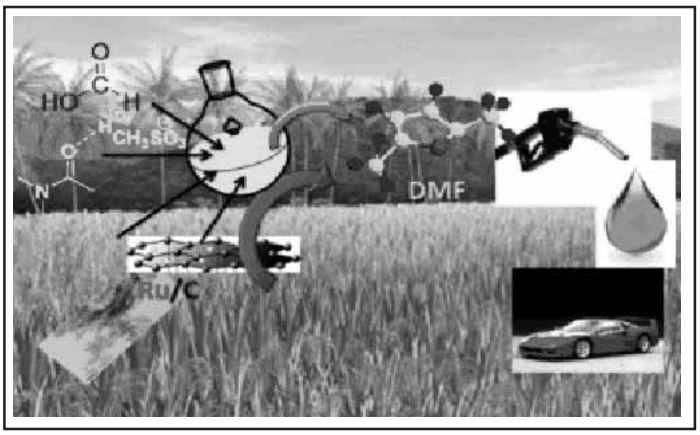
# NEW TECHNIQUE TO CONVERT BIOMASS INTO CRUDE OIL SUBSTITUTE




A revolutionary new technique converts all kinds of biomass into high grade crude bio-oil, which can potentially replace fossil fuel, by the virtue of being similar to natural crude. Developed by two Danish researchers, hydrothermal liquefaction (HTL) accepts sewage sludge, manure, wood, compost and plant material, and wastes from household, meat factories and dairy production for oil conversion.

It can help existing refinery technology, with a simple thermal upgrade, to subsequently obtain all the liquid fuels we know today, developed by the partnership of Aarhus and Aalborg universities in Denmark. Besides HTL consumes only 10-15% of the energy in the feedstock biomass, yielding an energy efficiency of 85-90%. It is by far the most feedstock flexible of any liquid fuel producing process in existence, according to an Aarhus and Aalborg statement.

The water emanating from the HTL process has low carbon contents and can either be recycled into the process or ultimately be purified to attain drinking water quality, which is the long-term goal. As such, HTL replaces the burden of disposal with the benefit of recycling.

The bio-oil from HTL can be used as-produced in heavy engines or it can be hydrogenated or thermally upgraded to obtain diesel-, gasoline- or jet-fuels by existing refinery technology.

# THE ENERGY AND RESOURCES INSTITUTE (TERI)

TERI was formally established in 1974 with the purpose of tackling and dealing with the immense and acute problems that mankind is likely to face within in the years ahead

- on account of the gradual depletion of the earth's finite energy resources which are largely non-renewable and
- on account of the existing methods of their use which are polluting

Over the years the Institute has developed a wider interpretation of this core purpose and its application. Consequently, TERI has created an environment that is enabling, dynamic and inspiring for the development of solutions to global problems in the fields of energy, environment and current patterns of development, which are largely unsustainable. The Institute has grown substantially over the years, particularly, since it launched its own research activities and established a base in New Delhi, its registered headquarters. The central element of TERI's philosophy has been its reliance on entrepreneurial skills to create benefits for society through the development and dissemination of intellectual property. The strength of the Institute lies in not only identifying and articulating intellectual challenges straddling a number of disciplines of knowledge but also in mounting research, training and demonstration projects leading to development of specific problem-based advanced technologies that help carry benefits to society at large.

The Institute's growth has been evolutionary, driven by a vision of the future and rooted in challenges looming today, based on an approach that looks beyond the present and across the globe. TERI has, therefore, grown to establish a presence not only in different corners and regions of India but is perhaps the only developing country institution to have established a presence in North America and Europe and on the Asian continent in Japan, Malaysia and the Gulf.

The global presence and reach attained by TERI are not only substantiated by its presence in different parts of the world, but also in terms of the wide geographical relevance of its activities. Symbolic of this fact is the annual Delhi Sustainable Development Summit (DSDS), a major event focusing on sustainable development, the pursuit of the Millennium Development Goals (MDGs) and assessment of worldwide progress in these critical areas. DSDS attracts the most prominent thinkers and practitioners in a range of fields that impinge on development. Since development worldwide is moving towards an architecture based on partnerships, the leaders who participate in DSDS come from government, business and industry, multilateral and bilateral organizations, research and academia and civil society. Encouraged by the success of DSDS, TERI has now established the World Sustainable Development Forum (WSDF), which is guided by the patronage of a group of select world leaders. WSDF would extend the experience of each DSDS to other parts of the world and carry out careful evaluation and monitoring of developments worldwide, particularly in meeting the MDGs.

The Institute established the TERI University in 1998. Initially set-up as the TERI School of Advanced Studies, it received the status of a deemed university in 1999. The University is a unique institution of higher learning exclusively for programmes leading to PhD and Masters level degrees. Its uniqueness lies in the wealth of research carried out within TERI as well as by its faculty and students making it a genuinely research based University.

TERI now has staff strength of over 900 dedicated employees, drawn from a range of disciplines and experience, supported by infrastructure and facilities, which are world class and distinctively state-of-the-art. The Institute continues to grow in size, spread and intensity of work undertaken.

In this world of increasing globalization and buoyed by optimism generated by the success of the Indian economy TERI moves forward to meet the challenges of the future through the pursuit of excellence embedded in its visionary charter.

**TERI, Himalayan Centre, Mukteshwar**

**Overview**

Nestled in Latey Bunga, Mukteshwar, 2300 metres above the sea level, stands TERI's Himalayan Centre. Blending the best that nature has to offer with the latest in technological innovation, this green building is ideal for purposes off repose and research. In addition to a residential wing, this TERI Centre boasts a state-of-the-art conference hall, complete with a meeting area, rest rooms and Internet facility.

***Panoramic view from TERI's Himalayan Centre***

**Architecture**

The architecture of the building reflects the local style. Practical considerations of locale and availability of resources also determined its design. The result – a simple, yet aesthetically designed building, which can capture the interest and imagination of the beholder.

**Landscaping and Lighting**

In accordance with strategic landscaping principles, trees have been planted on the northern side of the building to provide a buffer against cold winds. The general orientation of the building is south-east, ensuring that all major openings are in line with the sun. This positioning allows for optimal use of daylight for purposes of lighting as well as heating. Furthermore, each suite comes attached with unique solar passive features known as 'sun-spaces'. These enhance heat gain by day and emit it by night, when it is required. Judiciously planned corridors in front of the habitable spaces dilute the glare of the sunlight, while trapping solar radiation to be emitted at night.

***Sunlight spills into sun spaces, warming the indoor areas***

**Renewable Energy Systems**

Renewable energy systems in the form of photovoltaic solar panels have been integrated into the roof of the utility building and conference hall to meet a portion of the electrical requirements. An effective solar water heating system is in place to meet the hot water requirements of the building's inhabitants. In the absence of sufficient sunlight, battery banks provide a power back-up of three days. Fibreglass panels in the ceilings and walls act as insulators, preserving heat and improving acoustics.

***Solar water heating system***

***Photovoltaic solar panels for harnessing solar power***

**Water Management**

Despite the ample rainfall in the area, it faces a severe shortage of potable water. As a result, innovatively designed, twin-chambered water tanks are deployed in the harvesting and subsequent filtering of rainwater for human consumption.

The Himalayan Centre was designed with the basic purpose of disseminating relevant technological information at the grassroots level. A purpose it adequately fulfills by training farmers and villagers as to the latest techniques in agriculture. It is proposed that the water harvesting system used here be popularized amongst the locals in order to facilitate the conservation of the precious resource of water.

**TERI RANKED 7th AMONGST THE ENERGY AND RESOURCE POLICY THINK TANK BY UNIVERSITY OF PENNSYLVANIA**

New Delhi, 29th Jan 2013: In a major announcement The Energy and Resources Institute (TERI) has been ranked 7th in the top 20 Energy and Resource Policy Think Tanks by the University of Pennsylvania's Think Tanks and Civil Society Program. Since its inception in 1974, The Energy and Resources Institute (TERI) has evolved as an institution of excellence for its path breaking research on sustainable development, climate change, environment and energy.

The Rankings' primary objective is to recognize some of the world's leading public policy think tanks and highlight the notable contributions these institutions are making to governments and civil societies worldwide. Over the past six years, the "Think Tank Index" has become the authoritative source for the top public policy institutions around

the world. This year the report was launched at the United Nations University and at the World Bank in Washington, D.C. The Program's Rankings remain the first and most comprehensive ranking of the world's top think tanks, and are based on an annual global peer and expert survey of over 1950 scholars, policymakers, journalists, and regional and subject area experts. Given the rigor and scope of the process, the Rankings produced have been described as the insider's guide to the global marketplace of ideas. As part of the process, all 6,603 think tanks in the world were contacted and encouraged to participate in the nominations process as well as a group of over 9,000 journalists, policymakers, public and private donors, think tanks, and regional and subject area specialists. This group of peers and experts were surveyed to nominate and then rank public policy research centers of excellence for 2012. Additionally, the Program has assembled a set of Expert Panels, comprising over 750 expert members from around the world, spanning the political spectrum and drawing from a wide variety of disciplines and sectors, to help in the refining and validation of the lists generated. These experts were consulted at every stage in the process. The nominations and rankings were based on the detailed set of criteria that included the think tanks' production of rigorous and relevant research, publications, and programs in one or more substantive areas of research.

A newsletter published every two months, it highlights news and announcements of TERI and its research groups.

Visit: http://bookstore.teriin.org/index.php

***Courtesy : http://www.teriin.org/index.php***

# NEW METERS FOR CONSUMERS OPTING FOR ROOFTOP SOLAR POWER UNITS

These meters will replace the existing ones. The Tamil Nadu Generation and Distribution Corporation (TANGEDCO) will have to install fresh meters for domestic consumers who opt for rooftop solar power units. Giving this direction, the Tamil Nadu Electricity Regulatory Commission (TNERC), in its order a few days ago, stated that these meters would replace the existing ones used by such consumers. Their cost would be recovered from the consumers. The Corporation had been directed to submit a detailed procedure, covering a host of issues such as standards and location of meters, tariff for excess generation or lapsed units and period of power credit, to the Commission within 30 days. The order follows the formulation of the Solar Energy Policy by the State government. As part of the policy, the consumers would be offered a generation based incentive (GBI) of Rs. 2 per unit for the first two years; Re 1 per unit for next two years and 50 paise per unit for the subsequent 2 years. This would apply to all solar power units or solar-wind hybrid rooftop installations set up before March 31, 2014. Out of 3,000 megawatt (MW) expected to be added through solar power by 2015, roof-top installations account for 350 MW, of which 50 MW will be from domestic consumers, says the Policy document.

**Solar purchase obligation**

As the policy has prescribed solar purchase obligation (SPO) for commercial establishments of low-tension category and high-tension consumers including special economic zones and information technology parks, the order states that in the event of any of these consumers not complying with the SPO norms, a fee, called "forbearance price," will have to be paid by defaulters to the TANGEDCO, which is the administrator of the SPO. The details of the price are expected to be spelt out later. As on January 31 this year, solar power plants in general account for seven MW of the State's installed capacity of 7,866 MW through renewable energy. The break-up of the installed capacity of renewable energy units is: wind – 7,115 MW; cogeneration plants of sugar mills – 576 MW and biomass power plants – 168 MW. The installed capacity of plants, using conventional sources of energy, is 10,722.5 MW.

**Demand-side management**

Through another order, the Commission notified regulations on demand side management (DSM), according to which distribution licensee would have to constitute DSM cell at its head office and sub-cell in each region. At present, TANGEDCO is the distribution licensee. The TNERC would form a consultation committee, comprising representatives of different categories of consumers such as educational institutions, industry, agriculture and domestic consumers who have special knowledge in power sector. Officials concerned would also form part of the committee.

***Courtesy: The Hindu, dt: 11.03.2013***

***The Solar market is projected to grow 35 percent for the next 3-5 years* - WALTER NESDEO**

# IMPLEMENTATION OF SHUNT ACTIVE POWER FILTER BASED ON A SIMPLE NOVEL CONTROL ALGORITHM

*Shunt active power filter are commonly used as a harmonic and reactive power compensator. In this paper, a simple control method is described to control shunt active power filter. It operates on constant switching frequency, hence switching losses and stresses on the devices are lower. It can compensate the reactive power required by the load without sensing and computing the associated reactive power component, thus control circuit is made simple. It can also compensate harmonic components of the non-linear loads. The experimental results are agreed with the analytical and simulated results.*

***Keywords:*** *Shunt active power filter, Harmonic and reactive power compensator, Simple control method, constant switching frequency, Power quality and Active power filter.*

## 1.0 INTRODUCTION

Although the power electronics devices have benefited the electrical and electronics industry, these devices are also the main source of power harmonics in the power system. These power harmonics are called electrical pollution which will degrade the quality of the power supply. As a result, filtering process for these harmonics is needed in order to improve the quality of the power supply. There are many solutions available to improve the power quality like passive filtering and active filtering devices. Passive filters have disadvantages like larger in size, bulky, poor dynamic performances and resonance problems [1-2]. Thus, active power filter seems to be a viable alternative for power conditioning to control the harmonics level in the power system nowadays due to its advantages over the passive methods of harmonic filtering [3]. Active power filter have advantages like smaller in size, good dynamic performances, reactive power compensation, flexible, increase service life of equipments, no resonance problems etc [4].

## 2.0 PROPOSED SHUNT ACTIVE POWER FILTER

The circuit configuration of the proposed 3-phase shunt active power filter is shown in Figures l and 2. It can reduce the current harmonics and reactive power demand. It uses the pulse-width modulated voltage source inverter. It can compensate the reactive power without sensing and computing the reactive current component of the load, thus simplifying the control circuit. The current control is done in time-domain with constant switching frequency, hence it has fast time response and lower switching stresses. Overall voltage and current control circuits are simple and easy to implement. Also, shunt active power filters are easy to protect against power system short-circuit currents [5]. By using a fixed switching frequency, the high-frequency ripple current generated by the proposed active power filter can be easily removed from the power system [6-7].

The fundamental component, $i_{L1}$, is extracted from the load current by using the band-pass filter. The band-pass filter is tuned at the fundamental frequency, so that the gain attenuation introduced in the filter output signal is zero and the phase shift angle is 180°.

Thus, the filter output current [9] is exactly equal to the fundamental component of the load current but phase shifted by 180°. If the fundamental current component obtained from the second order band-pass filter is subtracted from the load current, the reference current waveform required to compensate only harmonic distortion is obtained. In order to provide the reactive power required by the load, the current signal obtained from the second order band-pass filter, $i_{L1}$ , is synchronized with the respective phase-to-neutral source voltage (see Figure 3), so that the inverter AC output current [8] is forced to lead the respective inverter output voltage, thereby generating the required reactive power and absorbing the real power necessary to maintain the DC voltage constant and to supply the switching losses.

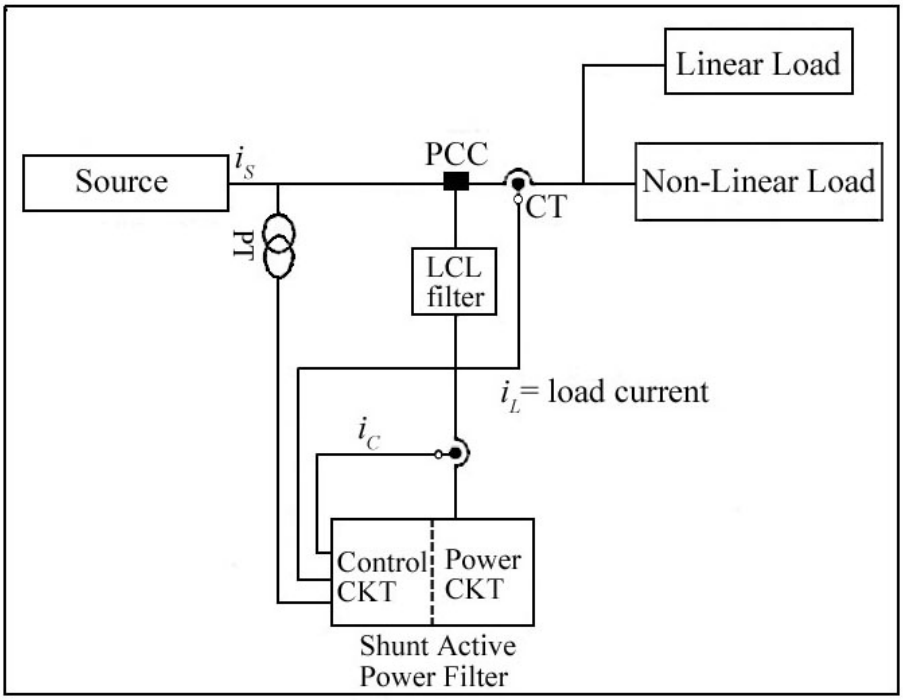



***Fig.1: Single Line Representation of Shunt Active Power Filter***

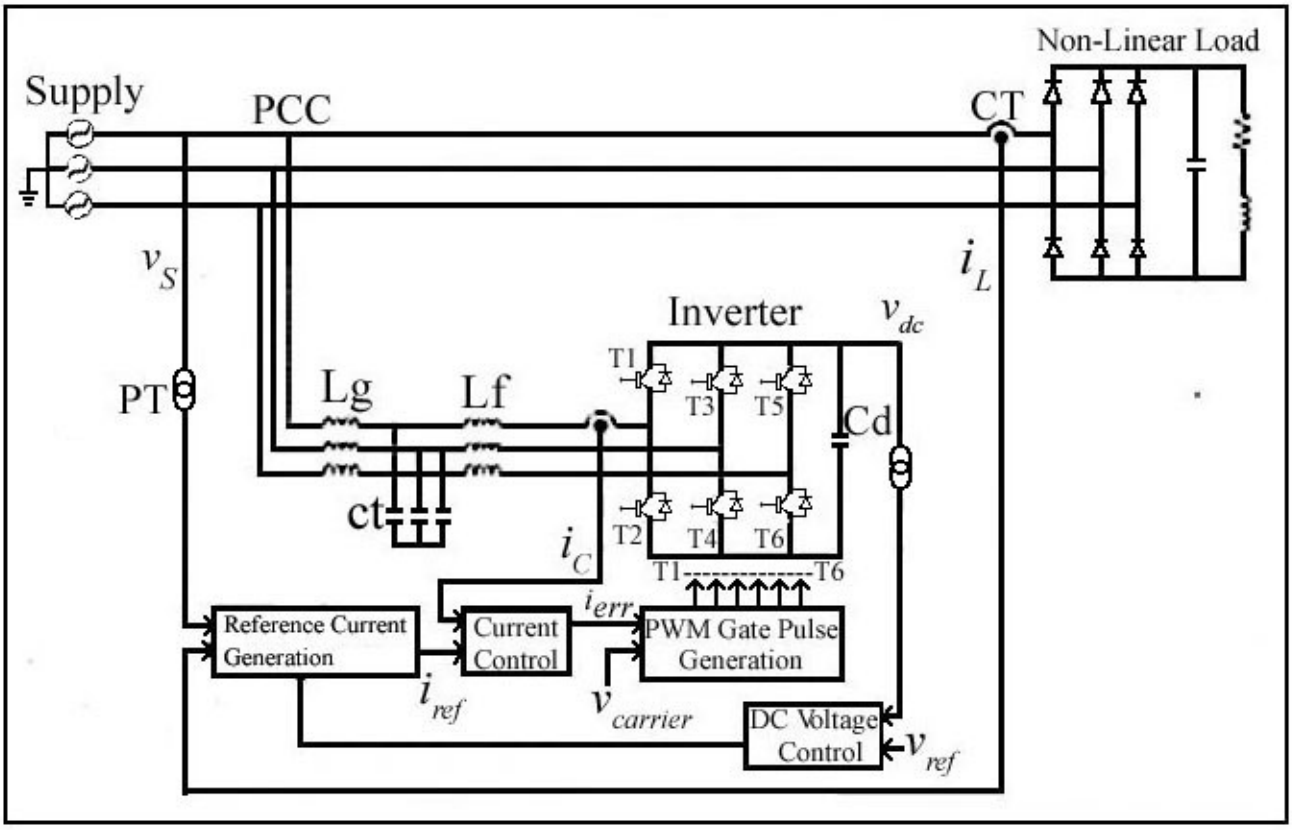



***Fig.2: Shunt Active Power Filter Configuration***

The real power absorbed by the inverter is controlled by adjusting the amplitude of the fundamental current reference waveform, $i_{L1,}$ obtained from the reference current generator (see Figure 3). The amplitude of the sinusoidal waveform is equal to the amplitude of the fundamental component of the load current plus or minus the error signal allows the inverter to supply the current harmonic components, the reactive power required by the load, and to absorb the small amount of active power necessary to cover the switching losses and to keep the DC voltage constant (Figure 4).

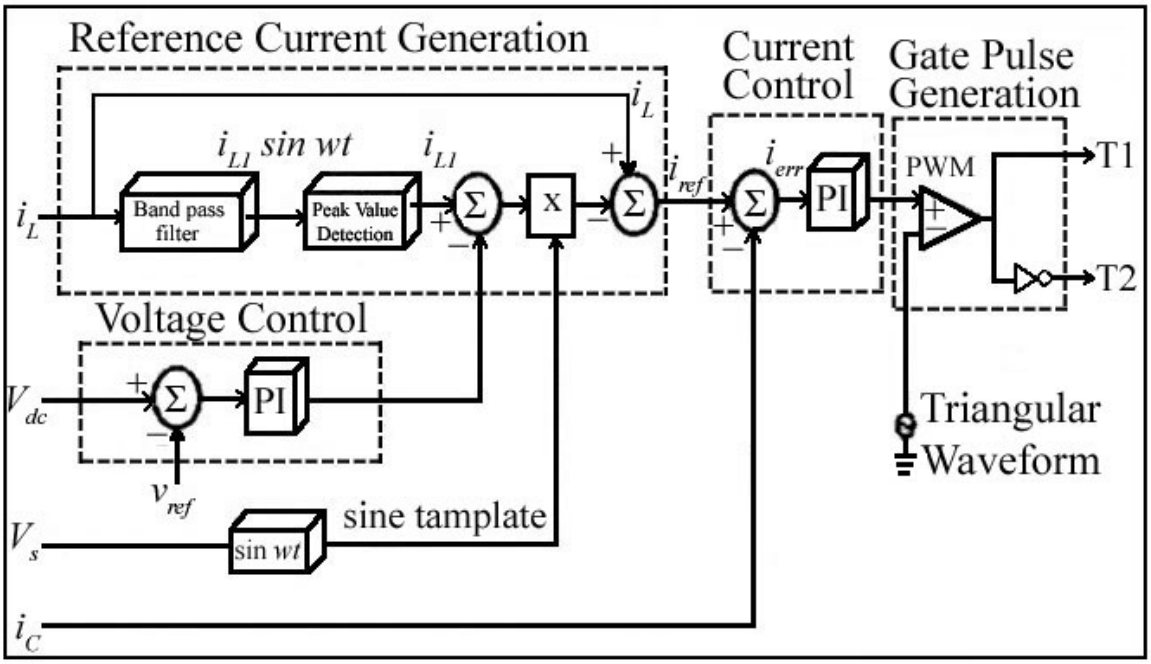



***Fig.3: Proposed Reference Current Generation Scheme***

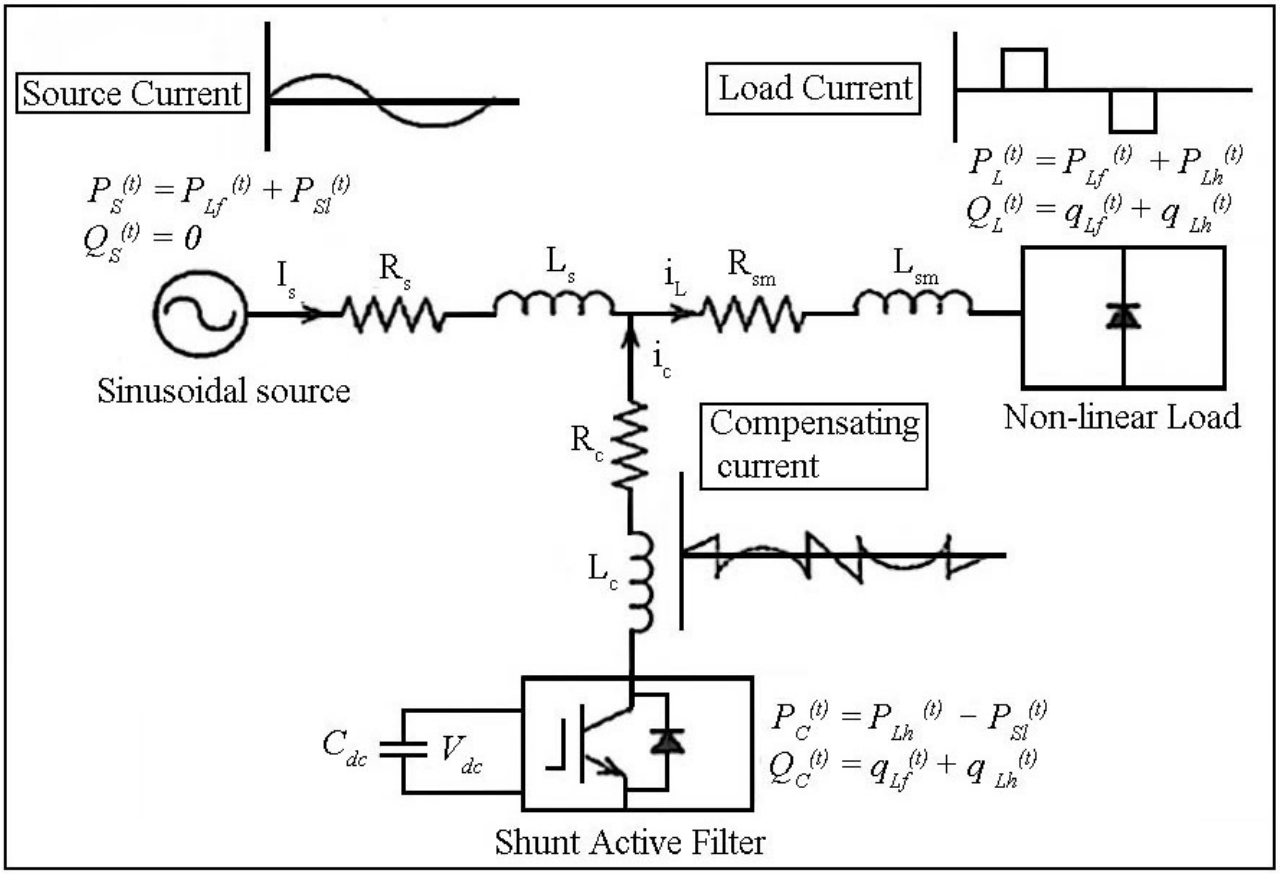



***Fig.4: Power Compensation and Shunt Active Power Filter***

By keeping the DC voltage constant, the inverter voltage gain is increased and the amplitude of the high-frequency inverter current harmonic component is reduced. The AC current generated by the inverter is forced to follow the reference signal obtained from the current reference generator.

***In the middle of difficulty, lies opportunity - ALBERT EINSTEIN***

$$i_{LOAD}(t) = \sum_{h=2}^{\infty} I_h \sin(h\omega t + \varphi_h)$$

$$= I_1 \sin(\omega t + \phi_1) + \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h)$$

$$= i_{L}1(t) + \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h) \qquad \textbf{(1)}$$

$$i_{LOAD}(t) - i_{L}1(t) = \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h)$$

$$i_C(t) = i_{LOAD}(t) - i_{L}1(t) = \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h)$$

$$i_{LOAD}(t) - i_{L}1 = \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h)$$

$$i_S(t) + i_C(t) = i_{LOAD}(t)$$

$$i_S(t) = i_{LOAD}(t) - i_C(t)$$

$$= i_{L}1(t) + \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h) - \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h)$$

$$= i_{L}1(t) \qquad \textbf{(2)}$$

Hence, $i_S(t) = i_{L}1(t)$

where,

I1 = peak value of fundamental load current

h = peak value of h order harmonic components of load current

$i_{L1}(t)$ = instantaneous value of the fundamental load current

h = order of the harmonics

$i_{LOAD}(t)$ = instantaneous value of the load current

ic(t) = instantaneous value of the compensating current

$i_s(t)$ = instantaneous value of the supply current

The instantaneous load power can be given as:

$P_L(t) = \mathbf{V}_S(t) i_L(t)$

$$= V_m I_1 \sin^2(\omega t) \cos(\varphi_1) + V_m I_1 \sin(\omega t) \cos(\omega t) \sin(\phi_1) + V_m \sin(\omega t) \sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h)$$

$$= P_{LP}(t) + P_{Lq}(t) + P_{Lh}(t) \qquad \textbf{(3)}$$

Where, $I_l$ is the peak value of the fundamental load current, $I_h$ is the peak value of the harmonic load current, $\Phi_l$ and $\Phi_h$ are the phase angle of the fundamental and harmonic component of the load currents, respectively. In Eqn. (3) the instantaneous power of nonlinear load is divided into three terms. The first term $P_{LP}(t)$ is the instantaneous load fundamental power. The second term $P_{Lq}(t)$ is the instantaneous load fundamental quadrature (reactive) power and the third term $P_{Lh}(t)$ is the instantaneous load harmonic power. A shunt APF is designed to be connected in parallel with the load, to detect its harmonic and reactive current and to inject into the system a compensating

current, identical with the load harmonic and reactive current. Therefore, instantaneous supply current $i_s$ having only fundamental component which is in phase with the source voltage $v_s(t)$.

$vs(t) = V_m \sin(\omega t)$ $\quad i_L l(t) = I_l \sin(\phi_1)$ (4)

If fundamental load current $i_{LI}$ (t), is synchronized with supply voltage vs(t), then it is known as $i_{Ls}$(t) Hence displacement angle between supply voltage vs(t) and synchronized load current $i_{Ls}$(t) is zero. Hence power factor angle is zero, and thus reactive power is compensated.

$\cos(\omega t) = 0$ $\quad P_{Lq}(t) = 0$ (5)

Compensating current makes harmonic current to be zero.

$$\sum_{h=2}^{\infty} I_h \sin(h\omega t + \phi_h) = 0$$

Therefore in Eqn. (3), $P_L h(t) = 0$ (6)

From Eqn. (3), (5) and (6), $PL(t) = PLP(t)$ (7)

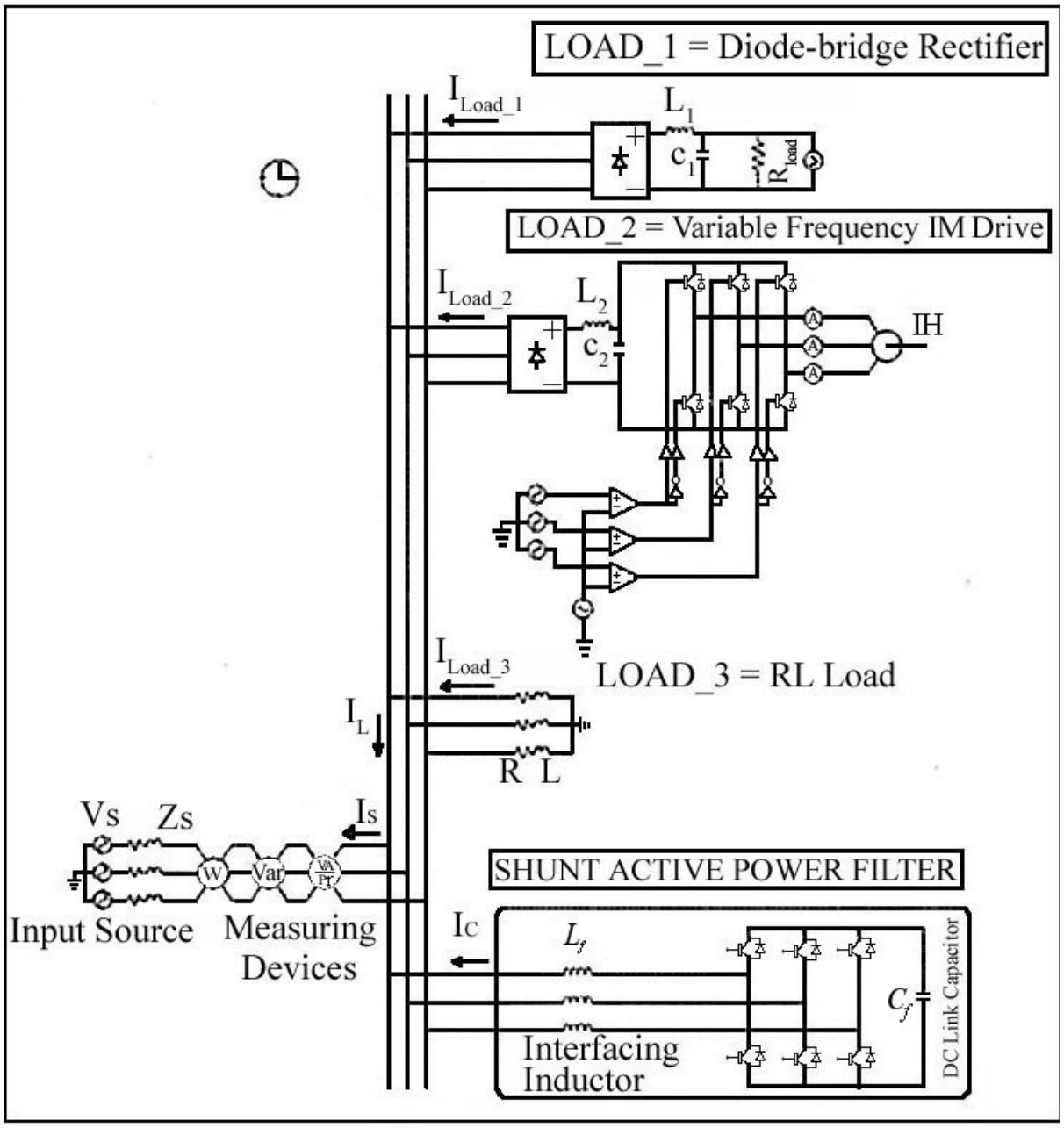



***Fig.5: Simulation Model of Power Circuit of Shunt Active Power Filter with Different Loads***

## 3.0 SIMULATION MODELING OF SAPF

The simulation of the proposed shunt active power filter is effectively done in the PSIM simulator software. The three-phase uncontrolled rectifier and variable frequency drive (VFD) are taken and modeled as non-linear loads for the shunt active power filter simulation purpose. The non-linear loads (uncontrolled rectifier and VFD) for producing harmonics in the supply current, linear load (RL load) for giving the phase-shifting between supply current and phase voltage are shown in Figure 5. Thus, Figure 5 shows power circuit arrangement of linear load, non-linear loads, AC source and shunt active power filter. The simulation model in PSIM for the proposed control scheme of three-phase shunt active power filter (SAPF) is shown in Figure 6.

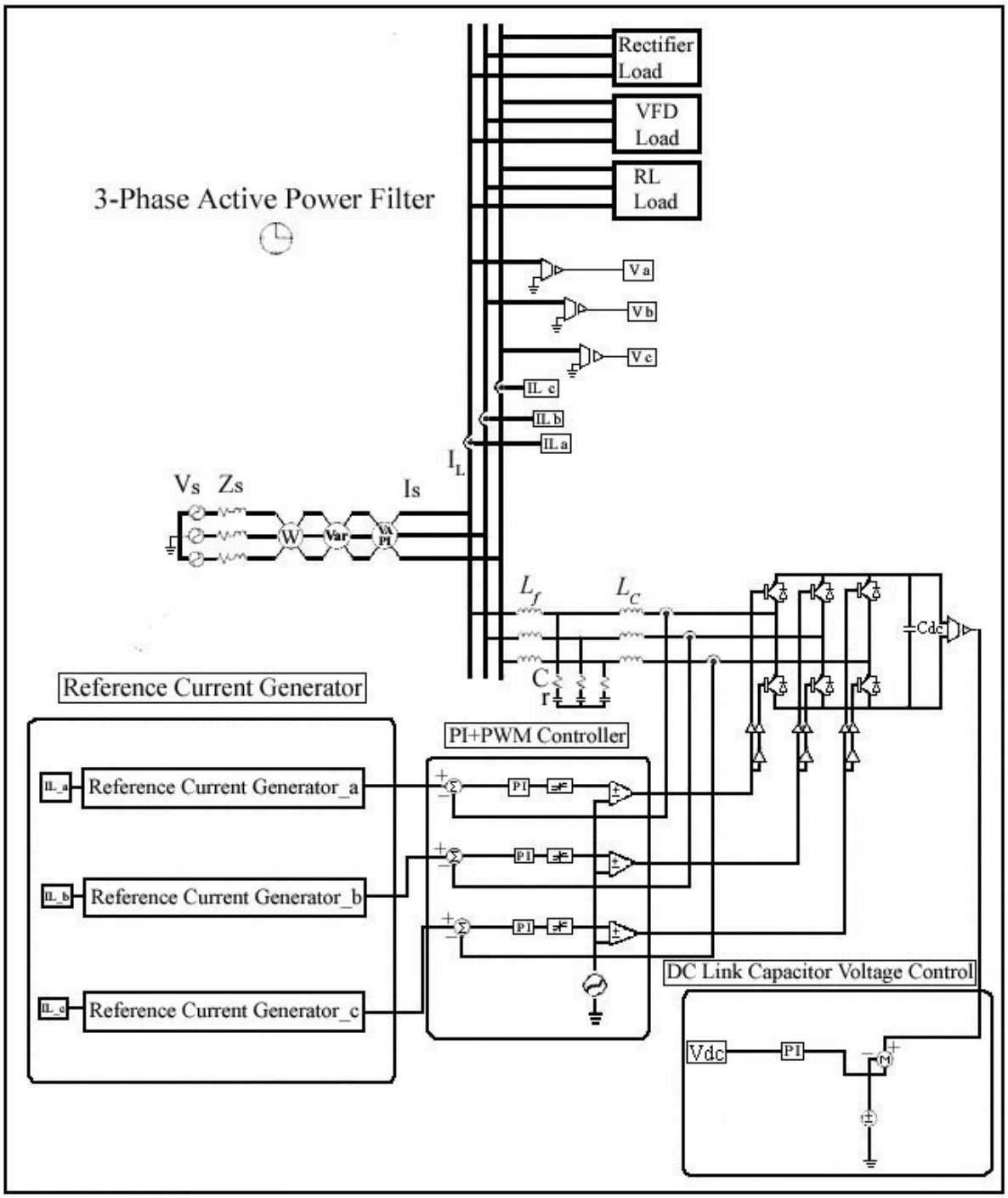



***Fig.6: Simulation model of control circuit of shunt active power filter***

***Think twice before you speak, because your words and influence will plant the seed of either success or failure in the mind of another.*** **- NAPOLEON HILL**

In simulation model as shown in Figure 6, the reference current generation block includes the band pass filter which extracts the fundamental component from the load current. The peak value of this fundamental component is detected and then multiplied with supply phase voltage, thus now it is called synchronized component as explained earlier. This component is subtracted from the load current, hence reference current is generated which is compared with actual current generated by the voltage source inverter. The error between them is processed through PI controller and compared with carrier waveforms which generated the modulated pulses. The PWM signals are applied to inverter switches, which generates the desired reference current.

## 4.0 SIMULATION RESULTS

The simulation results of proposed shunt active power filter for uncontrolled rectifier and RL load is simulated as shown in Figure 7.

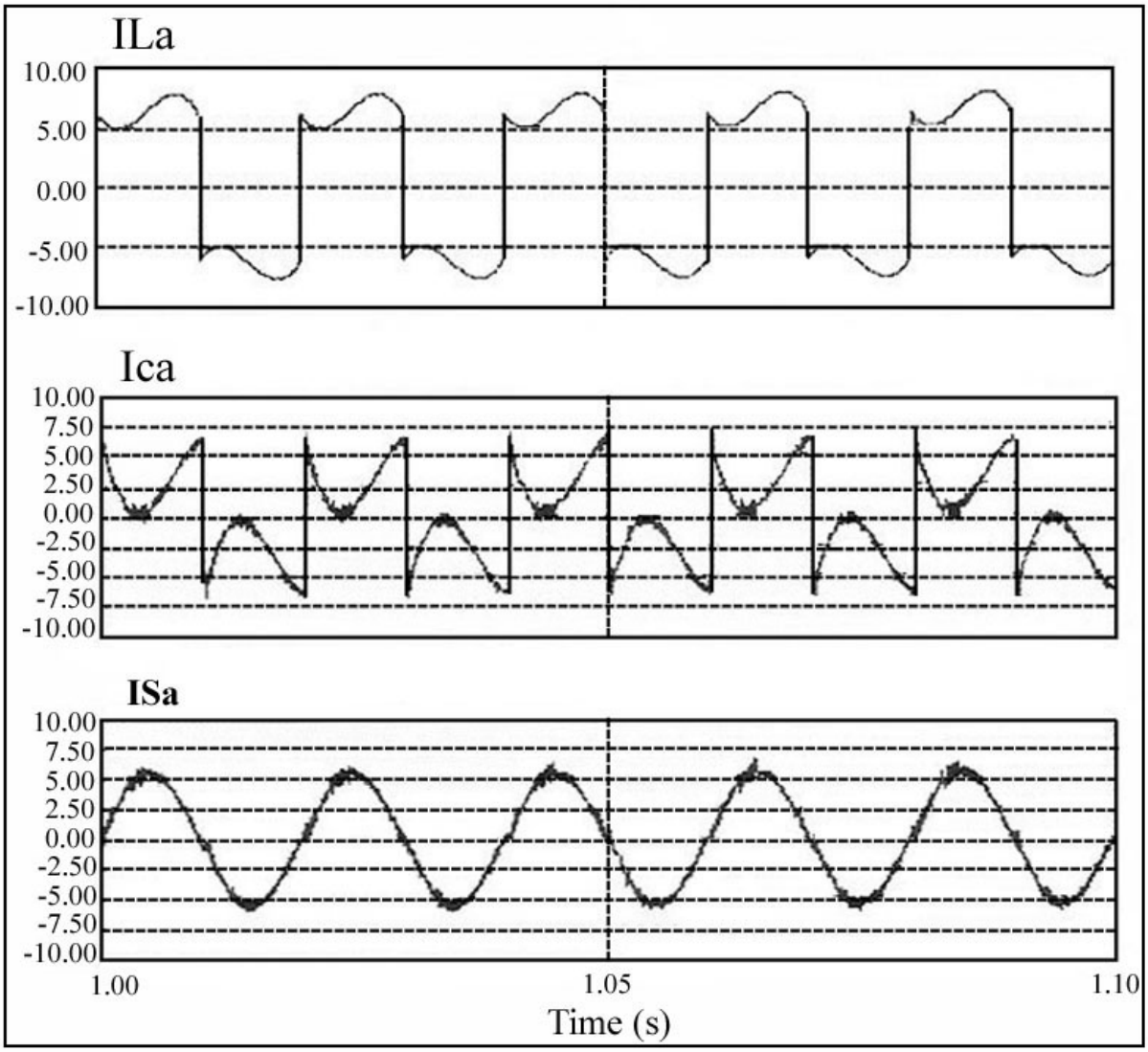



***Fig.7: Simulation Result (A) Rectifier Load Current, (B) Compensating Current, and (C) Supply Current***

It can be shown that the supply current harmonics are eliminated by using proposed shunt active power filter. The total harmonic distortion of the supply current is also decreased as shown in Figure 8.

## 5.0 EXPERIMENTAL SETUP AND RESULTS

The experimental setup is developed in the laboratory as a prototype of the proposed shunt active power filter.

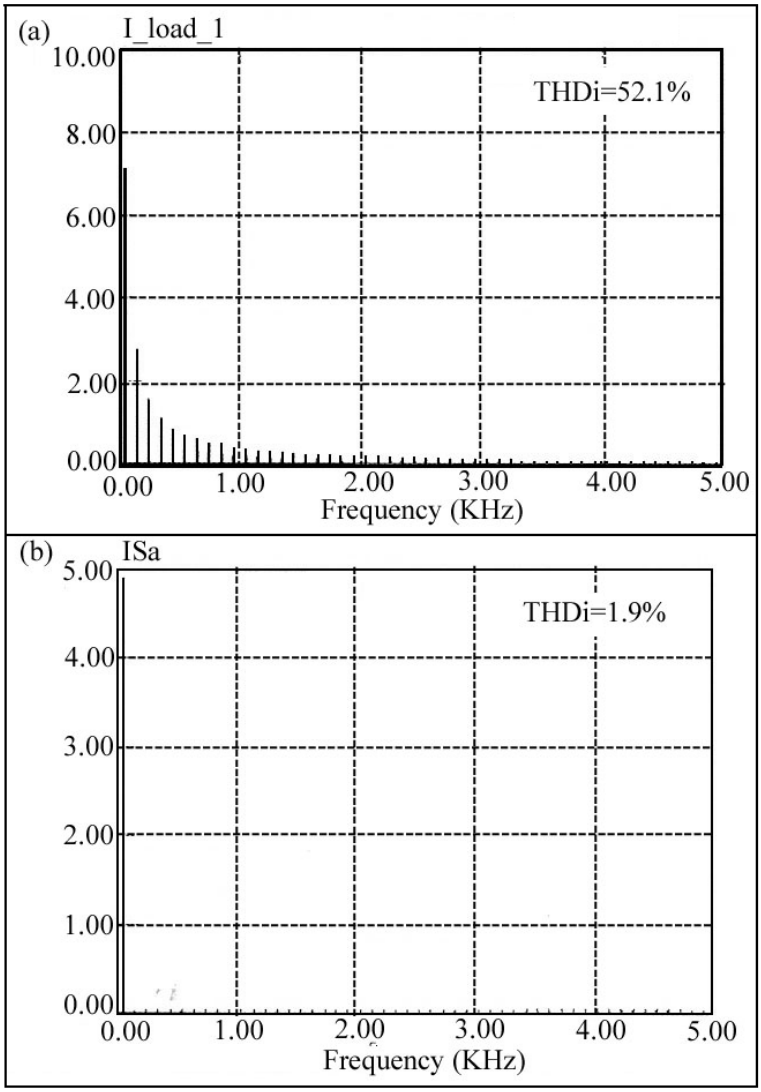



***Fig.8: FFT Spectrum of Supply Current***

***(A) Without Active Filter (B) With Active Filter***

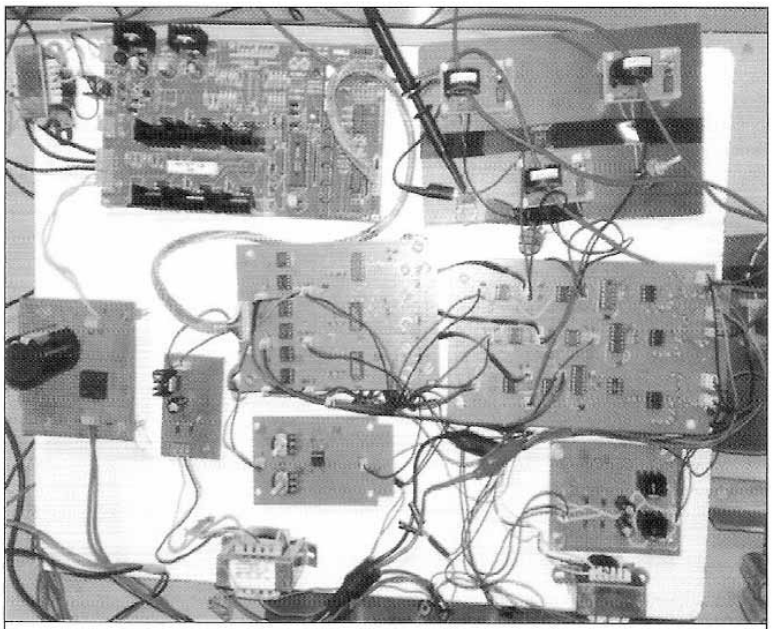


***Fig.9: Hardware Setup of Proposed Shunt Active Power Filter***

## SIMPLE, IMPORTANT AND UNFORGETABLE ELECTRICAL SAFETY DIMENSIONS AND "CHECK LIST"

Electrical Safety can be categorised in two ways.

One is Personal safety and the other is Equipment safety.

Equipment unsafe condition may also turn in to personal safety.

1. Earthing of equipment as per IE Rule No 61.
2. Enclose all open live parts properly so that nobody can approach inadvertently.
3. Close all openings in PCC/MCC Panels, terminal box openings in transformer, Motors etc.
4. Identify all feeders by Giving nomenclature for all feeders including I/C feeder along with cable sizes.
5. Give I/C source identification for all I/C feeders/I/C switches in all PCCs/MCCs/ Power and Lighting Dist. Boards without exception.
6. Provide proper ventilation for all PCCs/MCCs and their rooms.
7. Close all Spare cable gland holes in PCC/MCC/ HT and LT panels including in all electrical DBS etc.
8. Check periodically, the temperatures of all Power cable terminations carrying average to heavy currents.
9. At every available opportunity, tighten all cable terminations including control cable connections.
10. Ensure that the Buchholz relay is in circuit in transformers and keep them checking once in every year. This is very important to have proper indication of an internal fault.
11. Keep Insulators of all live parts in perfectly clean condition in HT panels without fail.
12. Ensure Panel heaters are in working condition and are switched 'ON' in HT panels invariable in Rainy season and in winter season.
13. For personal safety, ensure the person is knowledgeable of electrical system.
14. Follow Safety Work permit system without fail in to literally for switching OFF and Switching 'ON' the Electrical feeders.
15. Ensure that protection system of equipment is proper and is in working condition and is in circuit.
16. And many more depending on the situation.

This prototype is implemented by using analog circuits, which have advantage of real time application compared with digital implementation because there is no time is required for sampling, computing and executing. The hardware photograph is shown in the Figure 9. The experimental results shows that with proposed shunt active power filter, the supply current is improved and becomes almost sinusoidal and in phase with the phase voltage of the supply. Thus, the harmonics are eliminated from the supply current and reactive power is compensated. The input power factor is almost unity, because supply current and the phase voltage are exactly in phase as shown in Figure 10.

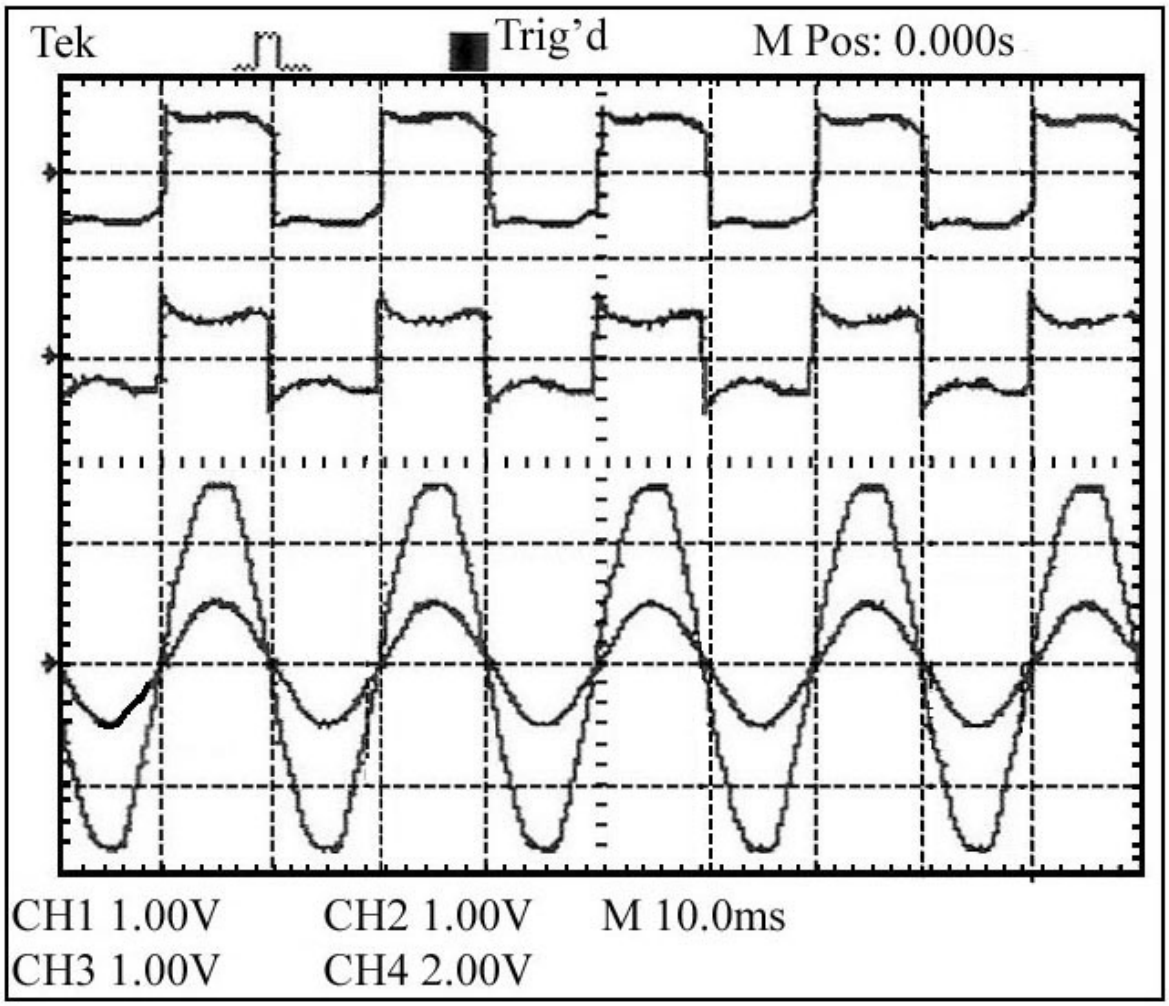



***Fig.10: Experimental Results***

***(A) Load Current, (B) Compensating Current , (C) Supply Current and Phase Voltage***

## 6.0 CONCLUSION

The shunt active power filter present in this paper, operates with fixed switching frequency has been simulated and analyzed. This scheme has two important characteristics. First, it operates with fixed switching frequency, and second, reactive power compensation is achieved without sensing and computing the associated reactive power component, thus simplifying the circuit topology. The performance of the active power filter has been improved by including a DC voltage control loop that maintains the voltage across the DC capacitor constant. In this way, the inverter voltage gain is increased and the high-frequency ripple current is reduced.

The experimental results validates the analytical and simulation results of the proposed control scheme of the shunt active power filter.

***by Vijay K Patel, EED and Mulla M A, EED,***
***Courtesy: CPRI Journal, December 2012***

***The two most abundant forms of Power on Earth are Solar and Wind, and they're getting cheaper and cheaper…***

# PRODUCT OF THE MONTH

## NEW PA–9PLUS PORTABLE POWER QUALITY ANALYSER

The latest addition to the power quality products family and the first to meet the CE requirements for the IEC marketplace.

- Designed to comply with all applicable IEC, IEEE, EN Standards and CE marking
- On–site analysis and data retrieval without a computer
- Intelligent Download — select only the data required
- Trends Harmonics, THD & TDD and provides real–time graphical display of individual harmonic power
- Includes AVO Metrosoft® software
- Remote communications & alarm capabilities

**Enhanced Instrument!**

The new PA–9Plus maintains the complete set of functions supported by the earlier PA–9, while adding many new enhancements to meet the needs of customers. AVO Metrosoft software provides the analysis tools needed by the power quality service personnel and is included with each PA–9Plus.

**New & Enhanced Metrosoft AVO PA–9W software capabilities**

- New – trends imbalance, individual harmonics, THD & TDD
- New test log feature allows user to preview reports and charts by sequence and download only what is required
- New zoom/unzoom charts feature
- Enhanced remote control display
- Modem software is now part of Metrosoft AVO PA–9W
- New Demo connection mode

**Why use the PA–9Plus?**

Poor power quality can affect capacitor switching, propagation of harmonic voltages from customer originated non–linear loads, billing verification within 2%, transformer testing and verification, shut down variable speed drives, computers or other equipment causing physical damage, loss of production, financial losses etc. Consequently, there is a growing need to both document the presence of power quality problems and use recorded data to determine the cause and responsible agency. These problems when they occur are called events.

The PA–9Plus can detect the following types of events.

- Voltage (or current) swells and sags.
- High–speed (sub–cycle) voltage/current spikes or notches.
- Harmonic events.

# FIRST SOLAR BECAME THE WORLD'S LARGEST PHOTOVOLTAIC (PV) EPC

For the first time First Solar became the world's largest photovoltaic (PV) EPC (engineering, procurement and construction) contractor in 2012, with more than 500 megawatts (MW) of projects completed – an increase of 50 percent over 2011, according to a new report from IMS Research, now part of IHS Inc. (NYSE: IHS). The report also revealed that a major shift in global rankings occurred in 2012 due to the explosive growth witnessed in Asia and the Americas at the expense of Europe. Just four European EPCs appeared in IHS' top 10 rankings for 2012. Two other US-based EPCs – Sun Edison and Sun Power also featured in the top fifteen, installing 390 MW and 190 MW respectively. First Solar and Sun Edison were found to have benefitted from the huge utility-scale PV pipeline being constructed both in the US and many other countries over a number a years, including the 550 MW Topaz Solar Farm and the 290 MW Agua Caliente Solar Project.

***Energy Conservation*** *is the foundation of* ***Energy Independence.***

# NATIONAL ENERGY CONSERVATION AWARD (NECA 2012)

Panasonic India won the National Energy Conservation Award (NECA 2012) for its non inverter 5 Star Air Conditioners at Vigyan Bhawan, New Delhi on 14th December 2012. Hon'ble President Shri Pranab Mukherjee along with Shri Jyotiraditya Scindia, Hon'ble Minister of State for Power presented the award to Mr. Manish Sharma, MD- Consumer Product Division, Panasonic India. This award is organized annually by Bureau of Energy Efficiency (BEE) which is a statutory body under Ministry of Power, Government of India.

Panasonic's CS-TC18NKY/CU-TC18NKY, a 5 Star air conditioner is the winning product in the consumer goods category. Several unique features in the air conditioner make it highly efficient in energy conservation. The Econavi mono sensor in the air conditioner can detect wasted energy and automatically select optimum energy saving operation which leads savings up to 20 percent. The High activity detection feature automatically increases cooling power to improve comfort when needed. The Anti Bacterial Filter which combines three effects in one: anti allergen, antivirus & anti bacteria protection to provide 99 percent clean air for a healthy lifestyle. The Soft Dry Mode starts with cooling to dehumidify and provides continuous breeze at a low frequency to keep a room dry without much change to the temperature. The anti-rust coating on the condenser and the super tropical compressor make the product highly efficient and help it perform well under high load conditions.

NECA is an award to give national recognition to the selected industrial units who have made systematic and serious attempts for efficient utilization and conservation of energy during the year. The scheme is open to all industrial units in the sub sectors like aluminum, automobile, chemicals, consumer goods, distillery and brewery, drugs & pharmaceuticals, fertilizers, forging, foundries, glass, integrated steel, mini steel, mining, paper & pulp, petrochemicals, refractory, sugar, steel re-rolling mill, textile plants and more.

# INCANDESCENT LAMPS BANNED IN J&K


The Jammu & Kashmir government has banned the use of incandescent lamps in all government and commercial establishments in the state, in a move aimed at conservation and energy efficiency. The state government has, meanwhile, made the use of Compact Fluorescent Lamps (CFLs) mandatory. The use of incandescent lamps in all new buildings constructed in the government sector, government institutions, PSUs, autonomous bodies, commercial establishments has been banned with immediate effect, according to an order issued on February 11, 2013.

***Courtesy: Electrical Monitor, March, 2013***

# HELP LINE

We are happy to announce our Helpline to serve our Members / Readers.

This Helpline shall provide you guidelines for your Electrical Related queries.

We shall try to provide solutions for your queries from replies sought from Experts in respective fields.

Since most of the queries shall be location specific.
We request you to clarify the replies published, with Local Authorities.

We request you to treat these replies only as guidelines.

We look forward to serve you better.

*Please send your queries to our mail id:* **tnagrade@gmail.com / tneleengrassn@vsnl.net**

# HELP LINE

**Query:** *Is there is any general practice in selecting the earthing system with respect to soil types.*

**Explanation:**

**Selection of Earthing System:**

| Installations/Isc Capacity | IR Value Required | Soil Type/ Resistivity | Earth System |
|---|---|---|---|
| House hold earthing/3kA | 8 ohm | Normal Soil/ up to 50 ohm-meter | Single Electrode |
| | | Sandy Soil/ between 50 to 2000 ohm- meter | Single Electrode |
| | | Rocky Soil/ More than 2000 ohm- meter | Multiple Electrodes |
| Commercial premises,Office / 5kA | 2 ohm | Normal Soil/ up to 50 ohm-meter | Single Electrode |
| | | Sandy Soil/ between 50 to 2000 ohm- meter | Multiple Electrodes |
| | | Rocky Soil/ More than 2000 ohm- meter | Multiple Electrodes |
| Transformers, substation earthing, HT line equipment/ 40kA | less than 1 ohm | Normal Soil/ up to 50 ohm-meter | Single Electrode |
| | | Sandy Soil/ between 50 to 2000 ohm- meter | Multiple Electrodes |
| | | Rocky Soil/ More than 2000 ohm- meter | Multiple Electrodes |
| LA, High current Equipment./ 50kA | less than 1 ohm | Normal Soil/ up to 50 ohm-meter | Single Electrode |
| | | Sandy Soil/ between 50 to 2000 ohm- meter | Multiple Electrodes |
| | | Rocky Soil/ More than 2000 ohm- meter | Multiple Electrodes |
| PRS, UTS, RTUs, Data processing centre etc./5KA | less than 0.5 ohm | Normal Soil/ up to 50 ohm-meter | Single Electrode |
| | | Sandy Soil/ between 50 to 2000 ohm- meter | Multiple Electrodes |
| | | Rocky Soil/ More than 2000 ohm- meter | Multiple Electrodes |

**Current carrying capacity**: The design of the electrode should be such as to have more than following current carrying capacity in kA (for 1 second)

| Sl. No. | Current Capacity | Primary Conductor diameter | Electrode dimensions (dia. x length) |
|---|---|---|---|
| 1. | 3 kA | 25 mm | 40 mm x 2000 mm |
| 2. | 5kA | 25 mm | 40 mm x 3000 mm |
| 3 | 15kA | 25 mm | 50 mm x 3000 mm |
| 4 | 40kA | 40 mm | 80 mm x 3000 mm |
| 5 | 50kA | 50 mm | 100 mm x 3000 mm |

For more than 50KA applications, multiple electrodes of 50KA capacity shall be installed and connected

- Number of Earthing Electrode and Earthing Resistance depends on the resistivity of soil and time for fault Current to pass through (1 sec or 3 sec).
- There is no general rule to calculate the exact no of earth Pits and Size of Earthing Strip, But discharging of leakage current is certainly dependent on the cross section area of the material so for any equipment **the earth strip size is calculated on the current to be carried by that strip.** First the leakage current is calculated and then size of the strip is determined.
- For most of the Electrical equipments like Transformer, DG set etc., the General concept is to have 4 no earth pits.2 no's for body earthing With 2 separate strips with the pits shorted and 2 nos for Neutral with 2 separate strips with the pits shorted.

- **The Size of Neutral Earthing Strip should be Capable to carry neutral current of that equipment.**
- **The Size of Body Earthing should be capable to carry half of neutral Current.**
- For example for 100kVA transformer, the full load Current is around 140A.The strip connected should be Capable to carry at least 70A (neutral current) which means a Strip of GI 25x3mm should be enough to carry the current. However a strip with lesser size which can carry a current of 35A can be used for body earthing. The reason for using 2 earth pits for each body and neutral and then shorting them is to serve as back up. If one strip gets Corroded and cuts the continuity is broken and the other Leakage current flows through the other run there by completing the circuit.
- Similarly for panels the no of pits should be 2 nos. The size can be decided on the main incomer Breaker.For example if main incomer to breaker is 400A, then Body earthing for panel can have a strip size of GI 25×6 mm Which can easily carry 100A.
- **Number of earth pits is decided by considering the total Fault current to be dissipated to the ground in case of Fault and the current that can be dissipated by each earth Pit.**
- Normally the density of current for GI strip can be roughly 200 amps per square cam. Based on the length and dia of the Pipe used the Number of Earthing Pits can be finalized. For using Copper & Aluminium strips, choose the equivalent current carrying capacity strip.

# ERODE CORPORATION TO GO IN FOR ENERGY-EFFICIENT STREET LIGHTING

The Erode Corporation will soon replace conventional fluorescent lamps with energy-efficient LED lamps for street lighting in the district. According to sources, the process of selecting the contractor is nearing completion.

The civic body has come up with the plan as its electricity expenditure particularly for street lighting continues to grow. It maintains more than 18,500 street lights and pays over Rs.3.5 crore as electricity charges for street lighting to the Tamil Nadu Generation and Distribution Corporation every year. Besides, the civic body spends over Rs.1.5 crore towards the maintenance of the street lights. The expenditure will grow further as the civic body has planned to install more street lights in the newly added areas – four municipalities, two town panchayats and five village panchayats. “When we complete the installation of street lights in the added areas, it will increase our total electricity bill by at least 15 to 20 per cent,” a senior official here said.

The implementation of the energy conservation plan would help civic body reduce the electricity consumption for street lighting by at least 30 to 35 percent. According to the plan, the conventional fluorescent lamps on the streets will be replaced with energy-efficient LED lamps. It also envisages the installation of illumination control devices, voltage regulators and other tools across the town to save the energy. The street light maintenance expenditure will also come down significantly following the execution of the plan, civic officials said. The civic body has earmarked a little over Rs.18 crore for the implementation of the plan on a public-private partnership mode.

“We are now scrutinising the tenders from various firms. The implementation will begin soon,” a senior official says. The civic administration is also preparing a proposal to install solar power generation equipment in its offices as a part of its energy conservation plan. “The long hours of power outage adversely affects the administration activities. If we have an alternative power source, it will improve the efficiency,” a civic official said.

***Courtesy: The Hindu***

# NTPC 5 MW SOLAR PV POWER STATION AT ANDAMAN & NICOBAR ISLANDS IS DECLARED FOR COMMERCIAL OPERATION

NTPC 5 MW Solar PV Power Station at Andaman & Nicobar Islands is declared for commercial operation w.e.f. 00:00 Hrs of March 31, 2013. With this the total capacity of non-conventional energy projects of NTPC Ltd. has become 10 MW. The total commercial capacity of NTPC has become 34820 MW and the total commissioned capacity of NTPC Group becomes 41184 MW. During the financial year 2012-13, NTPC has added 4170 MW which is the highest ever capacity addition by NTPC in any financial year. ***Courtesy: The Hindu***

# TECHNICAL SEMINAR - INSIGHT

Tamil Nadu Electrical Installation Engineers Association 'A' Grade organised a Technical Seminar on "Quality of Power" (Transformers Power factors & Harmonics, Compact Substations) & "Importance of Earthing in improving Safety in Electrical Installations" in Association with Electrotherm (India) Ltd.

The Seminar started at 9.15 AM with registration. Members & Visitors enthusiastically registered themselves.

Chief Guest arrived at the venue. Mr. U. Baskaran, President, Mr. K. Kannan, Secretary & Mr. P. Suyambu, Treasurer welcomed Mr. S. Appavoo, CEIG with a Flower Bouquet at the entrance.

After the guests taking the dais, Meeting started with Tamil Thai Vazhthu & Lighting of the Lamp.

Mr. U. Baskaran, President Honoured Mr. S. Appavoo by presenting a memento on behalf of the Association.

Mr. U. Baskaran addressed the welcome note welcoming the Chief Guest, Technical Speakers and all the members.

Chief Guest Mr. S. Appavoo, CEIG was very kind enough to release the first copy of "A Treatise on Power Quality with a focus on Harmonics". The first copy was received by Mr. A.K. Venkatasamy, former President of our Association.

Mr. S. Appavoo inaugurated the revamped Association website to our members and gave his inaugural speech.

In his inaugural speech he gave valuable suggestions regarding providing more useful information about the Govt. regulations and procedures to be followed. He urged the Association to make the website more interactive & transparent to make it more user friendly.

Technical Session on Quality of Power was started with Mr. Ravindra Nath Seth, Vice President, Electrotherm India, followed by an excellent Technical analysis by Mr. Dhiraj Budhiraja, Business Head, Electrotherm India.

After the technical session on Quality of Power was over, Mr. K. Kanesan, M.D., of JEF Techno Solutions Pvt. Ltd. gave valuable information about the Importance of Earthing in Electrical Installations. He virtually shattered all the Myths surrounding the general Earthing Techniques adopted.

Association Honoured Mr. Ravindranath Seth, Mr. Dhiraj Budhiraja & Mr. K. Kanesan with a Shawl & a Memento.

Mr. K. Kannan, Secretary delivered his vote of thanks to the Chief Guest, Technical Speakers, Members and all invitees. In the Post Lunch Session Association members meeting was held. We shall see a detailed coverage of this event in our forthcoming issue.

# CANADIAN RESEARCHERS DEVELOP ENERGY STORAGE SYSTEM

Canadian researchers have developed a ground-breaking method that may ultimately enable excess energy created by wind turbines and solar panels to be stored for later use.

Two researchers at the University of Calgary report in the journal Science that they have invented a relatively inexpensive way of using rust to act as a catalyst for capturing energy through the electrolysis of water. "This breakthrough offers a relatively cheaper method of storing and reusing electricity produced by wind turbines and solar panels," said Curtis Berlinguette, associate professor of chemistry at the university.

"Our work represents a critical step for realizing a large-scale, clean energy economy," he added.

Simon Trudel, assistant professor of chemistry, said the discovery "opens up a whole new field of how to make catalytic materials. We now have a large new arena for discovery."

The two researchers have created a company to commercialise their electrocatalysts for use in electrolysers.

Electrolysers use catalysts to create a chemical reaction that converts electricity into energy by splitting water into hydrogen and oxygen, which can then be stored and reconverted to electricity for use whenever needed. Catalysts are typically made from rare and expensive metals in a crystalline structure.

However Berlinguette and Trudel deviated from this principle by using common metal compounds or oxides, such as rust, which achieved the same results as more expensive metals.

The researchers expect to have a commercial product in the market by 2014, with a prototype electrolyser designed to provide a family home's energy needs ready for testing by 2015. ***Courtesy: The Hindu***

# TECHNICAL SEMINAR PHOTOS - 30.03.2013

Left to Right: Mr. K. KANNAN, Secretary & Mr. U. BASKARAN, President, TNEIEA,
Mr. S. APPAVOO, Chief Electrical Inspector to Government,
Mr. DHIRAJ BUDHIRAJA, Business Head & Mr. RAVINDRA NATH SETH, Vice President,
Electrotherm (India) Ltd.,
Mr. K. KANESAN, Managing Director, Jef Techno Solutions Private Limited

Honouring Mr. S. APPAVOO, CEIG by our President Mr. U. BASKARAN

Honouring Mr. DHIRAJ BUDHIRAJA, Business Head, Electrotherm (India) Ltd. by our Vice President Mr. S.D. POONGUNDRAN

Honouring Mr. RAVINDRA NATH SETH, Vice President, Electrotherm (India) Ltd. by our Vice President Mr. J. JOHN

Honouring Mr. K. KANESAN, Managing Director, Jef Techno Solutions Private Limited By our Member Mr. S. GOPALAKRISHNAN

Gathering at Seminar

## 18th Meeting of Electrical Installations Sectional Committee, ET 20
## Held at Manak Bhavan, Auditorium 9, B.S. Zafar Marg, New Delhi-110 002
## on Tuesday, 19th March 2013

Standing from left to right: TNEIEA President. Shri. U. Baskaran & Secretary. Shri. K. Kannan, Shri. Amitabha Sarkar (Schneider Electrica India Pvt Ltd.), Shri. Cdr. Soumitra Bhaduri (Garden research Ship Builders & Engineers), Shri. D. Maheswaran (L&T)
Sitting from left to right: Shri. R.C. Mathew, Sc F & Head (ETD), Chairman, Shri. N. Nagarajan, Sr. Consultant (MEP), Member Secretary Smt. Nishat S.Haque, Sc.E (ETD)

# EARTHING - 3

## 9 TYPES OF SYSTEM EARTHING

**9.1** Internationally, it has been agreed to classify the earthing systems as TN System, TT System and IT System.

**9.1.1** *TN System*

This type of system has one or more points of the source of energy directly earthed, and the exposed and extraneous conductive parts of the installation are connected by means of protective conductors to the earthed point(s) of the source, that is, there is a metallic path for earth fault currents to flow from the installation to the earthed point(s) of the source. TN systems are further sub-divided into TN-C, TN-S and TN-C-S systems.

**9.1.2** *TT System*

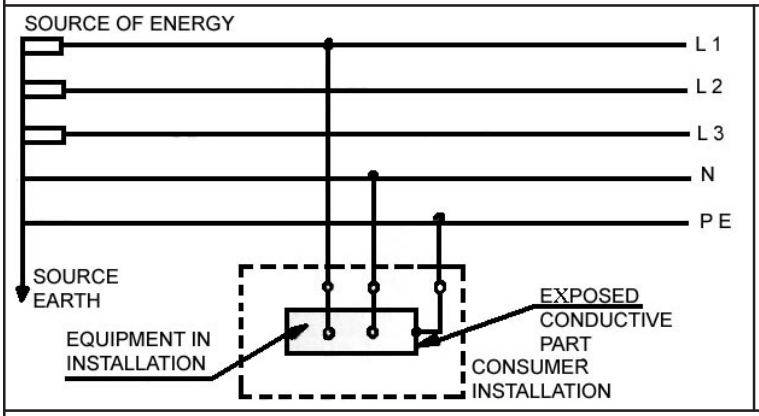
This type of system has one or more points of the source of energy directly earthed and the exposed and extraneous conductive parts of the installation are connected to a local earth electrode or electrodes and are electrically independent of the source earth(s).

**9.1.3** *IT System*

This type of system has the source either unearthed or earthed through a high impedance and the exposed conductive parts of the installation are connected to electrically independent earth electrodes.

**9.1.4** It is also recognized that, in practice, a system may be an admixture of types. For the purpose of this Code, earthing systems are designated as follows:

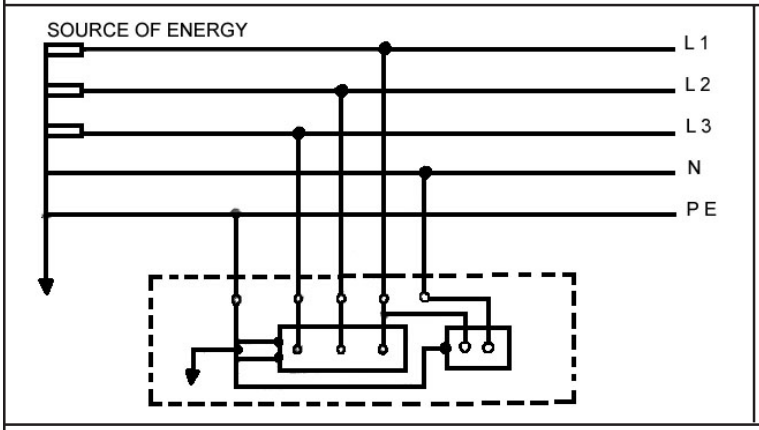
a) *TN-S system (for 240 V single-phase domestic/commercial supply)* – Systems where there are separate neutral and protective conductors throughout the system. A system where the metallic path between the installation and the source of energy is the sheath and armouring of the supply cable (*see* Fig.7A).




**NOTE:** *The protective conductor (PE) is the metallic covering (armour or load sheath of the cable supplying the installation or a separate conductor). All exposed conductive parts of an installation are connected to this protective conductor via main earthing terminal of the installation.*

***Fig.7A: TN-S System Separate Neutral and Protective Conductors Throughout the System, 230V Single Phase. Domestic/Commercial Supply for 3 ~ TN-S***

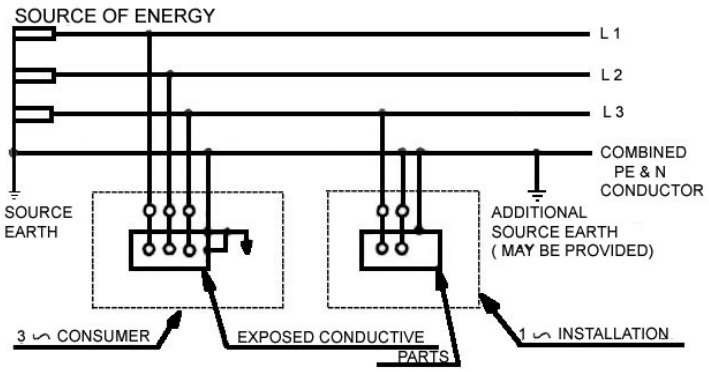
b) *Indian TN-S System (for 415 V three-phase domestic commercial supply)* – An independent earth electrode within the consumer's premises is provided (*see* Fig. 7B).




**NOTE:** *For 415 V Three Phase Domestic/Commercial Supply Having 3-Phase and 1-Phase Loads. All exposed conductive parts of the installation are connected to protective conductor via the main earthing terminal of the installation. An independent earth electrode within the consumer's premises is also provided.*

***Fig.7B: Indian TN-S System***

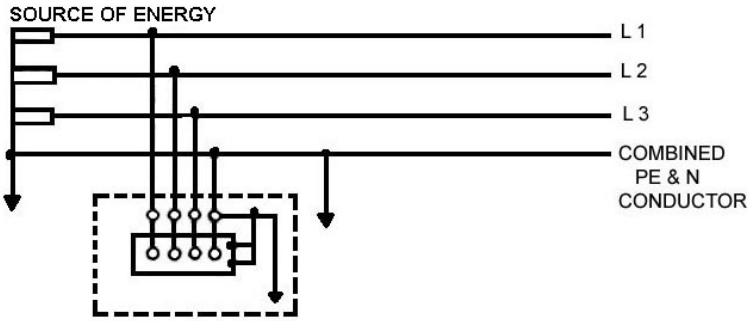
c) *Indian TN-C System* – The neutral and protective functions are combined in a single conductor throughout the system (for example earthed concentric wiring (*see* Fig.7C).




**NOTE:** *All exposed conductive parts are connected to the PEN conductor. For 3~ consumer, local earth electrode has to be provided in addition.*

***Fig.7C: Indian TN-S System (Neutral and Protective Functions Combined in a Single Conductor Throughout System)***

d) *TN-C-S System* – The neutral and protective functions are combined in a single conductor but only in part of the system (*see* Fig.7D).

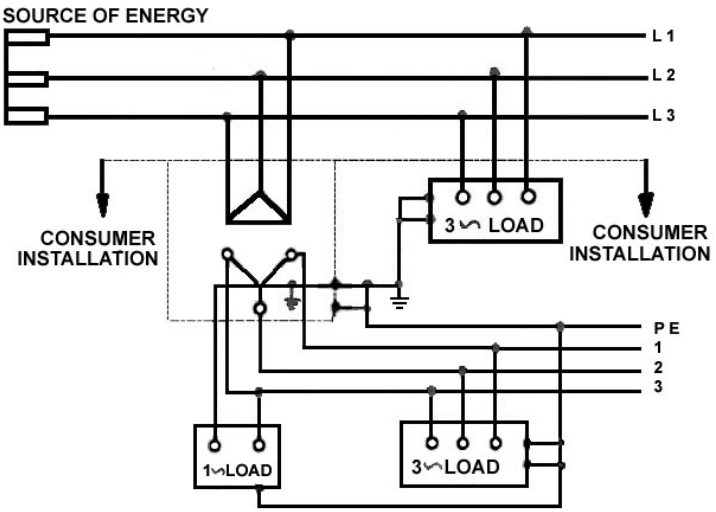



**NOTE:** *The usual form of a TN-C-S system is as shown, where the supply is TN-C and the arrangement in the installations in TN-S. This type of distribution is known also as Protective Multiple Earthing and the PEN conductor is referred to as the combined neutral and earth (CNE) conductor.*

*The supply system PEN conductor is earthed at several points and an earth electrode may be necessary at or near a consumer's installation. All exposed conductive parts of an installation are connected to the PEN conductor via the main earthing terminal and the neutral terminal, these terminals being linked together.*

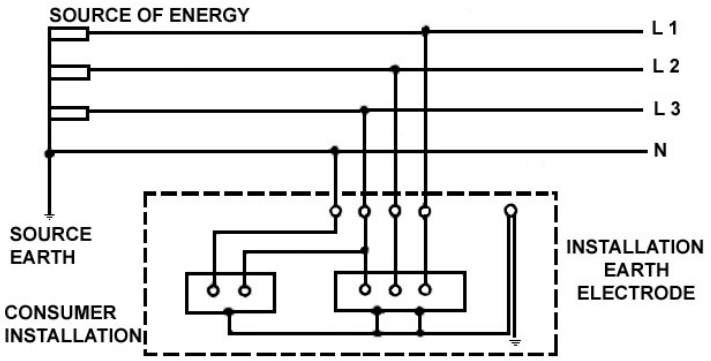
*The protective neutral bonding (PNB) is a variant of TN-C-S with single point earthing.*

***Fig.7D: TN-C-S System, Neutral and Protective Functions Combined in a Single Conductor in a Part of the System***




e) *T-TN-S System (for 6.6/11 kV three-phase bulk supply) – The consumers installation, a TN-S system receiving power at a captive substation through a delta connected transformer primary (see Fig.7E).*

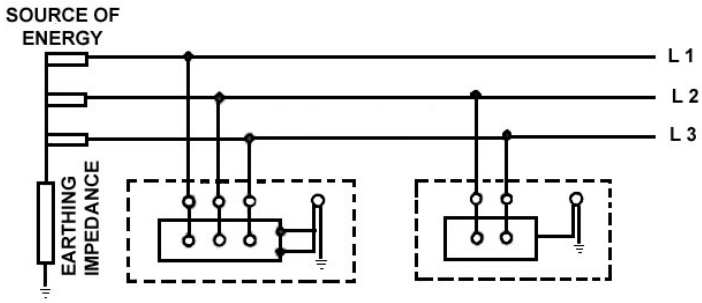
***Fig.7E: T-TN-S System***




f) *TT System (for 415V three-phase industrial supply) – Same as* ***9.1.2*** *(see Fig. 7F)*

**NOTE**: *All exposed conductive parts of the installation are connected to an earth electrode which is electrically independent of the source earth. Single phase TT system are not present in India.*

***Fig.7F: 415 V Three phase industrial supply having 3-phase and 1-phase loads***




g) *IT System* – Same **9.1.3** (*see* Fig.7G).

**NOTE:** *All exposed conductive parts of an installation are connected to an earth electrode.*

*The source is either connected to earth through a deliberately introduced earthing impedance or is isolated from earth.*

***Fig.7G: IT System***

## 10 SELECTION OF DEVICES FOR AUTOMATIC DISCONNECTION OF SUPPLY

### 10.1 General

In general, every circuit is provided with a means of overcurrent protection. If the earth fault loop impedance is low enough to cause these devices to operate within the specified times (that is, sufficient current can flow to earth under fault conditions), such devices may be relied upon to give the requisite automatic disconnection of supply. If the earth fault loop impedance does not permit the overcurrent protective devices to give automatic disconnection of the supply under earth fault conditions, the first option is to reduce that impedance. It may be permissible for this to be achieved by the use of protective multiple earthing or by additional earth electrodes. There are practical limitations to both approaches.

In case of impedance/arcing faults, series protective devices may be ineffective to clear the faults. An alternate approach is to be adopted for the complete safety of the operating personnel and equipment from the hazards that may result from earth faults. This is to use residual current devices with appropriate settings to clear the faults within the permissible time, based on the probable contact potential. This method is equally applicable where earth loop impedances cannot be improved.

In TT systems, there is an additional option of the use of fault voltage operated protective devices; whilst these devices will always give protection against shock risk, provided they are correctly installed, the presence of parallel earths from the bonding will reduce the effectiveness of the fire risk protection they offer. These are, therefore, more suited for isolated installations that do not have interconnections to other installations. It should also be remembered that every socket outlet circuit that do not have earthing facility in a household or similar installation should be protected by a residual current device having a rated residual operating current not exceeding 30 mA.

On all other systems where equipment is supplied by means of a socket outlet not having earthing facility or by means of a flexible cable or cord used outside the protective zone created by the main equipotential bonding of the installation such equipment should be protected by a residual current operated device having an operating current of 30 mA or less.

### 10.2 Use of Over-Current Protective Devices for Earth Fault Protection

Where over-current protective devices are used to give automatic disconnection of supply in case of earth fault in order to give shock risk protection, the basic requirement is that any voltage occurring between simultaneously accessible conductive parts during a fault should be of such magnitude and duration as not to cause danger. The duration will depend on the characteristic of the overcurrent device and the earth fault current which, in turn, depends on the total earth fault loop impedance. The magnitude will depend on the impedance of that part of the earth fault loop path that lies between the simultaneously accessible parts.

The basic requirement can be met if,

a) a contact potential of 65 V is within the tolerable limits of human body for 10 s. Hence protective relay or device characteristic should be such that this 65 V contact potential should be eliminated within 10 s and higher voltages with shorter times.

b) a voltage of 250 V can be withstood by a human body for about 100 ms, which requires instantaneous disconnection of such faults, giving rise to potential rise of 250 V or more above the ground potential.

The maximum earth fault loop impedance corresponding to specific ratings of fuse or miniature circuit-breaker that will meet the criteria can be calculated on the basis of a nominal voltage to earth ($U_o$) and the time current characteristics of the device assuming worst case conditions, that is, the slowest operating time accepted by the relevant standards. Thus, if these values are not exceeded, compliance with this Code covering automatic disconnection in case of an earth fault is assured.

Where it is required to know the maximum earth fault loop impedance acceptable in a circuit feeding, a fixed appliance or set of appliances and protected by an over current device, the minimum current that may be necessary to ensure operation of the overcurrent device within the permissible time of 10 s for a contact potential of 65 V is found from the characteristic curve of the device concerned. Application of the Ohm's Law then enables the corresponding earth fault loop impedance to be calculated.

For circuits supplying socket outlets, the corresponding earth fault loop impedance can be found by a similar calculation for earthed equipment. When equipment are not earthed and connected to socket outlets without earthing facility, disconnection should be ensured for 30 mA within 10 s and with appropriate decrements in time for higher currents.

This method requires a knowledge of the total earth loop impedance alone (rather than individual components) and is, therefore, quick and direct in application. Its simplicity does exclude some circuit arrangements that could give the required protection.While calculations give the maximum earth fault loop or protective conductor impedance to ensure shock risk protection under fault conditions it is also necessary to ensure that the circuit protective earth conductor is protected against the thermal effects of the fault current. The earth fault loop impedance should, therefore, be low enough to cause the protective device to operate quickly enough to give that protection as well. This consideration places a second limit on the maximum earth loop impedance permissible and can be checked by superimposing on the time current characteristic of the overload device, the 'adiabatic' line having the equation:

$$t = \frac{k^2A^2}{I^2} \text{ or } A = \frac{I\sqrt{t}}{k}$$

Details of the maximum permissible earth loop impedance for the thermal protection of cables by fuses can also be computed. However, the time current characteristics of a miniature circuit-breaker are such that if the loop impedance is low enough to give automatic disconnection within safe disconnecting time so providing shock risk protection, it will also give the necessary thermal protection to the earth conductor likely to be used with a breaker of that specific rating.

Figure 8 shows the relationship between the adiabatic line and the characteristic of fuses and miniature circuit-breaker.

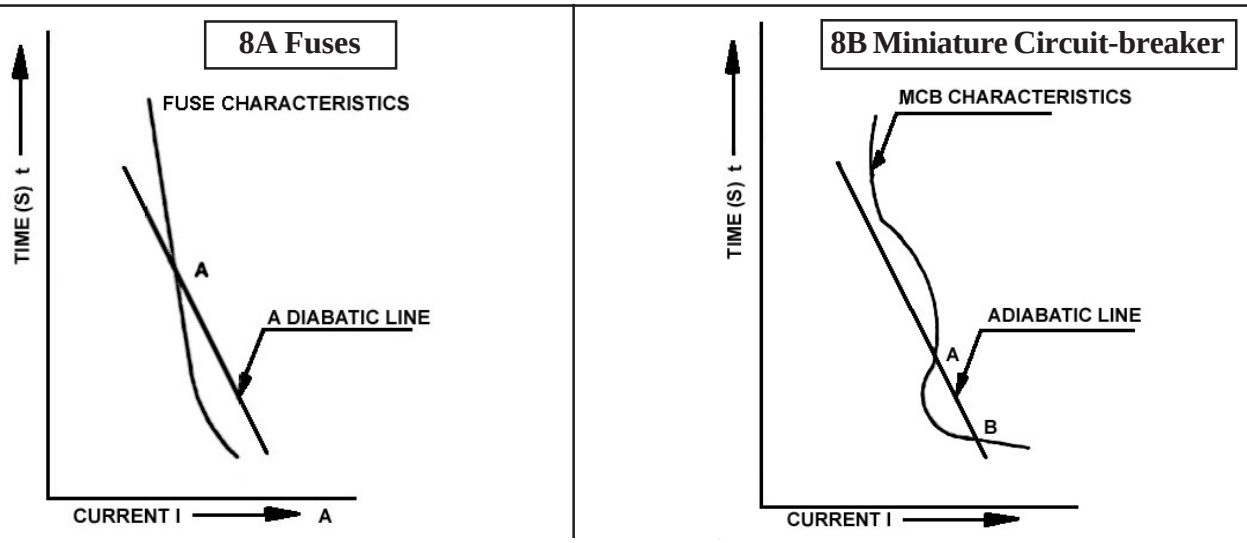



***Fig.8: Relationship between Adiabatic Lines and Characteristics***

In order that the devices will give thermal protection to the protective conductor, operation has to be restricted to the area to the right of point *A* where these curves cross. Thus, the maximum earth fault loop impedance for thermal protection of the cable is that corresponding to the minimum earth fault current for which the device gives protection. The value of this current can be read from the curve and the corresponding loop impedance can be calculated from:

$$Z_s = \frac{U_o}{I_t}$$

where $Z_s$ = earth fault loop impedance, $U_o$ = nominal voltage to earth, and $I_t$ = earth fault current.

For a given application, the maximum permitted earth fault loop impedance would be the lower of the two values calculated for shock risk protection or thermal restraint respectively.

It will be noted that the adiabatic line crosses the characteristic curve for a miniature circuit-breaker at a second point *B*. This denotes the maximum fault current for which a breaker will give thermal protection but it will generally be found in practice that this value is higher than the prospective short circuit current that occurs in the circuit involved and cannot, therefore, be realized.

### 10.3 Earth Fault Protective Devices

There are two basic forms of such devices that can be used for individual non-earthed/earthed (with limited application) equipment as follows:

#### **10.3.1** *Residual Current Operated Devices (RCD)*

An RCD incorporates two component items. A core balance transformer assembly with a winding for each recognizing the out of balance current that the fault produces in the main conductors. This induces a current that is used to operate the tripping mechanism of a contact system. For operating currents of 0.5 A or more, the output from such a transformer assembly can operate a conventional trip coil directly. For lower values of operating current, it is necessary to interpose a delay device, either magnetic or solid state.

Devices for load currents greater than 100 A usually comprise a separate transformer assembly with a circuit-breaker or contact relay, mounted together within a common enclosure. Devices for load currents below 100 A usually include the transformer and contact system within the same single unit, which is then described as a residual current operated circuit-breaker (RCB). Such an RCB should be considered a particular type of RCB although it is the most usual form.

A wide choice of operating currents is available (typical values are between 10 mA and 20A) RCB's are normally non-adjustable whilst RCD's are often manufactured so that one of several operating currents may be chosen. Single phase and multiphase devices with or without integral overcurrent facilities are available.

Where residual current breakers of 30 mA operating current or less are being used, there is a choice between devices that are entirely electromechanical in operation and those that employ a solid state detector. The electromechanical types are generally small and compact and will operate on the power being fed to the fault alone whereas the solid state type which tend to be bulkier to require a power supply to ensure operation. Where this power supply is derived from the mains, it may be necessary to take added precaution against failures of part of that mains supply. Devices suitable for time grading are more likely to be of the solid state form as are those having higher through fault capacity.

A test device is incorporated to allow the operation of the RCD to be checked. Operation of this device creates an out of balance condition within the device. Tripping of the RCD by means of the test device establishes the following:

a) The integrity of the electrical and mechanical elements of the tripping device; and b) That the device is operating at approximately the correct order of operating current.

It should be noted that the test device does not provide a means of checking the continuity of the earthing lead or the earth continuity conductor, nor does it impose any test on the earth electrode or any other part of the earthing circuit.

Although an RCD will operate on currents equal to or exceeding its operating current, it should be noted that it will only restrict the time for which a fault current flows. It cannot restrict the magnitude of the fault percent current which depends solely on the circuit conditions.

**10.3.2** *Fault Voltage Operated Earth Leakage Circuit Breakers (ELCB)*

A voltage operated earth leakage circuit-breaker comprises a contact switching system together with a voltage sensitive trip coil. On installations, this coil is connected between the metal-work to be protected and as good a connection with earth as can be obtained. Any voltage rise above earth on that metal-work exceeding the setting of the coil will cause the breaker to trip so giving indirect shock risk protection.

Tripping coils are designed so that a fault voltage operated device will operate on a 40 V rise when the earth electrode resistance is 500 W or 24 V on a 200 W electrode. Single and multi phase units, with or without overcurrent facilities, are available for load currents up to 100 A.

A test device is provided on a voltage operated unit to enable the operation of the circuit breaker to be checked, operation of the device applies a voltage to the trip coil so simulating a fault. Tripping of the circuit breaker by means of the test device shows the integrity of the electrical mechanical elements that the unit is operating with the correct order of operating voltage, and, in addition, proves the conductor from the circuit breaker to the earth electrode. It cannot prove other features of the installation.

Whilst the voltage operated (ELCB) will operate when subjected to a fault voltage of 20 V or more, it should be noted that it cannot restrict the voltage in magnitude only in duration.

**10.3.3** *Current Operated Earth Leakage Circuit-Breakers*

For industrial applications, earth leakage circuit-breakers operating on milliampere residual currents or working on fault voltage principle are of little use, since milliamperes of earth leakage current for an extensive industrial system is a normal operating situation. Tripping based on these currents will result in nuisance for the normal operation. Milliamperes of current in a system, where exposed conductive parts of equipments are effectively earthed and fault loop impedance is within reasonable values, will give rise only to a ground potential/contact potential rise of a few millivolts. This will in no way contribute to shock or fire hazard. Here objectionable fault currents will be a few or a few tenths of amperes. In such cases, residual current operated devices sensitive to these currents must be made use of for earth fault current and stable operation of the plant without nuisance tripping. This is achieved either by separate relays or in-built releases initiating trip signals to the circuit-breakers

**10.4 Selection of Earth Fault Protective Devices**

In general, residual current operated devices are preferred and may be divided into two groups according to their final current operating characteristics.

**10.4.1** *RCDs having Minimum Operating Currents Greater than 30 mA*

These devices are intended to give indirect shock risk protection to persons in contact with earthed metal.

**10.4.2** *RCDs having Minimum Operating Current of 30 mA and Below*

These devices are generally referred to as having ‘high sensitivity’ and can give direct shock risk protection to persons who may come in contact with live conductors and earth provided that the RCD operating times are better than those given in IS 8437 (Part 1) and IS 8437 (Part 2). It should be noted that such RCDs can only be used to supplement an earth conductor and not replace one.

In addition to giving protection against indirect contact or direct contact RCDs may also give fire risk protection, the degree of protection being related to the sensitivity of the device.

An RCD should be chosen having the lowest suitable operating current. The lower the operating current the greater the degree of protection given, it can also introduce possibilities of nuisance tripping and may become unnecessarily expensive. The minimum operating current will be above any standing leakage that may be unavoidable on the system. A further consideration arises if it is intended to have several devices in series. It is not always possible to introduce time grading to give discrimination whereas a limited amount of current discrimination can be obtained by grading the sensitivities along the distribution chain.

The maximum permitted operating current depends on the earth fault loop impedance. The product of the net residual operating current loop impedance should not exceed 65 V.

It is often acceptable on commercial grounds to have several final circuits protected by the same residual current devices. This, however, does result in several circuits being affected if a fault occurs on one of the circuits so protected and the financial advantages have to be weighed against the effects of loosing more than one circuit.

It should also be noted that different types of RCD in different circuits may react differently to the presence of a neutral to earth fault on the load side. Such an earth connection together with the earthing of the supply at the neutral point will constitute a shunt across the neutral winding on the RCD transformer. Consequently, a portion of the neutral load current will be shunted away from the transformer and it may result in the device tripping. On the other hand, such a shunt may reduce the sensitivity of the device and prevent its tripping even under line to earth fault conditions. In general, therefore, care should be taken to avoid a neutral to earth fault where RCDs are in use, although there are some designs being developed that will detect and operate under such conditions. On installations with several RCDs, care should be taken to ensure that neutral currents are returned via the same device that carries the corresponding phase current and no other. Failure to observe this point could result in devices tripping even in the absence of a fault on the circuit they are protecting.

When using fault voltage operated ELCBs, the metal-work to be protected should be isolated from earth so that any fault current passes through the tripping coil gives both shock and fire risk protection. However, this isolation is not always practicable and the presence of a second parallel path to earth will reduce the amount of fire risk protection offered. Because the coil is voltage sensitive, the presence of such a parallel path will not reduce the shock risk protection offered provided that this second path goes to earth well clear of the point at which the earth leakage circuit-breaker trip coil is earthed. It is required that the earthing conductor is insulated to avoid contact with other protective conductors or any exposed conductive parts or extraneous conductive parts so as to prevent the voltage sensitivity element from being shunted, also the metal-work being protected should be isolated from that associated with other circuits in order to prevent imported faults.

**NOTE:** *For hybrid Indian TN-S system it is recommended that RCD protection is provided in addition to the overcurrent protection provided for earth fault protection. This will ensure required protection in case of any break in continuity of the protective earth conductor.*

***(To be Continued)***

***Courtesy: National Electrical Code 2011***

# NORTH CHENNAI THERMAL POWER UNIT ATTAINS FULL LOAD

The present shortage of 4,000 MW is expected to come down drastically in another two months. One 600-megawatt (MW) unit of the North Chennai Thermal Power Station (NCTPS) reached full load on Saturday morning, indicating that the State is on the road to recovery from the spell of power crisis that it has undergone in the past several months.

At about 10.10 a.m. on Saturday, the unit attained full load, meaning that it was able to generate power to its capacity. An official says one more month may be required before the unit gets commissioned or, what is called in the parlance of power engineers, attains the stage of COD (Commercial Operation Declaration).

The other unit at the NCTPS which is also 600 MW is also expected to commence production in a full-fledged manner by May, the official expresses the hope. As per the original plan, the two units should have reached the stage of COD in 2011 – one unit in May and another in November. At the Mettur Thermal Power Station, a 600-MW unit is likely to reach COD in a month. Already, for the last couple of months, the State has been getting its share of 375 MW from one 500-MW unit of the Vallur Thermal Power Project, which is being implemented by the Tamil Nadu Generation and Distribution Corporation (TANGEDCO) and NTPC. Another unit is to be commissioned in a few months.

The execution of the projects was hit by a host of factors, including the delay in establishing coal handling/ash handling facilities and issues with suppliers of equipment, all contributing to the inordinate delay in the commissioning of units. If the present plans fructify, the State is expected to get, by the end of May, about 2,500 MW additionally and the present shortage of 4,000 MW will come down drastically. Around late May-early June, the advent of southwest monsoon will make available considerable quantum of wind power, say, at least 1,000 MW. Central agencies too have assured Tamil Nadu of inter-region corridor availability for 500 MW from June. This is why the authorities are confident that the middle of 2013 will be qualitatively different, on the power supply front, from what the State witnessed during the corresponding period of 2012 and thereafter.

***Courtesy: The Hindu, dt: 10.03.2013***

# SIEMENS OPENS WORLD'S LARGEST WIND TURBINE R&D TEST FACILITIES

Siemens Energy has opened two major Research & Development test facilities for wind turbine technology in Denmark. The new test center in Brande features test stands for major components of Siemens wind turbines, including generators, main bearings and complete nacelles. In Aalborg, seven blade test stands are capable to perform full scale tests of rotor blades, including the world's largest blade in operation with a length of 75 meters. In combination, the two facilities form the world's largest R&D test center for wind turbine technology.

Aerial view of Siemens research and development test center in Brande, Denmark. It features test stands for major components of Siemens wind turbines, including generators, main bearings and complete nacelles.

"Our investments in testing today will result in savings for our customers tomorrow"; says Felix Ferlemann, CEO of the Siemens Wind Power Division in Siemens Energy. "With our extensive tests of all major components of a wind turbine we can significantly reduce the risk of technical issues in the field. Our continued commitment to R&D and testing enables us to deliver wind turbines that are both the most innovative and the most reliable at the same time."

The two test centers in Denmark feature indoor testing facilities of more than 27,000 square meters. The nacelle test stands in Brande are among the most advanced in the industry. They are capable of testing Siemens' D6 direct drive platform, the company's largest current wind turbines with a six megawatt rated capacity, and are prepared to test even larger turbines.

The seven blade test stands in Aalborg and three blade tests stands in Brande together form the largest blade test facility in the world both in size and in scope. The Aalborg facilities are able not only to fully test Siemens' 75-meter long B75 blade, the largest wind turbine blade in operation, but also even larger blades. Wind turbine blades are now bigger than any other composite structure in the world. For example, the wing of an Airbus 380 is less than half as long as the B75 blade.

In its new test facilities, Siemens can perform Highly Accelerated Lifetime Tests (HALT) on all major components of its direct drive and geared wind turbine platforms. In HALT testing programs, which can last to up to six months, Siemens exposes prototypes to much higher loads than they would normally experience over the course their full life-time in the field.

"In HALT tests, we compress the biggest loads over a short time, as they affect the turbine the most", says Siemens Wind Power CEO Ferlemann. During the HALT test of blades, for example, full-scale prototypes are oscillated at larger deflections than they would ever experience on site for 2 million cycles vertically and then for another 2 million cycles horizontally.

2013 marks the 25th anniversary of Siemens Wind Power's Test and Measurement Department. In 1988, the company was the first in the wind industry to establish an in-house Test and Measurement Department capable of the full range of field measurements required by modern wind turbine development and verification. "Innovation requires validation to be employed successfully", says Ferlemann. "Siemens is the company with the greatest experience in testing and making field measurements in the wind industry". ***Hamburg, Germany, 2013-Mar-12***

# THE RISE OF ASIA

Asian EPCs also featured heavily again in the 2012 rankings, most notably Chinese companies linked to state-owned utilities and industrial companies that benefited from massive domestic demand in ground-mount projects.

Interestingly, an Indian company, Larsen & Toubro, appeared in the top 10 ranking for the first time. Larsen & Toubro is estimated to have completed nearly 200 MW of projects in 2012, nearly double the amount completed the year before. Like their Chinese counterparts, Indian EPCs remain in an excellent position to capitalize on the high growth of domestic ground-mount projects.

# ENERGY STORY

## ENERGY EFFICIENCY – THE FIFTH FUEL – PART 1

**Introduction:**

Equipments of Energy in general and their installations and Electrical Energy Installations in particular, require paramount attention with regard to Safety and Efficiency. Efficient Installations result in Safe installations and Energy Efficiency contributes in large measure to conservation of Energy. In a simple diagrams shown below it can be seen that the primary energy requirement can reduce by about 74% if in case the efficiencies can be increased in the "Chain" and in particular the end use efficiency.

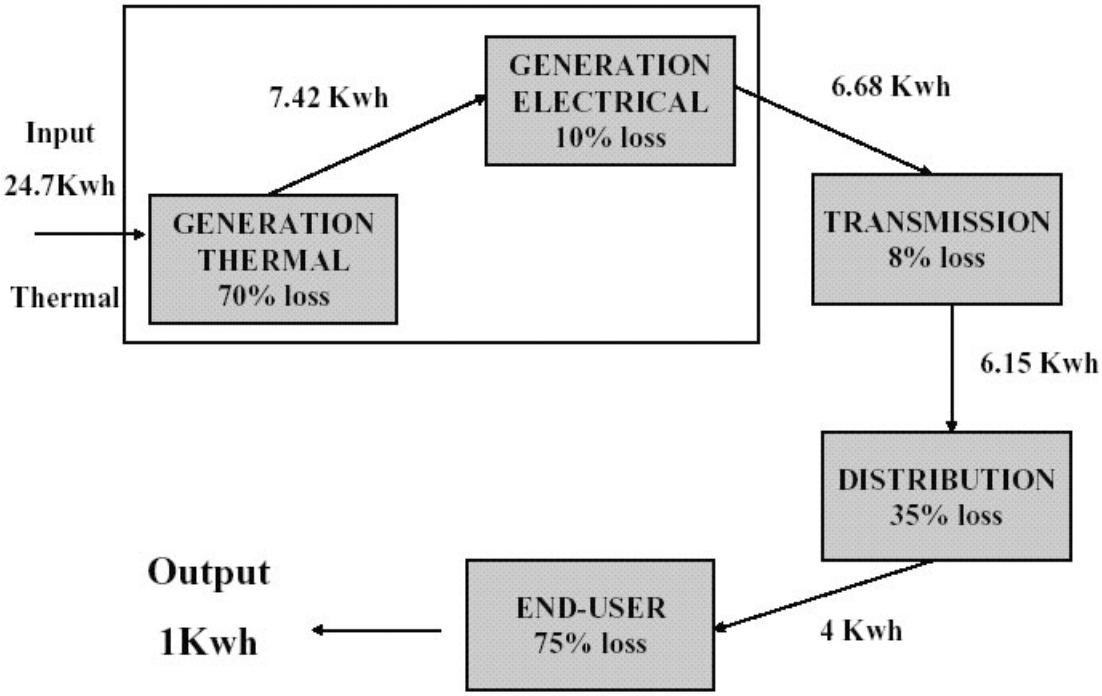



*Diagram 1 - 'Before Eff. Improvement'*

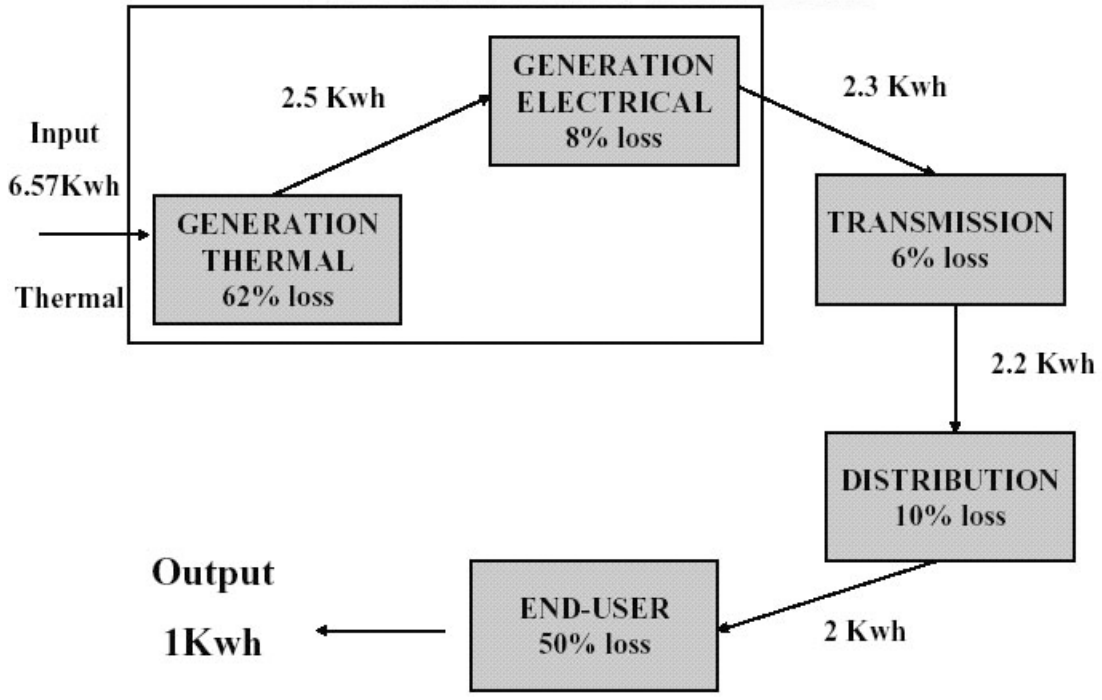



*Diagram 2 - After some measures of Eff. Improvement*

This is the reason why the Modern concept is to consider Energy Efficiency as the Fifth Fuel as it can help substantial reduction in the requirement of Primary Fuel for conversion of Energy to the form required. It is therefore felt that detailed presentations on Fifth Fuel with focus on Energy Efficiency at all stages, starting from Solution Selection to Equipments and Installations can help ensure Safety as well as Energy Conservation. The reduction in Primary Fuel requirements is a way of providing Fuel for future Energy requirements.

**The Fifth Fuel:**

For too long we have relied on the big four – coal, petroleum, nuclear and alternatives – meeting our energy demand. The fifth fuel, energy efficiency remains a largely untapped resource in today's world. Energy efficiency remains the most cost effective source of meeting our nations demand for energy. **As the 21st Century progresses, growing energy demand is going to severely strain the big four sources. Resource-depletion will put increasing pressure on the petroleum, coal, and uranium obtained from the Earth. Some geologists now say that the world is running out of petroleum, having reached so-called "Peak Oil." Peak Oil is the maximum point of global annual petroleum extraction that can possibly be obtained, followed thereafter by permanent annual production declines, until the resource is used-up. Other scientists have concluded that the world has already reached its peak of annual coal production. Still, others are concerned that the peak of uranium production will soon be attained. Similarly, demand for renewable energy is going to strain what the sun, wind, and biofuels can give us.**

**As the world's non-renewable fuel resources decline there will be intense competition for what remains to be extracted, causing energy prices to inexorably climb. However, there is a very abundant Fifth Fuel available to everyone right now, which can be found just about anywhere: energy efficiency and conservation. These will help combat rising energy costs caused by the pressures from declining non-renewable energy sources.**

Efficiency can be used in industry to recover waste heat at factories and recycle it to generate electricity. It can be used in commercial and residential buildings, where new designs promote energy conservation, and where smart-grid technology and efficient electronic devices allow more to be obtained from less electricity.

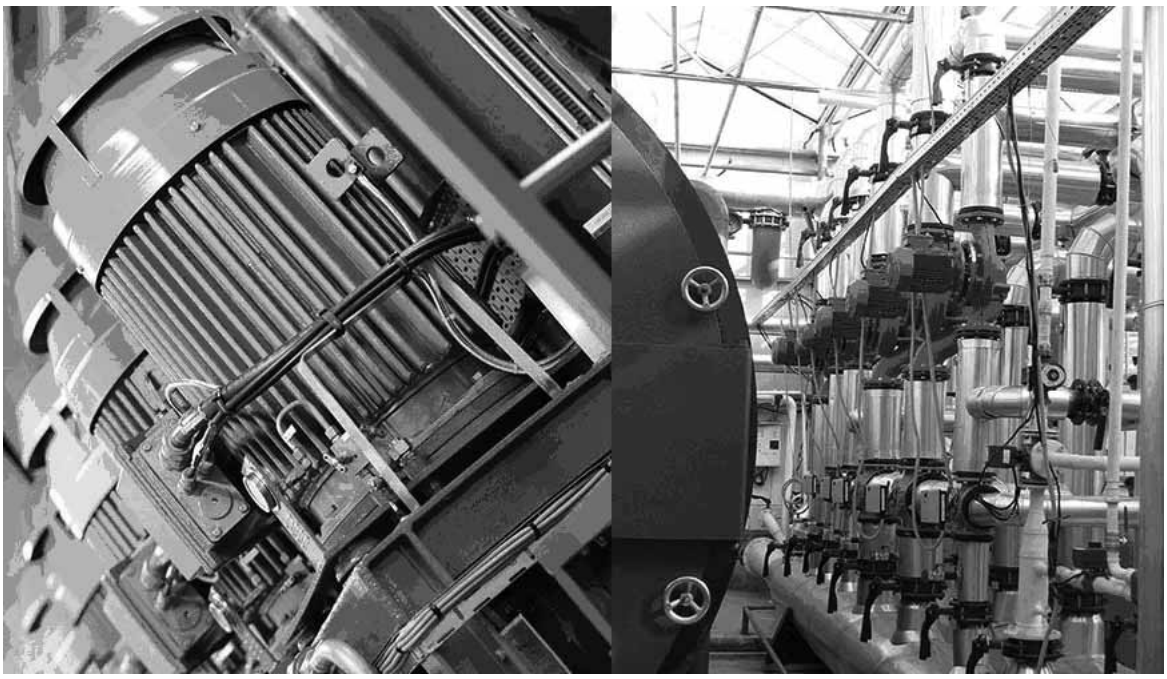
**Efficiency can be also used to revolutionize the way we view transportation. Did you know that trains fall just below motorcycles in fuel efficiency? It's a matter of tons shipped per gallon burned, and one day rail may supplant less efficient long-haul trucking as the primary means of shipping goods.**

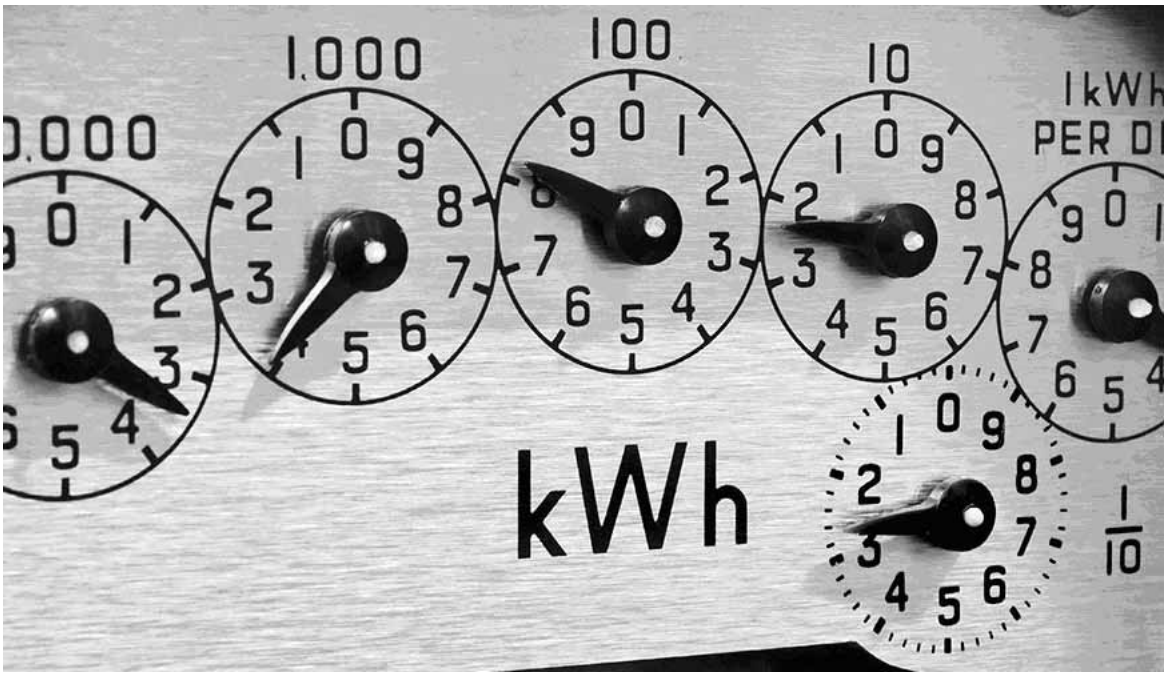
The price and availability of jet-fuel will also one day dictate the economic viability of the airlines. When the price of oil exceeds $200 per barrel, many airlines will be in jeopardy. One Fifth Fuel solution may be designing highly efficient airliners, like the new Boeing 787. Ultimately, the rejuvenation of passenger rail could prove to be the most fuel-efficient means of moving people long distances. But how do you cross oceans? Ships are even more fuel-efficient than trains (in both cases it will be the numbers of people shipped per gallon burned).

And what about those awful, fuel-wasting traffic jams that occur with our morning and afternoon commutes? The Fifth Fuel solution will be to allow more employees to use the Internet to telecommute and work from their homes.

At some future point, the price of gasoline and other liquid fuels will necessitate accounting for each gallon burned. Efficiency will direct the way we approach transporting people and goods.

Whether it is the electricity used in your home, or the fuel burned in your vehicles, making prodigious use of the Fifth Fuel will help make your energy footprint smaller. Done smartly, this can be accomplished without making undue sacrifices. It will also help you keep more money in your pocket, while contributing fewer greenhouse gas emissions to the environment; a winning solution for both you and the planet.






**Energy Efficiency:**

Using smarter technologies, more brains and less money to wring more work from less delivered energy—what energy experts call "end-use efficiency"—is the largest, cheapest, safest, cleanest, fastest, most diverse, least visible, least understood and most neglected way to provide energy services.

How big is it? Studies have been undertaken in different countries and different parts of the world about to arrive at a Gross Energy Efficiency parameter in terms of Energy used per Unit of GDP. In this respect Japan has been taken as standard and if Japan uses X quantum of Energy per Unit of GDP, US uses 1.55X, Europe 1.5X and India 3.7X. For India the figure could actually be more considering the kind of in-efficiencies, whether it be transportation or Industry or Electricity Distribution or Agriculture. The present use of Primary Energy resources by India is estimated at about 500 MTOE, comprising largely of Coal and Oil. If the 3.7X can be brought down to say 2.7X,

the reduction in primary energy requirement will come down by 130 MTOE, which is substantial considering that the total crude oil requirement of India at present is 130 Million Tons. As can be seen the total potential is huge and very rightly since 2001, the Government has initiated lot of activities and focus on Energy Efficiency.

But because these savings came not from giant plants but in zillions of tiny pieces imperceptible to the untrained eye, energy efficiency gets little respect. It's ironic, given that rising energy prices automatically make efficiency gains more valuable, and cheaper to attain. And we've barely scratched the surface. Fully exploiting wherever practical the best available efficiency techniques throughout the country's economy could save half our oil and coal use, and three-fourths of our electricity, at about an eighth of their current price. Innovative designs, technologies, policies and marketing methods are increasing that potential faster than we are using it up.

The three big efficiency areas — oil, gas and electricity—form the total energy efficiency scenario. Oil can be saved for the equivalent of $12 a barrel, mainly by tripling the efficiency of cars, trucks and planes—without sacrificing consumer-pleasing design.

Fantasy? Not really. Already, Boeing is beating Airbus with the 787 Dreamliner—a plane that's 20% more efficient than rivals but costs about the same. Leading Indian truck manufacturers nearly done boosting its trucks' efficiency by 25%, is set to make billions more by doubling their efficiency by 2015. And the hottest strategic trend in automaking—led by Tata Motors, Maruthi, Ford Motor, Nissan and China—is making lighter, safer and more fuel-efficient cars.

Another example: natural gas. Half its use can be saved at an eighth of its price, two-thirds indirectly. At times of peak demand, electricity is made largely from Naphtha/natural gas in turbines so inefficient that saving 1% of electricity, including peak hours, saves 2% of total natural gas use and cuts its price 3% to 4%. This saving is more than paid for by the value of the saved generating capacity, so the net cost of saving the gas itself is less than zero.

Almost half of electricity- 25% of which is used in buildings, 20% in agriculture and nearly all the rest in industry- can be saved for less than the price of just *running* a coal or nuclear plant. This "megawatt" potential is not just in smarter motors, lights, appliances, etc., but even more in their larger systems. For example, three-fourths of the India's electricity runs motors, and half their shaft power runs pumps and fans. Designing friction out of pipes and ducts can save 10 times as much fuel at the power plant.

The savings are arrestingly simple: Redesigning a standard pumping loop in one factory saved 35% of the pumping power-with lower construction cost and better performance. Even better design could have saved about 50% at lower cost. The secret: use fat, short, straight pipes rather than thin, long, crooked ones. Another dimension particularly in pumping is selection of less efficient solutions and equipments.

More broadly, better design can make very big savings cost *less* than small savings, turning diminishing returns into expanding returns like the three-year paybacks on retrofit, and 40% to 90% savings in new facilities with generally *lower* capital cost.

Energy efficiency can save trillions in national costs, but its side benefits are often even more valuable: 6% to 16% higher labor productivity in efficient offices, 20% to 26% faster learning in well-day-lit schools, 40% higher sales in well-day-lit shops, faster healing in efficient hospitals. When you count these kinds of side benefits, you double the cost-effective energy savings in a typical steel mill.

Yet the efficiency cornucopia is the manual model: You have to turn the crank. Like any worthy management goal, saving energy requires leadership, learning, metrics, alignment, relentless patience and meticulous attention to detail. There are scores of real obstacles to be overcome. But in any business struggling for energy and capital, energy efficiency is often the highest-return, lowest-risk investment available, limited less by technology or economics than by culture and imagination. Using energy in a way that saves money protects the climate too, not at a cost but at a profit. We can save our bottom lines, and maybe our butts, by taking economics-and efficiency-seriously. Energy efficiency, sometimes called "conservation", also known as the "fifth fuel", for decades, its significance was underestimated and its role debated, sometimes dismissively so. But today, energy efficiency has moved from contention to consensus. Environmental groups and energy companies agree that it should be at the top of the agenda of what needs to be done. Indeed, efficiency could well be called the "first fuel"; for, overall, it has had the single biggest impact of any source in the energy mix. ***(To be continued)***

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***Mobile: 98401 55209***

# GANAPATHY DIKSHITAR SUBRAMANIA IYER

GANAPATHY DIKSHITAR SUBRAMANIA IYER

Ganapathy Dikshitar Subramania Iyer (Born - January 19, 1855 – Died - April 18, 1916) was a leading Indian journalist, social reformer and freedom fighter who founded 'The Hindu' newspaper on September 20, 1878. He was proprietor, editor and Managing Director of *The Hindu* from September 20, 1878 to October 1898.

**Early life**

Subramania Iyer was born in January 1855 in Tiruvadi in the then Tanjore district. He was the fourth of seven sons of Ganapathi Dikshitar, a pleader in the Munsiff's Court of Tiruvadi. Subramania Iyer had his early schooling in Tiruvadi and matriculated from St. Peter's College, Tanjore in 1871. In 1873, he passed his arts examinations in merit and attended a teacher's training course at Madras from 1874 to 1875. Subramania Iyer taught at the Church of Scotland Mission School at Madras from 1875 to 1877 and at Pachaiyappa's High School in 1877. In 1877, he cleared his B.A. examinations as a private candidate and was appointed headmaster of the Anglo-Vernacular school, Triplicane in 1879.

**Founding of *The Hindu***

In order to voice their support for Sir T. Muthuswamy Iyer to be appointed to the bench of the Madras High Court, Subramania Iyer founded *The Hindu* along with M. Veeraraghavachariar, T. T. Rangachariar, P. V. Rangachariar, D. Kesava Rao Pant and N. Subba Rao Pantulu, on September 20, 1878. Initially, *The Hindu* was started as a weekly, but later, it was converted into a tri-weekly and then a daily.

**As Editor of *The Hindu* 1878-1898**

Soon, 'The Triplicane Six' broke up when the other students were called to the Bar and editor G. Subramania Iyer and Veeraraghavachariar were the only ones who remained with the newspaper.

*The Hindu* made its presence felt for the first time since its inception. Subramania Iyer was known for his fiery articles with plenty of sting. Subramania Iyer actively supported the cause of India's freedom and used his newspaper to protest British Imperialism. In 1897, when Bal Gangadhar Tilak was arrested by British authorities, The Hindu vehemently condemned the arrest. On December 3, 1883, the paper moved to 100 Mount Road and established its own press called 'The National Press'.

*The Hindu* welcomed the birth of the Indian National Congress in a December 12, 1885 editorial:

The objective of the Congress... is to bring to a focus to our scattered political energy and to give solidity and organisation to native opinion... [on such] topics in which... all parts of the country are interested...

In May 1889, at Subramania Iyer's invitation, the Anglo-Indian barrister Eardley Norton began to write a regular column *Olla Podrida* for the newspaper. The two later became intimate friends. Subramania Iyer was dead against conservatism and blind superstitions and try to use his newspaper as a vehicle for reform. However, Subramania Iyer's articles landed the newspaper in many defamation suites and Subramania Iyer was reduced to dire financial straits while trying to fight them. In 1898, Subramania Iyer quit as Chief-editor and was succeeded by Veeraraghavachariar. In 1905, the newspaper was bought by prosperous barrister Kasturi Ranga Iyengar.

**Politics**

Subramania Iyer actively participated in the Indian Independence movement. He was one of the 72 delegates present at the Bombay Conference at Tejpal Sanskrit College on December 12, 1885, which resulted in the founding of the Indian National Congress. In the second session of the Indian National Congress, Subramania Iyer

***Better to eat bread in peace, than cake amid turmoil - SLOVAKIA QUOTES***

was selected member of the Committee to report on the representation of Indians in the public services. In the Madras session of 1887, Subramania Iyer was appointed member of the Committee which framed the constitution of the Indian National Congress. During the 1894 Madras session, he was selected as a part of the delegation which presented the case of Indian nationalists before the Secretary of State for India in London. In 1906, he was appointed member of the Standing Committee to promote the objectives of the Indian National Congress.

When he conducted his widowed daughter's remarriage in 1889, Subramania Iyer was socially boycotted by his own relatives apart from the conservative Mylapore society. Subramania Iyer lost the support of conservative elements who formed a powerful lobby in the Indian National Congress. As a result, he was never elected President of the Indian National congress nor was he ever elected to the Madras Legislative Council.

**Social Reforms**

Subramania Iyer campaigned vehemently for reforms in Hindu society. He supported widow remarriage and desired to abolish untouchability and child marriages. Subramania Iyer arranged for the remarriage of his eldest daughter, Sivapriyammal, who had been widowed at the age of 13, to a boy in Bombay during the 1889 Congress session.

Subramania Iyer wrote in *The Hindu* that:

the degraded condition" of Dalits was "notorious and the peculiarities of The Hindu social system are such that from this system no hope whatever of their amelioration can be entertained." It seemed hopeless, he commented, for Dalits "to expect redemption from anything that *The Hindu* might do" and "no amount of admiration for our religion will bring social salvation to these poor people.

He realised the importance of speaking in the local language and addressed the masses in Tamil in his public lectures. He encouraged Subramaniya Bharathi in his early years and kept him in his house.

**Later Life and Death**

In 1898, Subramania Iyer relinquished his claims over 'The Hindu' and concentrated his energies on *Swadesamitran*, the Tamil language newspaper which he had started in 1882. When he left *The Hindu* in 1898, he made the *Swadesamitran*, a tri-weekly and, in 1899, a daily, the first in Tamil.

Subramania Aiyar's pen "dipped in a paste of the extra-pungent thin green chillies" - as Subramania Bharati described his Editor's writing style - got him in trouble with the British in 1908. He suffered jail terms and persecutions which gradually broke his health. In his later years, Subramania Iyer was diagnosed with leprosy and succumbed to the disease on April 18, 1916.

# WHAT IS THE DIFFERENCE?

**Between DUTY and RESPONSIBILITY**

**DUTY** is a moral commitment to something or someone, whereas responsibility is a condition of being responsible. According to Cicero, duties come from four sources. Duty is a result of human beings, one's particular place, one's character and one's own moral expectations. His philosophy of duty has been depicted in his famous work on duty. As duty refers to moral commitment, it denotes an active feeling for doing something. Once a person engages himself with some duty or if he has been entrusted with a duty, then that person fully commits himself to it. In the case of duty, the person will be involved in activity without any self-interest. As a citizen of a country, a person has many duties to perform. It is his duty to adhere to the constitution.

**RESPONSIBILITY** can be termed as an ability to act at one's own will, without any supervision. It is the obligation to successfully complete an assigned task. In responsibility, a person takes upon the duty to compete the task and to make the task a success. In responsibility, a person is solely responsible for the entire task and its outcome. In case of responsibility, he takes the ownership of the entire task. Responsibility can also be explained as a set of instructions in life that one has to follow. It is the responsibility of the parents to give good education to their children.

**Between JUNGLE and FOREST**

**JUNGLE:** wilderness full of plant and animal life

**FOREST:** area with a large number of trees

# EAR CARE TIPS

**TEN TIPS**

**For Safer Listening and Making the most of Music**

**Know the facts**

80% of deafness is caused by damage to the tiny hair cells in the inner ear. Fish, amphibians and birds can regenerate these cells but in humans this damage is permanent. Aim for prevention - There is NO cure!

**Remember: maximum space, moderate time, minimal volume**

The longer and louder you listen to music the more likely it is to damage your hearing. Listening to music in a confined space such as a car also increases the risk. Alter listening habits to suit the surroundings and don't listen too long, too loud.

**60 a day goes a long way**

Adopt the 60:60 rule: Only use your MP3 player at 60% of its maximum volume for no more than 60 minutes a day. Moderate the volume on home hi-fis: if you need to raise your voice to be heard above the music, turn it down.

**Invest in the best**

Opt for noise cancelling headphones, or go retro with older muff-type headphones. Ear-bud style headphones are less effective at drowning out background noise so it's tempting to crank up the volume, especially on transport.

**Plug in**

Worn correctly, earplugs can reduce average sound levels by between 15 and 35 decibels. They are widely available at many live music venues and are suitable for those on and off the stage. Some instruments produce damagingly loud sound; when making music, be aware of the sound level of your instrument, and those around you.

**Enjoy an aural detox**

Give your ears time to recover after exposure to excessive noise. Spending around two hours in 100 decibel sound e.g. in a club, needs at least 16 hours of rest for the ears to recover. Reducing this recovery time increases the risk of permanent deafness.

**Treat 'em kind**

Don't use cotton buds to clean your ears. Instead, put a drop of olive oil in each ear once a week to help wax exit naturally.

**Take heed of change**

Do you have trouble hearing conversation against background noise, understanding higher pitched sounds or feel that people often mumble? Be aware of the first signs of hearing loss.

**Don't wait until it's too late**

Act now and get medical help if you think your hearing is not as good as it used to be. You benefit more from being fitted with a hearing aid while a hearing loss is relatively mild.

**EARPLUGS**

**General Guidelines about Earplugs**

**One-size re-usable earplugs**

This type of earplug can help protect the ear from loud sound at clubs and concerts. It offers reasonably even sound reduction across high and low frequencies which is achieved by having a triple-flanged design. Once inserted, their appearance is fairly discreet. With good care they can be used again and again.

**Custom-made earplugs**

These are suitable for musicians and people such as DJs who are exposed regularly to high volumes of sound. The earplugs are made to fit the individual ear and so it is necessary first to visit an audiologist to have an ear-mould taken. There are different types of custom-fit earplugs and so it is important to know what type and degree of protection is required in advance of ordering.

**Earplug tips**

- Don't use disposable earplugs at concerts or in clubs unless they are the only option. Although they help to dampen sound, they are more effective at removing high frequency sounds than low, and do not faithfully preserve the timbre of the music. Their design is generally smooth-sided, made of foam or wax, and they are cheaper than re-usable versions.
- Before purchasing earplugs, be clear what degree of protection they offer and for what purpose they are suitable.
- Do not trust that your earplugs are working properly if there is any sign of damage.
- To avoid possible risk of infection, wash re-usable earplugs after use with soap and water. Rinse carefully and ensure they are dry before putting away.
- To insert earplugs correctly, about a third of the way down your ear, gently pull it upwards and outwards. This helps to straighten the ear canal as the earplug goes in.
- Enough of the earplug should protrude out of the ear so that you can gently twist and remove it.
- Always remember to take your earplugs with you when you go to a club, concert, or even a noisy pub.
- Do not assume that by wearing earplugs you are fully protected against hearing damage. Continue to judge whether you are still listening too loud for too long.

**USING MP3 PLAYERS SAFELY**

*Research by Deafness Research UK indicates that too many people are putting their hearing at risk by listening to their MP3 player too loudly and for too long.*

There are simple ways to reduce your risk. Our top tips include:

- Always use the noise limiter on your MP3 player
- Parents should look for a locking feature on the player and use it to set the maximum volume using a special code
- Check that your player is not one with a maximum volume that exceeds statutory and Health & Safety limits
- Adopt the 60:60 rule - only use your MP3 player at 60% of its maximum volume for 60 minutes a day. In other words, the higher the volume, the shorter time you should listen.
- Never have your MP3 player so loud that you can't hear the noise around you
- Never have it so loud that those around you can hear your music! If they can, it's loud enough to damage your ears.
- Ear bud headphones are less efficient at drowning out background noise so it's tempting to turn up the volume. Use sound isolating earphones, muff-type over-the-ear headphones or noise cancelling headphones instead.

Current European Union legislation on the power output of 'portable audio equipment' with headphone use means the maximum volume personal music players can reach is currently 100 dBA (decibels) – equivalent to a pneumatic drill heard from four metres away.

***Which headphones should I use?***

There are four types of headphones, and all need to be used with care to protect your hearing.

**EAR BUD HEADPHONES**

These are in common use because they are relatively cheap and are often included in the purchase price of a personal music player. They are positioned at the entrance to the ear canal but, because the fit is quite loose, sound tends to leak to the outside world. Conversely, sounds from the outside can often be heard relatively easily.

To hear the music clearly it can be tempting to turn up the volume when using ear bud headphones. However, there is a risk that volumes may reach dangerously loud levels which can potentially damage hearing.

**Sound isolating earphones**

Sound isolating earphones also fit into the entrance of the ear canal, but are able to block outside noise and more effectively channel sounds from the player into the ear. This is achieved using a rubberised sleeve around the earphone tip which, once placed in the ear, acts as a seal. It is known as a 'passive' method because no electronic manipulation of sound is involved. Various models are available and they look somewhat like ear bud headphones being similarly small and lightweight. It is important not to turn the volume up too loud as the sound source is very close to the eardrum. With sound isolating earphones, outside sounds are blocked out and so their use in certain situations is potentially dangerous.

**Noise cancelling headphones**

Noise cancelling headphones have cushioned muffs or cups that rest over the ears and have the appearance of traditional headphones. Using clever electronics, they are able to reverse the ambient noise from outside and cancel it out. They work best where the background noise is constant and low frequency, as on a train or plane, and the degree to which they reduce noise pollution depends on the model purchased. Because of the 'active' electronics, noise cancelling headphones require batteries to power them. The audio signal from the music player also undergoes some electronic processing and this can slightly distort the sound being listened to.

However, music can be enjoyed at lower volumes and so noise cancelling headphones are potentially safer for the hearing system. As with other headphone types, being mindful of personal safety is important when reducing outside sound.

**Open- and closed-back headphones**

Traditional headphone styles vary in that they can be open or closed at the back and the ear pad can either rest on or cup the ears. These variations create different listening conditions.

To block out background noise effectively, closed back headphones work best where the ear pad completely cups the ears. The ear cup fit is usually quite tight to stop unwanted sound getting in and to prevent leakage of the audio sound to the outside. Under these conditions, music can be listened to at lower volumes. Where the ear pad is smaller and lightly rests on the ear, more sound can leak in and out and it can be tempting to turn the volume up higher.

The real connoisseur may prefer open back headphones because they offer the most natural sound reproduction. However, they are best suited to quiet listening conditions to avoid the problem of sound leaking out.

**EAR CARE WHEN FLYING**

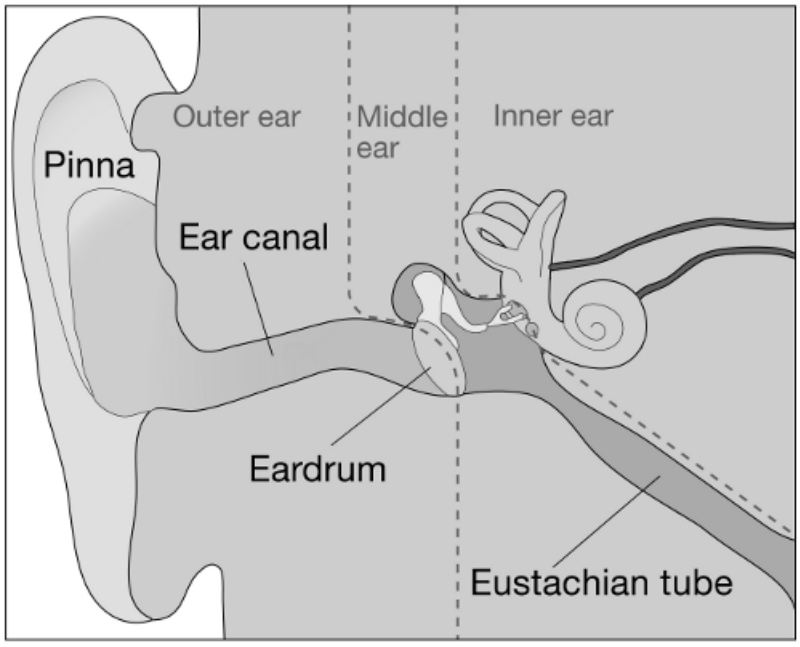
Flying can be an uncomfortable experience. On this page we explain why this is the case, and share five of our top tips on how to stay comfortable when flying. There are simple steps you can take to make your ears feel better. We also answer your questions on flying and your ears.

**Why do my ears hurt when flying?**

Most ear pain when flying results from **changes in cabin pressure**. These are most noticeable during takeoff and landing.

At these times, air in the middle ear is at a lower pressure than the air in the cabin and **the middle ear needs to be topped up to restore equal pressure**. Problems can include throbbing pain in the middle ear, a dullness of hearing, or a feeling of 'fullness' in the ear canal.

**Air reaches the middle ear through the Eustachian tube**. This is normally closed but opens when we swallow, yawn or chew. For some people the Eustachian tube doesn't open as easily as for others so the pressure may not be equalised so quickly. The tube may also be blocked because of a cold or throat infection.




**FIVE TOP TIPS**

**1. Swallowing, chewing or sucking on a sweet**

When you swallow, air can pass more easily through the Eustachian tube. You can help this by chewing gum or sucking boiled sweets.

**2. Yawning**

This is a very good way of opening the Eustachian tube, but doing this repeatedly can be difficult. Alternating between yawning and swallowing may be easier.

**3. Stay hydrated**

Make sure you have plenty to drink so you do not dehydrate. If you are dehydrated, the mucus in the nose and Eustachian tube gets sticky and this increases the risk of blockage. Avoid drinking alcohol as it increases the risks of dehydration.

**4. Stay awake**

Make sure you are awake before the plane starts to ascend or descend as the Eustachian tube does not open well when you are sleeping.

**5. Valsalva manoeuvre**

This manoeuvre forces air along the Eustachian tube, equalising the pressure.

To do this, you need to pinch your nose and close your mouth and try to gently breathe out through the nose. Do not force the air out. You will hear your ears 'pop' when the pressure is equalised. This action does not help young children as their Eustachian tubes are underdeveloped.

**Why is my hearing dulled after landing?**

Ears can continue to feel blocked even after landing if the pressure in the middle ear has failed to equalise. It should be possible to avoid this happening by using two puffs of an over-the-counter nasal spray in each nostril one hour before landing. If symptoms persist, please visit a doctor.

**Can I fly with a cold?**

Flying with a heavy cold or sinus infection does increase the risk of middle ear problems and, if convenient, you might consider postponing your flight. If you are flying when congested with a cold, there are over-the-counter nasal sprays available that can help to clear the nose and these can be used an hour before descent. They should be used sparingly though, as repeated use over many days can actually cause the nose to become more congested.

**Can my child fly with glue ear?**

If your child suffers from glue ear (otitis media with effusion), you should check with your GP to see if there is any reason why they should not fly. If the middle ears are filled with fluid at the time of flying, the pressure changes should hardly be noticed. If the middle ears are clear, or partly clear, your child should follow the guidelines especially on descent.

**Can my child fly with a grommet (ventilation tube)?**

If your child has a grommet inserted, and as long as it has not become blocked, they should not experience any ear discomfort. This is because the grommet acts in the same way as a perforation.

**Can I help my baby feel more comfortable when flying?**

Babies and young children can be particularly affected by ear discomfort during descent. Keeping a drink handy is a good way to get them to swallow so the Eustachian tube opens.

**Can I fly with perforated ear drums?**

When you have a perforated eardrum, the air pressure in your middle ear should equalise more easily with the pressure in the surrounding air. This is because the air is able to pass through the hole. Therefore, you probably won't get as much discomfort.

***Most great people have attained their greatest success just one step beyond their greatest failure* – NAPOLEAN HILL**

**Can I fly with my hearing aid?**

If you use a hearing aid it should work normally on the aeroplane. However, the increased background noise may cause discomfort depending on the type of aid you have. You may feel more relaxed if you switch the aid off and take it out completely. Before boarding, it is advisable to inform the flight crew that you are a hearing aid wearer.

**Can my tinnitus get worse when flying?**

Many people find that their tinnitus is masked by the engine noise, so it isn't audible. However, your tinnitus may become louder if your Eustachian tube is blocked. This will return to normal as your ears clear. If you are worried that the noise of the engine will damage your ears or make your tinnitus louder, it can help to select a seat in front of the wing.

**How soon can I fly after my ear surgery?**

If you have had any kind of ear surgery it is important that you ask your ENT consultant if it is safe for you to fly. Some specialists advise that you avoid flying for up to six weeks after major ear surgery.

**Are ear plugs helpful?**

Specialised pressure-regulating medical grade silicone ear plugs, which slowly allow ears to become used to the difference in pressure, may help. These are available to buy at pharmacies and supermarkets in adult and child sizes. If you find your hearing has changed after flying and it has not returned to normal after two weeks, consult your GP.

***Courtesy: www.deafnessresearch.org***

# TOP MEDICAL DISCOVERIES OF 2011 FOR PERFECT HEALTH

1. **Olive oil is associated with lower stroke risk -** 7600 subjects were followed up for 5 years. All were more than 55 years of age. There was a 41% reduction in stroke in those people who consumed olive oil. *Ref. Neurology. June 16 2007, Physicians first watch.*
2. **Viewing TV before bed time with violent contents affects children's sleep -** Those children who watched TV, Video, Computer games after 7 PM reported more sleep disturbances. *Ref. Pediatric journal Watch – 28th June, 2011.*
3. **Vegetarian high fiber diet lead to lower risk for diverticular disease (large intestine disease) -** According to BMJ, 47000 subjects were followed up for 12 years. One third were vegetarian. 30% lower risk of diverticular disease was seen in vegetarian. *Ref. BMJ. July, 2011-343*
4. **Smoking is associated with bladder cancer -** Current smokers had 4 fold and ex smokers had 2 fold increased incidence of bladder cancer. This is true for women and has been shown in a 10 year study of 4, 50,000 women between the age of 50 and 71. *Ref. JAMA 2011 306(7).*
5. **Excessive red meat connected with kidney cancer -** It is not clear whether the red meat itself or the microwave cooking is responsible for kidney cancer in subjects who consume excessive red meat. A 19% higher incidence was seen in these subjects. *Ref. American Journal of Clinical Nutrition. 2011.*
6. **Spirituality reduces depression. Now proved -** In a 10 year study, it has shown that spirituality reduces depression both in parents and their children. *Ref. Journal watch Psychiatry. Sep 19, 2011.*
7. **Vit-E associated with increased prostate cancer -** Men who received Vit-E 400 IU had a 17% increased incidence of prostate cancer. *Ref. JAMA. 2011-306.*
8. **Just a few drinks a week increases breast cancer risks -** A 15% increase in the incidence of breast cancer was seen in women who consumed 3 to 6 glasses of wine per week. *Ref. JAMA 2011-306(17).*
9. **Yoga and stretch exercises both have equal benefit in low back ache -** The improvement in symptoms and mobility was seen for several months in both forms of treatment. *Ref. Archives of Internal Medicine. Vol.171. Dec – 2011.*
10. **Adverse Drug Events (Side effects of drugs) causes frequent hospitalization in elders -** 1.5% of all emergency admissions of elders in hospital is related to drugs like anti diabetic drugs, anti clotting drugs etc. *Ref. Journal watch hospital medicine. Nov 23, 2011.*

# POWER YOUR MIND - *SWAMI SRIKANTANANDA*

**As your thoughts**
**So your mind**

**Sow good thoughts**
**Power your mind.**

**The depth of an ocean**
**Is measured by fathoms**

**The depth of the mind**
**Is measured by thoughts.**

# CONCEPT OF DHARMA

## OUR CULTURE – FOUNDATION OF OUR NATIONALISM

Bharatiya Cultural values expounded in the preceeding pages constituted the foundation of our Nation. This aspect is very forcefully brought forth by a constitution bench of the Supreme Court of Bharat in the case of Pradeep Jain Vs. Union of India – [A.I.R. 1984 S.C.1420] as follows:

*"It is an interesting fact of history that India was forged into a Nation neither on account of a common language nor on account of the continued existence of a single political regime over its territories but on account of a common culture evolved over the centuries. It is cultural unity – something more fundamental and enduring than any other bond which may unite the people of a country together – which has welded this Country into a Nation."*

Thus, though in this land we have many religions, many castes, many languages, many food habits, all of us are welded together into ONE NATION by a common culture evolved over hundreds of centuries. OURS IS CULTURAL NATIONALISM which is IMMORTAL, INVALUABLE AND INVINCIBLE.

To preserve this rich heritage of our culture is one of the fundamental duties of a citizen under Article 51-A of our Constitution.

WE ARE ONE NATION.
WE HAVE ONE BHARATMATA TO WORSHIP
WE HAVE ONE FLAG TO HOIST AND PROTECT
ONE NATIONAL ANTHEM
AND ONE NATIONAL SONG TO SING.
WE HAVE COMMON CULTURE TO FOLLOW,
TO PROTECT AND TO PRESERVE.

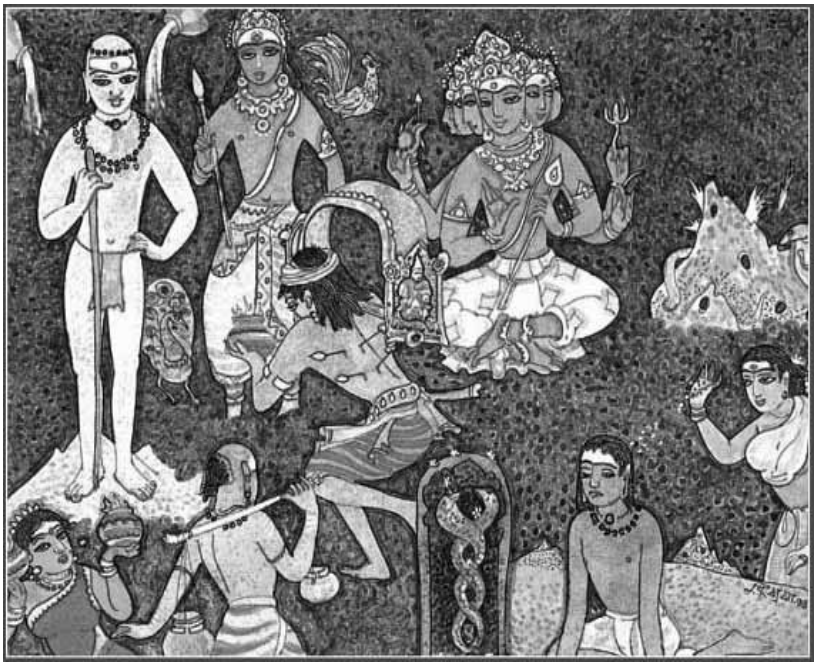
These thoughts should be uppermost in the mind of every individual citizen. It will solve all our problems.

BHARATIYA SAMSKRITI AMAR RAHE.

**BHARAT MATA KI JAI**

# HOME FESTIVALS

**Vaikasi (May/june)**



This month is devoted to the worship of Lord Murugan, who is honored on Vaikasi Vishakham (above). He is shown at far left as Palani, the renunciate, dressed in loincloth, wearing a necklace of rudraksha beads, sacred ash covering His body and holding the sannyasin's staff. To the right He is shown as a prince, with His peacock, and farther to the right as the six-headed Arumugam. Devotees approach Him doing penance by piercing their bodies with small spears and carrying various offerings, including pots of milk and a *kavadi,* a kind of portable arched shrine. At lower right is depicted Naga Chathurthi, celebrating an ancient story in which a young boy bit by a cobra was saved from death when his sister's prayers caused the sands of the cobra's anthill to counteract the poison.

*(To be continued)*

# HUMOUR

1) I went to a medical shop to have a headache tablet.
*Shopkeeper:* "Take ANACIN".
I asked for some thing else.
*Shopkeeper:* "Take CROCIN".
I wanted some other tablet.
*Shopkeeper:* "Take SARIDON".
I said, "DONE.. Give me "
*Shopkeeper:* "Why you said NO, to the first two tablets? They are equally good!"
I replaid, "Why should I pay and purchase "SIN?".

2) There is one thing where in which, from One-Point, one can Raise and go up Steeply and also go down Deeply. What is that? ***GRAPH PAPER***

3) There is one word with 5 letters, which meaning does not change even 4 letters are removed. Even the pronounciation does not change. What is that? ***QUEUE***

4) There is one word with 5 letters, which meaning does not change, when the First letter is removed. The meaning does not change much even the First and the Second letters are removed. What is that? ***ALONE***

5) There is one thing, where in which the Persons involved in it, will FALL, but there will be no Injury! What is that? ***PHOTOGRAPHY***

***Courtesy: M. Shriramaprasad***

## *Joke told by Manohar Parrikar -CM of Goa at Pan IIT Meet in Pune.....*

"Two lions escape from a zoo. One of the lions had been captured from the jungle, so he runs back to the jungle. The other was born in the zoo itself - so is basically a city-slicker. He vanishes into the city.

Three days later the jungle-lion is recaptured - and returned to the zoo. A month passes, then two, three..... but city-lion is not traceable! Finally, after six months the city-lion is also recaptured and brought back to the zoo. Jungle-lion is amazed to see his friend.

**Jungle-lion:** For God's sake, how were you able to evade these guys for 6 whole months?!

**City-lion:** Kuchh nahi yaar! I just went to a government department, and hide behind a huge pile of dusty files that they have there.

**Jungle-lion:** But what did you eat there?

**City-lion:** Arrey, there was an unlimited supply of government servants. Whenever I ate one, they hired five more. Nobody did any work anyway, so nobody missed the ones I ate.

**Jungle-lion:** Wow! But, then how did you get caught?

**City-lion:** Galti kar gaya yaar... On the last day I ate the chai-walla. Now, everyone missed their chai-walla & their chai! They launched a massive hunt. And I got caught!"

**DIDN'T FLY**

A helicopter carrying passengers suddenly looses engine power and the aircraft begins to decent. The pilot safely performs an emergency landing in water, and tells the passengers to remain seated and to keep the doors closed, stating that in emergency situations, the aircraft is designed to stay afloat for 30 minutes, giving rescuers time to get to them. Just then a man gets out if his seat and runs over to open the door. The pilots screams at him, "Didn't you hear what I said, the aircraft is designed to stay afloat as long as the doors remain closed?!".

"Of course I heard you", the man replied, "but it's also designed to fly, and look how good that one worked out!!"

**EMERGENCY**

Holidays around the precinct are always lively, especially in the 'Emergency Call' areas. One particular night, a drunk calls in, and the following communication began:

"Sir, what is your emergency?"

"Osifer, (he means officer) I've been robbed!"

"Can you be more specific sir?"

"Osifer, someone stole my steering wheel, my gas pedal and my brake pedal."

"Could you please repeat that sir?" By now there's a crowd gathering around the dispatcher's chair.

"Yes, shur. Someone stole my gas pedal, my brake pedal and my steering wheel."

"Sir, what is your location?"

"I'm in my car."

"Sir, could you explain to me exactly where your car is located?"

"Yes, shur. I'm on Baker Street. Uh, 488 Baker!"

"Alright, sir, we'll send officers out to investigate it. Try to stay calm."

The phone call ends at this point but not five minutes later another call comes in.

"Sir, what is your emergency?"

"Osifer?"

"Yes, what is your emergency please?"

"Osifer, this is me again. I just found my steering wheel, my gas pedal and my brake pedal."

"Okay, sir. Are you still needing assistance?"

"No, shur, I was just in the back seat."

# SOME OF THE GOLDEN QUOTES OF THIRUVALLUVAR

| | | |
|---|---|---|
| 1 | mfu Kjy vOjnjyyhk; Mj‰ gftd KjwNw cyF | 'A' leads alphabets; the Ancient Lord<br>Leads and lords the entire world |
| 11 | thde‰dW cyfk toqf‰ tUjyhy jhdmk‰ojk vdWz uw ghwW | By the continuance of rain, the world is preserved in existence; it is therefore worthy to be called ambrosia |
| 26 | nrawfh‰a nrathH ngh‰aH; r‰w‰aH nrawfh‰a nrafyh jhH | The great person will do things rare to do;<br>The small cannot do rare things |
| 100 | ,d‰a csthf ,ddhj $wy fd‰a‰Uggf fhaftHe jwW. | To say unpleasant things, when we have nice ones,<br>is like eating unripe fruit, ignoring sweet ripe fruits |
| 102 | fhyjj‰ dhynraj edw‰ r‰w‰Jvd‰Dk Qhyjj‰d khzg ngh‰J. | A help rendered in hour of need<br>Though small, is greater than the world |
| 202 | jait ja gajjyhy jait ja‰Dk mQrggLk | Since the evil begets evil,<br>Evil is more dreaded than fire |
| 391 | fwf frlwf fwgit; fwwg‰d e‰wf mjwFj jf. | Learn thoroughly whatever is to be learnt;<br>Then, let the conduct be worthy of his learning |
| 392 | vzvdg Vid vOjJvdg ,tt‰uzLk fzvdg thOk ca‰HfF. | Art of using alphabets and science of using numerals<br>Are the two eyes of living human beings |
| 396 | njhllidjJ CWk kzwNfz‰ khejHfF fwwidjJ CWk mw‰T. | The deeper you dig, greater the spring;<br>The more you learn, greater the knowledge |
| 400 | NfL,y t‰Ornrytk fyt‰ xUtwF khLmyy kwiw ait. | Learning is the true imperishable wealth;<br>Other things are not wealth |
| 411 | nrytjJs nrytk nrt‰rnrytk mrnrytk nrytjJs vyyhk jiy. | Listening is the best of all wealths;<br><br>It is considered to be the foremost. |
| 475 | gy‰nga rhfhLk mrR,Wk mggzlk rhy k‰FjJg nga‰d. | The axle of a cart loaded only with light peacock feathers can also break, if it is greatly overloaded |
| 537 | mh‰avdW Mfhj ,yiynghr rhthf fUt‰ahy Nghww‰r nra‰d | There is nothing too difficult to be accomplished<br>When done carefully with unflinching endeavour |
| 595 | ntssjJ mida kyHellk; khejHjk cssjJ midaJ caHT | The lotus flower rises to the level of water<br>Greatness of men rise with mental strength |
| 596 | cs StJ vyyhk caHTcssy; kwWmJ jss‰Dk jsshik eHjJ. | Let the thoughts be always great and progressive.<br>It will not be a loss, even if the success eludes |
| 656 | <dwhs gr‰fhzghd Ma‰Dk nraawf rhdNwhH go‰fFk t‰id | Even if your mother is seen starving<br>Avoid the actions condemned by wise men |
| 655 | vwWvdW ,uqFt nraawf nrathNdy kwmvdd nraahik edW. | Avoid an act which you may repent later;<br>If done by mistake, better not to repeat it |
| 666 | vz z‰a vz z‰ahqF vaJg vz z‰ahH j‰z z‰aH Mfg ngw‰d. | Whatever is thought to be done will be achieved as planned, if the planners possess firmness in execution |
| 786 | Kfkef elgJ elgdW; neQrjJ mfkef elgJ elG | Friendship is not just a smile on the face;<br>It is what is felt deep within a smiling heart |

| | | |
|---|---|---|
| 787 | mo¡t¡d mi teff¡ MWcajJ mo¡t¡df z myyy coggjhk elG. | True friends guard you from evil, make you walk in right path and share your sorrow in difficult times |
| 941 | k¡f¡Dk Fiwa¡Dk NehanraAk E}NyhH ts¡Kjyh vz z¡a %dW. | Excessive or deficient food or activity causes Disorders in mobility, breathing and digestion. |
| 1031 | fodWkVHg g¡ddJ cyfk; mjdhy coeJk coNt jiy | Though the world goes round with many activities, it is dependent on agriculture. Hence, though laborious, farming is the foremost activity. |
| 1032 | cOthH cyfjjhHfF M z¡m/J MwwhJ vOthiu vyyhk nghWjJ. | Agriculturists are the linchpin of the mankind since they support all others who cannot till the soil |
| 394 | ctggj jiyf$b cssg g¡h¡jy midjNj GytH njho¡y | The learned teacher makes you enjoy learning; On leaving, makes you to keep thinking of his teaching |
| 467 | vz z¡j Jz¡f fUkk Jz¡ejg¡d vz Ztk vdgJ ,OfF. | Think and then undertake the work; To think after commencement will bring disgrace. |
| 616 | Kawr¡ j¡Ut¡id MfFk Kaww¡dik ,dik GFjj¡ t¡Lk. | Determined efforts result in prosperity; Idleness will bring nothing. |

# THE CHAIN OF LOVE

He was on his TVS 50 moped. He was driving home. Long days had become the norm ever since recession. It was late into the night and not many people had a reason to be on the road. There was an old lady stranded on the side of the road. Even in dim light he could see that she needed help. So he pulled up in front of her Honda Civic and got down. She looked worried. He could see that she was frightened, standing alone on the road, wanting help. He said, "I am here to help you ma'am. By the way, my name is Jai."

Well, all she had was a flat tyre, but for an old lady that was bad enough. Jai crawled under the car, looking for a place to put the jack, skinning his knuckles a time or two. Soon he was able to change the tyre. But he had to get dirty and his hands hurt. As he was tightening up the lug nuts, she began to talk to him. She told him she could not thank him enough for coming to her aid. Jai just smiled as he closed her trunk. Typical of most who flaunt with wealth, she asked him how much she owed him. Any amount would have been all right with her. She had already imagined all the awful things that could have happened had he not stopped. Jai never thought twice as this was not a job for him. This was helping someone in need, and he knew in the heart of his hearts that there were plenty who had given him a hand in the past. He had lived his whole life this way by helping others, and it never occurred to him to act any other way. **He told her that if she really wanted to pay him back, the next time she saw someone who needed help, she could give that person the assistance they needed, and Jai added, "And think of me."** He waited until she started her car and drove off.

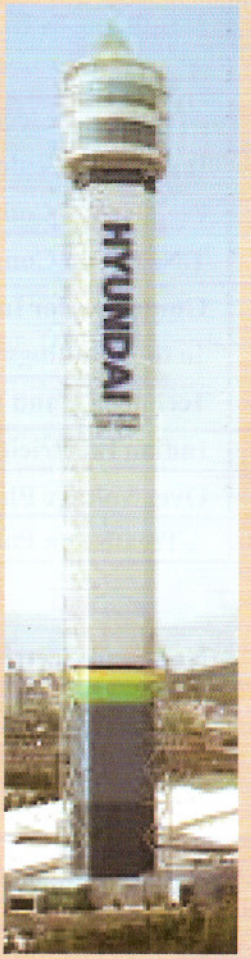
A few kilometres down the road the lady saw a small cafe. She went in to grab a bite and drink something hot. It was a dingy looking restaurant. The waitress came over and offered a sweet smile, one that even being on her feet for the whole day could not erase. The lady noticed the waitress was nearly eight months pregnant, but she never let the strain and aches change her attitude. After the lady finished her meal, the waitress went to get the change for a thousand-rupee-note, and by the time the waitress came back the lady had already left. The waitress noticed a note left behind on the table. She read them with tears in her eyes, **"You don't owe me a thing. This is for the one inside you and the smiles with which you served me. You were refreshing. Someone just helped me out, and then I knew how it felt receiving and now I know how it feels giving. If you really want to pay me back, here's what you do. Do not let the chain of love end with you."**

Well, there were tables to clear, sugar bowls and people to serve, but the waitress made it through another day. That night when she got home from work and climbed into bed, she was thinking about the money and what the lady had written. With the baby due next month, the going was hard. Every rupee mattered. She knew how worried her husband was, and as she lay next to him, she gave him a soft kiss and whispered low, "Everything's going to be alright. I love you, Jai."

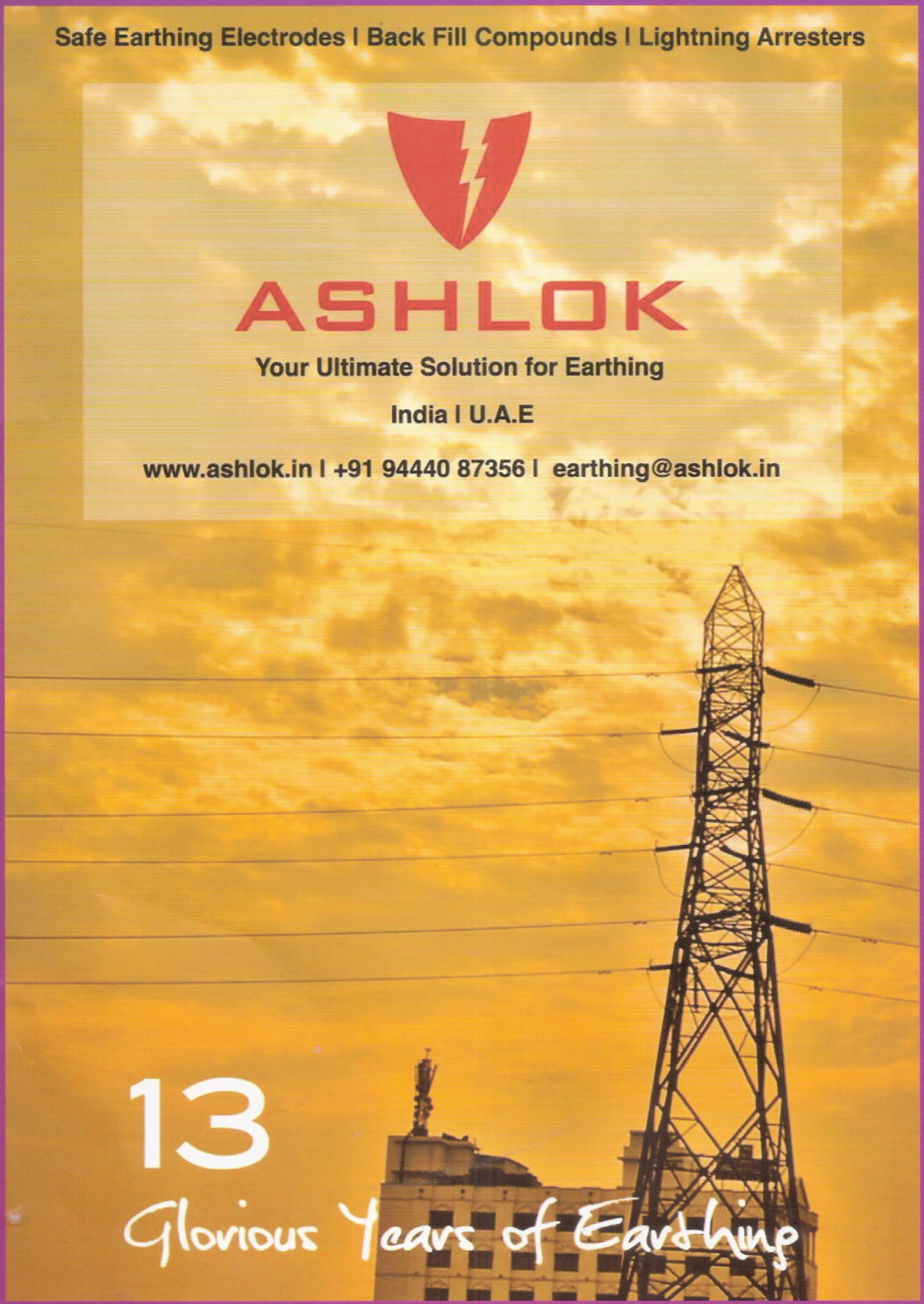
***Courtesy: Frozen Thoughts, May 2011***

***A HEART THAT LOVES IS ALWAYS YOUNG.***

# HYUNDAI ASAN TOWER


Standing 205.2m above and 15m below ground level, the elevator test tower is world class, covering an area of 4,351 Sqmtr. As a steel and concrete structure, the tower has a triangular column, and the upper structure that houses the elevator machine room is circular. Hyundai Asan Tower's height is equivalent to that of a 52 storey building. The 1st floor encompasses the Exhibition Room, Public Relations Center, and the MH Jung R&D Center. The 52nd Sky Lounge is located above the 50th floor transfer platform and 51st floor elevator machine room All systems and parts related to high speed operations are tested for vibration, noise, temperature, pressure, and others to ensure reliability and safety. The facility also helps in the development and testing of our double deck elevators and ultra-high speed elevators that can operate at speeds up to 1080m/min. The column that makes up the main frame of the test tower is modeled after the Hyundai Group's triangular logo and represents Hyundai Elevator's flight into the future. As of September 2010, the world's fastest elevator title belongs to the 1080m/min elevator at our Hyundai Asan Tower. Next is the Tapei 101 building elevator in Taipei that can reach up to a speed of 1010m/min. The elevator in the world's tallest building, Burj Khalifa in Dubai, can operate at a speed of up to 600m/min.

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