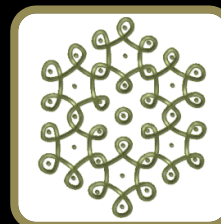
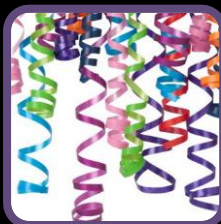


# TCExpression

House Magazine of TCE



*The TCExpression Team wishes  
all its Readers  
A Very Happy New Year 2012!*



**Editorial Team****Sponsor**

Rakesh Gupta

**Editor In Chief**

Sowmya Raghu Raman

**Managing Editor**

Syed Shahameer

**Editorial Advisor**

M V Soman

**Editors**

Agashe N S

Amit Chaudhary

Arivalagan Arumugam

Ashish Kumar Verma

Bharathi Vishwanath

Bopanna K M\*

Chandrika C\*

Dhananjay Dave

Poorva Narsapur

Punam Chaudhary

Sukanya Chakraborti

Susheela Kapaleaswaran

**Associate Editors**

Abdul Bari Mohammed\*

Akshata Mulay

Amrith Chhimbi

Anusuya Nayak

Dhiraj Verma

Kanchan Ghuge

Karthik G

Kavita Mudgal

Maria Nancy D

Moanaro A O

Oindrila Dey

Sharvari Sujay

Shalini Roy

Suhail Qadri

Vivek S

**Information Coordinators**

Arpita Dey

Divya M N\*

Saraswati Govardhan\*

Shamira Bhastekar

Tilottama Shirsath

**Design Editor**

Sridevi K S

**IT Coordinator**

Aneesh Joseph

**TCEEx Cartoonist**

Santosh M Bhavan

**Associate Cartoonist**

Karthik. B

Varsha Kaveri K.M

\*Central Editorial Team

(winning cartoon entries on last page)

# Engineering Celebrations

*Dear TCEites**Sustenance is the key to success.**Humankind has stood the test of time leveraging on its perseverance and adaptation to changes. We have climbed mountains, crossed waters and explored spaces to sustain victory, time and again. Every conquest, small or big, has been a cause for celebration. The style of celebration has also sustained over the ages.**This issue of TCExpression is a tribute to celebrations that have stood the test of time and kept us connected to the past, present and future. They have constantly reminded us of our past triumphs and goaded us to strive for more, within and beyond the world of engineering.**Here's wishing you all a New Year that ushers in triumphs and celebrations galore,**Yours Truly**Sowmya Raghu Raman**Editor-In-Chief*





The cover page is an effort to align with this quarter's theme for TCExpression - "Engineering Celebrations".

The period Oct – Dec is marked by a bevy of festivities each of which is characterised by accessories which subtly remind us of the greater engineering within and beyond them.

Firework rockets that zoom up like well-engineered missiles, chocolate slabs that mimic skyscrapers, wicker lamps that gave way to electric bulbs, pinwheels that catch the wind just like windmills, streamers that swirl like DNA, pastries that remind us of the complexity of sugar molecules, balloons that carry joy like their hot air counterparts and rangolis that vie with engineering drawings...

Celebrations have a lot of engineering woven into them. Let us *celebrate engineering*.



**Theme  
Talk  
Page 3**



**Corporate  
Communique  
Pages 4-8**



**Project  
Patchwork  
Pages 9-17**



**Business  
Brief  
Page 18**



**Global  
Glimpses  
Pages 19-20**



**Corporate  
Sustainability  
Page 21**



**Lighter  
Liaisons  
Pages 22-25**

**Voice of  
Victory  
Pages 26-27**



**TCE  
Triumph  
Page 28**



**Technovation  
Page 29**



**Training  
Tracker  
Page 30**



**Creative  
Clique  
Pages 31-36**



**Reader's  
Recall  
Page 37-38**



**Hard Hat Humour  
(H3)  
Page 39**





# Reflections

*The last three months have been eventful for TCEites as a lot has happened around us, both within and beyond.*

*One can appreciate how TCEites have mixed hard work with fun at a time when project deadlines had to be met and the festive season demanded indulgence.*

*We celebrated both at work and at home, the Navratris, Diwali & Christmas and bade farewell to a year that takes TCE into its Golden Jubilee. Also, TCE Day, as it continues at various locations, brings family and friends together around cultural diversity.*

*We bade a fond farewell to our MD, R Srinivasan. TCE cohesively set on course with our DMD, J P Haran and the leadership team.*

*Strains of the economic challenges is what the New Year is expected to begin with and as TCEites have always done without a break, the team is gearing up collectively to tide over these challenges for a true Golden Jubilee celebration in 2012.*

*Laurels are sweeteners of a successful venture. TCE's involvement in the TCS Siruseri Project is a matter of pride as the project received the global award under Best International Office Architecture of 2011. TCE also won the EEPC award.*

*Innovision got a boost with participation growing six fold in four years with an enthusiastic and young team. However, we have distance to cover.*

*As we continue to grow, TCE's involvement with the Tata Group entities also grows, bringing more synergy. We were happy to associate in various ways with TCS, Tata Steel, Tata Power, Tata Motors, Tata Projects, Tata International, TQMS, TMTC, Group Communications, Group HR and several other Group entities.*

*The story of TCE's march into the second half of a century of its existence begins.....*

*Rakesh Gupta*

*Senior Executive Vice President – Corporate Affairs*

*“ I like living at the intersection of the humanities and technology “  
Steve Jobs*



**TCEx: What do you consider as your very first achievement upon assuming office as MD & CEO of TCE?**

**RS:** While TCE has assumed the status of a generic brand, we still needed a strong impetus for opening doors in the international market.

The first task that I took upon myself was to get the company rechristened so as to bring in the Tata name and be better recognised overseas. Our growing stature within the group enabled this.

**TCEx: What do you think is the cornerstone of TCE's business stability?**

**RS:** The massive restructuring exercise that began in 2003-04 was an important milestone in TCE's growth chart. Moving away from the traditional mould of a technology & discipline based structure to don a newer structure that was more business focused, was both arduous as well as rewarding.

Our conviction was strengthened by our earlier successes with the task force approach for major projects. The project task force structure nurtured a harmony amongst various engineering disciplines and emerged as a delivery model closely aligned to the client requirements.

Mr. P K Sarathy, who was the CEO then, vociferously supported the move and we managed to expand the taskforce approach to an organisational level .

This got us closer to the customer and ensured better alignment of TCEites and their work processes.

A large part of the phenomenal growth that happened after 2004 can be attributed to the organisational structural change.

**TCEx: What is the way forward for TCE to take on the world?**

**RS:** Technological leadership, leveraging on its vast potential and Investment for the future should comprise the three-pronged approach.

Short term sacrifices that could erode into the operational results should be embraced as a pre-requisite for an eye on the future.



## Cerebral Deliberations

**After laying down office as CEO & MD, Mr. R. Srinivasan chats with Sowmya at TCExpression, to recall and reminisce about the highlights of his tenure in TCE. Gazing into the future, Mr. RS also shares a few nuggets on the way forward for the company.**

**TCEx: How do you think TCE should position its brand image?**

**RS:** TCE is a product company in a service sector!

Our Product offerings include engineering outputs like drawings, designs, specifications and reports, while our services are characterised by project management, project execution, construction supervision and commissioning support.

The brand differentiation therefore depends on the technical content of our products as well as the end user's perception of the value added by our services.

While the product offerings may not be very different from our competition, true differentiators can be built by focusing on the services component of our offerings to the client.





### TCEx: How can we leverage on our service quality?

**RS:** It is like tasting a *Gulab Jamun*, in your mind, even before it is served!

We would need to create a virtual experience for a prospective customer to visualise the value to be delivered by TCE's product and service offerings.

As engineers we are tuned into the rational side of the customer needs. We need to tune up our antennae to capture the emotional side of it in order to create service differentiators.

The way the Japanese have supported us and the way GE has been forthcoming in partnering with TCE are examples of the recognition we have gained in the international market.

We are in a position to quickly establish ourselves in the global market by the sheer strength of our delivery processes.

As the international customer is more discerning about the service component we would need to deftly align ourselves to the emotional / cultural service differentiators in the global market.

**"We are in a position to quickly establish ourselves in the global market by the sheer strength of our delivery processes"**

### TCEx: The one single thing to engineer a better tomorrow?

**RS:** Effective Leadership at all levels... In a knowledge based industry, people participation is the key to success. This requires each and every TCEite to develop and display leadership qualities within his / her domain or even transgressing the realms of those domains.

Miracles can be wrought by an all pervading leadership that is not just vested at the top but cascades down to the very bottom.

Simply put, each one of us should think and act as a leader.



### TCEx: Does TCE need to position itself differently in the global arena?

**RS:** Not necessarily. Positioning in the global arena is eminently feasible and absolutely practicable since the external world is much simpler with fewer associated uncertainties.



## Tenure Dashboard

Means to an End	CRM Focus	Going Global	HRM Matters	Real Estate
Focus on shaping TCE as a <i>process driven</i> organisation.	Installation of a <i>marketing cell</i> in addition to the vast commercial network of TCE.	Several MOUs signed with overseas firms with a view to laying the foundation for growth beyond home turf.	Emphasis on sound HR practices for recruitment training, performance mgmt. & restructuring.	Matulya moves to a snazzy office in Vikhroli, land acquisition in Bangalore & office construction at Kolkata.

### TCEx: What are your future plans?

**RS:** Right now I am enjoying the luxury of time!

I truly believe that I should do something different after laying down office and catch up on a lot of things that I always wanted to do. I would like to spend a lot of time in reading, writing and teaching.

I am also enjoying spending time with my family. I want my second innings to be different.



**TCEx: What are the Core Strengths of TCE that have contributed to sustained operations?**

**JPH:** While a lot can be said about TCE's technical & engineering strengths, I believe that our true strengths are perhaps more *closer to the heart than the mind*.

Two of them have stood the test of time right from inception and have got etched in our operational DNA.

Our biggest forte is the driving force of our Core Values. This strength is possibly not very apparent. However, but has subconsciously driven TCEites to greater and greater heights. Another innate strength is our ability to bravely step into unknown terrain. In TCE, I am yet to see a team that was afraid to experiment or innovate. This exploratory style has got us many firsts to our credit.

**The Dy. MD incumbent, Mr. J P Haran does a SWOT of TCE in a tête-à-tête with Sowmya from TCExpression. Elaborating on TCE's global strategies and innovative overtures, Mr. JPH reveals his innermost thoughts on TCE's journey to the future.**



**TCEx: What was different about the Blast Furnace for SAIL?**

**JPH:** While the Blast Furnace per se did not pose any problems in spite of its associated complexities, it is the system integration component that needed intricate structural analysis.

Our familiarity with ANSYS compared to other consultant resulted in a classic 4 poster structural analysis was done for the first time by an Indian consultant.

What was always considered as the domain of an MNC EPC contractor got its indigenous stamp from TCE.

While the business savvy option would have been to seek a seasoned (overseas) hand for support, our team had confidence in its own technical strengths and plunged on. Our prowess in multidisciplinary engineering, won the day.

## VALOUR & VALUES

Our value systems and boldness of approach have helped us remain active in diverse sectors and carve a niche for TCE across markets and customer segments.

**TCEx: Could you please cite a few examples of TCE's boldness of approach?**

**JPH:** TCE offered its services for the India's first Roller Compacted Concrete (RCC) dam project at Ghatghar for the Government of Maharashtra.

The project ranked 1<sup>st</sup> in the efficiency of concrete placement in the World and 10th in the Fastest Constructed RCC dams. It ushered in the first time use of a Stepped Spillway and was instrumental in bringing about a shift towards RCC construction for the dams in India.

The steel plant blast furnace project for SAIL, Rourkela started with a lot of client (TPL) apprehensions about our capabilities of delivery.

However, not only did we deliver, we did it to the best satisfaction of the leading consultants in the country who appreciated TCE's unique capabilities in this new area.

**TCEx: How are TCE's operations tuned to its strengths?**

**JPH:** TCE constantly encourages innovation. This year we have a total of 92 entries from TCE, for the Tata Innovista contest.

We are constantly creating room for experimenting within the realm of real time projects. Our moves to embrace newer business areas like mining /mineralogy/metallurgy and renewables stand testimony to this fact.

Also, our customer-centric operations create a constant demand for innovation. Today's customer is not sated with yesterday's engineering. So we are always pushed for novel engineering solutions and service offerings.

**TCEx: Do you think TCE has any weaknesses? Chinks in the armour?**

**JPH:** In fact our innate strengths themselves turn out to be weaknesses. While we possess the confidence to tread onto newer pastures, we also tend to be self-effacing consider these organisational traits as run-of-the-mill. Like all rational minded knowledge-based organisations we tend to play down our behavioural traits that truly define our services

Hence, we sometimes miss out on boldly branding ourselves to the external world.

**TCEx: How is TCE poised in today's global arena?**

**JPH:** To be frank, we are not very present in the global arena. Though we have the capabilities and skills, we have made only a few feeble attempts to go global.

It is now time for us to streamline our efforts in a time bound manner and make our mark in chosen geographies. We have set our sights on the Middle East, South Africa and parts of the USA.

**“Be aware of your strengths and make efforts to retain, revisit and reinforce them at all times”**  
**“Today's customer is not sated with Yesterday's Engineering”**



The current fiscal has been very encouraging in terms of business acquisitions in the international front.

**TCEx: What is your mantra to improve our global footprint?**

**JPH:** We need to focus on 'what we did right this year and make it a sustainable model for international acquisitions. We need to dwell more on our success stories. This will put us on a positive platform and the learning can be repeated. Therefore, we have strategized to pursue sectors of strength and make our mark in Power, Chemical and Infrastructural assignments abroad.

I am confident that before long we will be accruing a sizeable percentage of global revenues.

**TCEx: Do you foresee any challenges in building TCE's persona as a Global Player?**

**JPH:** One universal challenge for any global player is the fluidity of its workforce. We are tackling this by making it worthwhile for TCEites to move and work beyond the Desi shores.

We have rationalised the overseas allowance structures and incentivised overseas tenures.

“Be aware of your strengths and make efforts to retain, revisit and reinforce them at all times”. “Today's customer is not sated with Yesterday's Engineering”

I am reasonably sanguine about the fact that we are on the launching pad of international business and that the countdown has begun. TCE is now poised for a grand Lift Off.

**TCEx: Any message for TCEites?**

**JPH:** As a professional TCEite, be aware of your strengths and make efforts to retain, revisit and reinforce them at all times.

When it comes to improvement, prioritise on a select few areas, gather some critical mass and then move on from a position of strength.

**TCEx: Any message for TCEExpression?**

**JPH:** TCEExpression fills a critical communication slot in TCE. It helps us connect with each other, know each other and reach out to the external world. It is in my opinion a very vital means of communication since it brings us closer and satisfies our curiosity about other offices, other locations, other projects, other people.

**TCEx: Can we have a glimpse of your tenure in TCE?**

**JPH:** As a TCEite, I have had the privilege of dabbling in a healthy mixture of technical and business responsibilities covering Nuclear, Thermal Power, Environmental, Chemical and Infrastructural sectors. Every responsibility came with new challenge and as I grew, I kept adding on to my repertoire.

To put it succinctly, I have never had a dull moment in my 38 years in TCE!

## Vital Statistics

### Education

BTech (Civil), MTech (Structural) – IIT Madras

### Career Highlights

1966-73: IIT-Madras, 1973-74: Government of India, 1974 onwards: Tata Consulting Engineers Ltd

### Interests

Film making, Music (all genres), Travelling (nature & history), Reading (business publications)

### Matter of Pride

Work-Life Balance





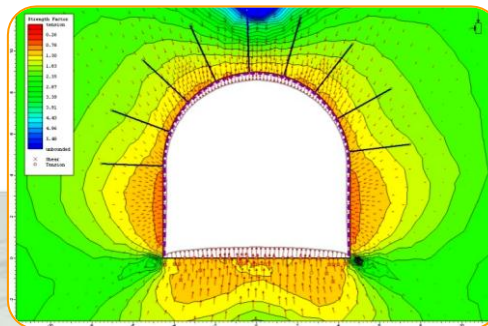
## Delhi

**Project: Engineering Consultancy Services for Mander-I and Mander II small hydroelectric projects each of 24.75 MW, Chhattisgarh.**

TCE-New Delhi has successfully completed the review and updating of detailed project report for Mander-I and Mander II small hydroelectric projects each of 24.75 MW installed capacity in the state of Chhattisgarh. The project was awarded by RAMKY Enviro Engineers Ltd. Pre-construction activities are nearly completed. Implementation of the Project components has commenced. The Projects are Run-of-the-River type mini-hydro projects comprising diversion & intake structures, feeder tunnels, by-pass & tailrace channels, surface power house and associated infrastructure.



Fall on the downstream of weir axis



'PHASE 2.0' Strength Factor Output

In this project the structural analysis and design of feeder tunnel support system in rock mass has been carried out in-house using software available with TCE Delhi such as 'Roc Lab' (for finding the rock parameters), 'Dips' (for finding sets of joints), 'UNWEDGE 3.0' (for formation of wedges) and 'PHASE 2.0' (for strength factor in support class).

### **Project: 220kv GIS (Civil & Electrical) sub-station at Wazirpur, New Delhi.**

TCE Delhi has been entrusted with a job of detailed engineering for building a 220 kV GIS (Civil & Electrical) sub-station at Wazirpur, New Delhi by EMCO. GIS building is a forethought to accommodate a 7-Bay GIS substation, embracing 2x100MVA 220/33/11 kV transformers and covers a plot area of 4723 sqm. Most of the civil drawings have been prepared and civil construction work is in advanced stage. Both the transformers have been installed at site. GIS equipment is expected to be at site by Jan'12.



100MVA Transformer, EMCO

### **Project: 2X 180 MW Kariba North Bank Extension Power Project, Zambia.**

TCE and EDF-CIH hydro engineering centre as a consortium is the Owner's Engineering Consultant for execution of 2x180 MW Kariba North Bank Extension Power Project, Zambia for ZESCO Limited (Zambia



Shotcreting for power intake at 489.500 m depth

Electric Supply Corporation). This project was awarded to Sino-hydro Corporation Limited, China for implementation as EPC Contractor.



Shotcreting of crown at Extension Power House

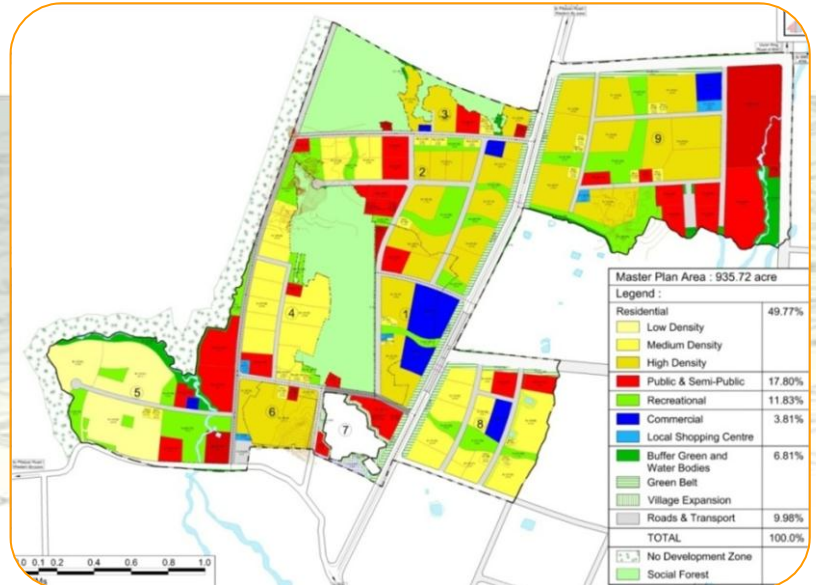


The proposed extension project constitutes a power intake, two headrace tunnels, adits, drainage gallery, extension of underground powerhouse, installation of two numbers of vertical turbines, extension of overhead crane gantry, two tail race tunnels, bus bar adits, etc. Most of the excavation work of the project components is completed. The concreting and support system arrangement of the structures are in progress.

### Project: Master plan for Modern Integrated Township (MIT), Bhubaneswar.

With the purpose to guide the growth trend of urban population in Odisha state and to trigger a systematic process of balance development in the future, it was felt necessary to prepare a "vision document". Bhubaneswar Development Authority (BDA) proposed to develop new satellite cities in the fringe areas of Bhubaneswar so as to reduce pressure on the central city. The satellite cities with the concept of preserving ecology and environment, will be planned to be self sufficient with water, electricity, sewerage, parks, school and colleges and other utilities so that the development can be decentralized .

To decentralize the central city pressure, the study "Development of MIT at Bhubaneswar" has been initiated by the BDA and is being carried out by TCE. TCE has successfully submitted the final MIT master plan in October 2011 to BDA. The master plan covers land development strategy based on socio-economic & demographic projections for year 2041.

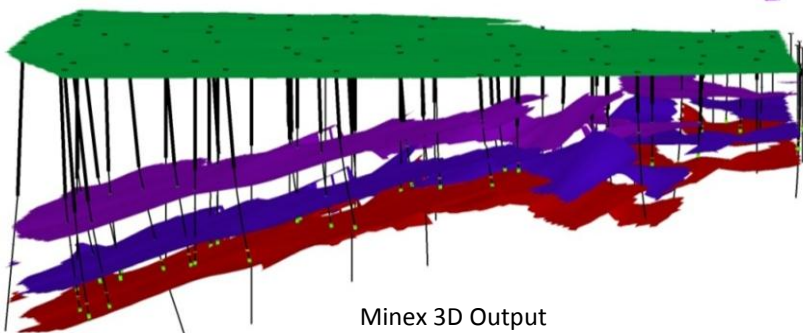


Master Plan of the proposed MIT @ Bhubaneswar

## Kolkata

### Project: Sitarampur Coal Block Project in Burdwan District, West Bengal

The project entailed a geological study of a coal block located in Sitarampur, Burdwan District, West Bengal. The data obtained from exploratory boreholes for Sitarampur Coal Block, was fed into *Minex* software to develop a 3-Dimensional depiction of different coal seams. Using the borehole data and High Resolution Seismic Survey (HRSS) data, TCE-Kolkata has done the structural interpretation of the 9 square kilometres coal-block area and 3D modelling to understand the underground disposition of coal seams which is the vital part for mine planning. Following are highlights of the study:



Minex 3D Output

- The strike of the formation in this coal block is almost E-NE-WSW.
- The dip of the beds varies from 100 to 200 towards southeast.
- As per borehole data and HRSS, total seven mineable coal seams are encountered in this block and all occurring in Barakar coal formation.
- This block contains coking coal and due to igneous activity, most deposits of this block have changed to Jhama (burnt coal).
- Estimation of seam-wise and grade-wise reserves of coal along with total coal reserve.



## Jamshedpur

**Project: Project management and construction management services for a 6 MTPA steel plant of Tata Steel at Kalinganagar in Odisha.**

TCE Jamshedpur is currently working on design, project management and construction management services for a 6 MTPA steel plant of Tata Steel at Kalinganagar in Odisha.



Piling of Battery No.2

The engineering services scope includes two coke oven batteries, a by-product plant and Coke Dry Quenching with an associated power plant. The steel plant is proposed to be constructed in two phases each of 3 MTPA capacity.



Dressing of pile top

To meet the demand of metallurgical coke for the blast furnace, four stamp charged-recovery type-5 m tall coke oven batteries with 88 ovens each, will be installed (2 batteries in each phase) along with a by-product plant and coke dry quenching facility.

The Kalinganagar project is one of the biggest consultancy orders received by TCE in the recent times. The construction at site has already commenced and progressing at a very fast phase.

## Mumbai

**Project: TCS IT SEZ Facilities at Rajarhat.**



IT SEZ facility for TCS

TCE is providing comprehensive PMC Services for TCS's 22,50,000sqft IT SEZ facility at Rajarhat. A Design and Build Contracting strategy is adopted to ensure project completion within a challenging timeline of 36 months. Other challenges include structural concept design of high rise buildings and appropriate water proofing strategy of the basement to account for high ground water level.

**Project: Maharashtra Cricket Associations' International Cricket Centre at Pune.**

The Maharashtra Cricket Association (MCA) is constructing a 45,000 spectator capacity Cricket Stadium off the Mumbai-Pune expressway, approximately 20 km from Pune. TCE has carried out engineering of MEP services and has completed the traffic assessment study. TCE also supported Hopkins Architects (UK) and structural engineers 'Adams Kara Taylor' (UK) while carrying out Indianisation of specifications. The stadium is nearing completion and may be expanded to include additional stands, club and academy facilities in the near future.



MCA Stadium at Pune

**Project: Fire Hazard Analysis (FHA) for IGCAR's Fast Reactor Fuel Cycle Facility (FRFCF).**

Methodology on FHA for IGCAR's FRFCF at Kalpakkam was developed at TCE's 247 Park Nuclear office. The aim of FHA was to analyze the anticipated fire growth and its consequences with respect to items important to safety and to determine the required fire resistance of fire barriers. FHA was carried out using CFD based software called Fire Dynamics Simulator (FDS).





400kV DCT line for JITPL

### Project: 400kV DC Transmission Line Project.

TCE provided Engineering Consultancy Services for a 400 kV Double Circuit Transmission Line project for Jindal India Thermal Power Limited (JITPL). TCE economized the project cost by optimizing on tower body extensions, deleting the extra towers and revising the tower types based on design requirements during tower spotting review. This exercise resulting in the overall project cost saving was appreciated by the client.

### Project: PMC for IIT Hyderabad, Phase-1.

TCE has bagged a prestigious PMC assignment from IIT- Hyderabad for campus development. This is one of its kind project for TCE since it is the first large scale educational institute job. The campus will consist of a 583 acre residential academic campus comprising of eleven academic buildings, student hostels, administration building, lecture hall complex, students and faculty commons (book store, food court, Faculty and Staff housing, Guest house, convention centre, student sports and cultural activity centre, library) and complete infrastructure facilities for the entire campus. Mr. V S Bapat, Mr. C Gautam Kamath and Mr. Raju Boddu from TCE attended the ground breaking ceremony in Hyderabad.



TCE's foray into education sector

### Project: Consultancy Services for Asian Paints Ltd.

Asian Paints Ltd. (APL) assigned TCE the task of basic and detailed engineering services along with Construction supervision & Project management services for their decorative paint plant at Khandala industrial area, Pune, Maharashtra for Phase-I. It will be the 7th decorative paint plant of Asian Paints having facility of water based paint and solvent based paint. The project will be of similar capacity of Rohtak Project, designed and engineered by TCE earlier, which was Asia's largest paint manufacturing paint plant with a state of art technology.

The project will be implemented in two phases with total capacity of 4,00,000 KL / annum. The phase-I which is currently under implementation is of capacity of 3,00,000 KL / annum. Salient features of the project are:

- Master Planning & modelling of Master Plan in "Revit" Software.
- PDMS modelling of entire plant including civil, underground facilities, mechanical, equipment, piping, electrical and instrumentation.
- Implementation of Green Engineering concept with respect to energy optimization, water consumption
- Feasibility study and recommendation of site grading to optimize site grading cost.
- Application of Pigging for transfer of liquid raw materials and products to reduce the number of transfer lines. Completely automatic Process Plants.





*APL project features, Cont'd.:*

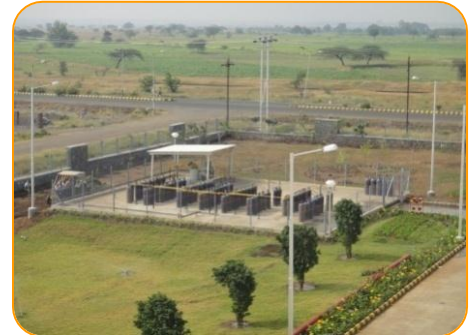
- Automatic Equipment cleaning System (automatic CIP system).
- Zero Discharge Plant; consist of conventional ETP, MEE & Incinerators RO.
- Detail design of Automatic Storage & Retrieval System (ASRS) for finish good and packing material storage and transfer.
- Detail design of Pneumatic Conveying System for unloading & transfer of solid raw material.
- Ergonomics of Plant in layout development.
- Extraction and issue of construction drawing, isometric drawings and accurate bill of quantities from the model.

## Pune

**Project: Consultancy Services for Imsofer India Manufacturing (P) Ltd.**



Imsofer India Manufacturing (P) Ltd- FERRERO Group has established a state of art facility at Baramati, Pune- Maharashtra. FERRERO group is popular manufacturer of confectionary for brands like Rocher, Raffaello, Kinder Joy, TicTac and many more.



TCE-Pune has been awarded a job for providing consultancy services to establish MEP and ETP facilities. The plant is beautifully installed over an area of 28,000 square meters, which includes the production facilities, warehouse and service areas. TCE has extended detailed engineering services in coordination with FERRERO German / Italian engineering team for all utilities like chillers & plant air conditioning, compressed air, WTP / WWTP, LPG station, 6.4 MVA electrical distributions & data acquisition system. Team has accomplished a benchmark for providing services in accordance with Good Manufacturing Practices (GMP) and the plant was inaugurated on 13<sup>th</sup> Oct. 2011.



## Construction

The site office teams across the country achieved a host of milestones in various projects. *Read On* for a glimpse of the major highlights:

This quarter saw the successful completion of TATA Lockheed Martin Aero-structures Limited project on 19th December, 2011. TCE was involved in Design & Construction supervision services for this project. Delegates from TLMAL, USA & India were present during the occasion.



Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RRVUNL), Chhabra has safely & successfully erected a 210 MT Stator on 1<sup>st</sup> December, 2011. Two EOT cranes of 150 MT each were used. The travel time from the maintenance bay of Unit 1, was 2 hours and the EOTs traversed over a length of 240 meters.

Team Mundra achieved a key milestone in Unit # 30 on 21/12/11 by successful lighting up the third super critical Boiler. The initial firing was done using Light Diesel Oil (LDO) and the major enabling activities /systems completed before Boiler Light Up were DCS power-on (30/09/11), Boiler chemical cleaning completion (06/10/11) followed by BFP run on recirculation (15/12/11).



The CNBU is constantly engaged in spreading awareness regarding safety at construction sites. The Tata Power Maithon site is one such example which drew a special appreciation from the **MD of Tata Power Mr. Anil Sardana**. This is what he had to say about TCEite Mr. Raghunathan Khan, in an email message to the Construction Manager *"It is indeed interesting to see his passion. I only wish there are many more of Raghunath Khan's in our team, which would make our world that much more safer. Please convey my compliments to him and wish him enhanced enthusiasm to make our environment further safe and secured for all living beings and machine"*.





**Mr. Raghunath Khan** displayed his passion for safety by sharing the learning & imparting training on a mass scale to all the workers at the Maithon site.

Another important ongoing project that recently won accolades is the TCS Siruseri complex in Tamil Nadu.

TCE, as the Project Management Consultant was responsible for converting this architectural intent into reality at Indian Construction Environment

In the last quarter, an entire campus of 25,000 seats has been made operational with full occupancy level housing a cafeteria, training centers, administration blocks, security systems and an Integrated Building Management System.

TCE, as PMC agency has adopted different process as depicted, which have culminated into a Global recognition for this prestigious campus.



### Project: Fuel Cycle Facility for DAE:

TCE is working on a fuel cycle facility for Department of Atomic Energy (Govt. of India). This project is executed from Chennai with large participation from TCE's offices in Mumbai and Delhi. It is the largest design engineering project secured by TCE today and is in the verge of completion in a couple of months. With financial sanctions in the anvil, the construction activities are slated to begin in the next financial year.

The past quarter witnessed a lot of activities in the form of hectic client meetings, continuous internal review meetings, R&D in niche areas and new initiatives into hitherto unexplored areas. This has a participation of a total of **250 TCE-ites** collectively responsible for the project's progress till date.



Bird's Eye View of Fuel Cycle Facility for DAE

### Project: Air Compressor Plant for ELGI

ELGI equipment private limited, leading manufacturer of air compressors based at Coimbatore has proposed to shift their existing compressor manufacturing plant to a new campus in Kinathukadavu near Pollachi, Coimbatore district. It is one of the fast paced industrial jobs for TCE Chennai. In addition to air compressor manufacturing facility, TCE is also involved in consultancy of foundry, an allied facility of this manufacturing centre. TCE is involved in engineering design (including architectural) and project management consultancy for this job. Foundry being a very unique industry handled for the first time by TCE, it poses quite a few challenges in plant design. There is a gradient difference of about 13 meters in the site. TCE has suggested terrace concept for various facilities of this plant which has resulted in saving of excavation & land filling expenditure, faster execution & also giving aesthetically appealing perspective.



Terrace Concept for ELGI





JSW, Ratnagiri

### Project: JSW Energy Limited (Ratnagiri) 4 x 300MW Thermal Power Plant.

JSW Energy Limited has set up 1200 MW (4 x 300 MW) Thermal power plant at Jaigad in Ratnagiri district of Maharashtra. TCE was associated with this project right from the conceptual stage to the commissioning of plant with its services like detailed engineering, procurement assistance, project monitoring, vendor document/drawing review, inspection & expediting services and site supervision services. Some of the unique features of this project are:

- Circulating type cooling water (CW) system using sea water for condenser.
- Provision of 400 kV Gas Insulated Switchgear.
- Reduction of electrical system cost by tapping Station Transformer (ST) from main run of Isolated Phase Bus Duct (IPBD) between Generator Circuit Breaker (GCB) & Generator Transformer (GT).
- Electro-hydraulic butterfly valve to suit the specific requirement of high-head and reliable operation in black-out conditions at the CW make-up pump discharge.



JSW, Cooling towers

### Project: Essar Power Limited 2x660 MW Thermal Power Plant

Essar Power Limited is setting up two thermal power projects of 2X600 MW capacity (each) at Mahan in Madhya Pradesh & at Salaya in Gujarat. The Complete Design Engineering Services for both of these projects has been awarded to TCE. The two plants are the flag-ship projects for Essar Group's mega-energy plans in the country. They are also among one of the first in India where the BTG Equipment has been exclusively sourced from China.

The major project highlights are:

- Design of RCC Stack (height 275 M)
- Review Engineering for BTG Equipment supplied by Harbin Power Engineers China
- Preparation of the Plant Control Philosophy for the integration of complete plant

Erection work is under progress at Mahan Site and the two units will be synchronized with the Grid in year 2012. At Salaya, Unit-1 has been synchronized with the Grid in Dec'2011 and Unit-2 is scheduled to be synchronized by March'2012.




Hydro Test in progress @ Mahan



The Turbo-Generator Bay @ Salaya



## Chemical



Design, procurement, inspection and construction supervision for Oxidation, PEK and Pigment Yellow plant at Panoli, Gujarat by **Gharda Chemicals Limited** (GCL) awarded to **TCE-Raj Plaza**

**TCE-Raj Plaza** bagged design engineering & procurement assistance for the Process Plants, utilities & off-site area for the proposed 600TPD Poly-condensation and Solid State Poly-condensation plant at Haldia, West Bengal by **South Asian Petrochem Limited (SAPL)**.

**Hindustan News Print Limited (HNL)**, Kerala appointed **TCE-Raj Plaza** to carry out Project Management Consultancy services for proposed 300 TPD capacity De-inking Plant project.

**Cadbury India Limited's (CIL)** proposed separate 16K chocolate plant and moulding line (Phase-II) at Induri, Pune.

**TCE-Raj Plaza** along with engineering design services support CIL in carrying out inspection and construction supervision at site.


## Infrastructure



**Mumbai Metropolitan Regional Development Authority (MMRDA)** in association with **National Environmental Engineering Research Institute (NEERI)** has conceptualized a first of its kind Regional Landfill site with an integrated Solid Waste Management (SWM) & Treatment Facility at Taloja, Maharashtra. **TCE-247** park has been appointed to carry out Techno-Commercial Feasibility for this project

Entering into a new segment of structural engineering, **TCE-Pune** is now working on 'Structural Assessment' of "**Pride Mall, Pune**" and "**Kiwi Projects- Chemical Industry, Nagpur**". Assessing the existing RCC structures by physical mapping and Non-destructive testing, the renovation for the structure will be advised.

## Power




**TCE-Bangalore** is playing the role of Owner's Engineers for **NavBharath Ventures** for their new coal fired thermal power plant of capacity 2X150 MW at Maamba Collieries Limited, Zambia.

**Daewoo**, South Korea has appointed **TCE-Bangalore** for Pre-bid engineering services for 500MW Combined Cycle and Simple Cycle Power Plant at Qua Iboe, Nigeria.

**TCE-Bangalore** is involved in the Pre-feasibility study for 2X660 MW Coal based Pit Head Power Project at Waterberg Region, South Africa, by **Calcutta Electricity Supply Company (CESC)**.

**GE India Technology Centre**, for the preparation of their reference design model for Turbine-Generator Island of capacity 660 MW to 715 MW, has appointed **TCE-Bangalore**.



**TCE-Bangalore** has commenced Engineering for Piping arrangement and 3D modeling for MHI-Japan's Byproduct Gas Combined Cycle Power Plant, **POSCO Power** at Pohang, Korea.

**Dodsal Enterprises Private Limited** has appointed **TCE-Bangalore** for Detailed engineering services for the Balance of Turbine Island Package (BOTIP) for 2X700 MW **Kakrapar Atomic Power** Project (KAPP Units 3&4).

The last issue of TCExpression provided a glimpse of our on-going global presence.

Here's an account of the recent sign-offs and what they entail.

#### **OML 58 Upgrade Phase I Project : Obagi Operations & Security Camps - Total E&P Nigeria Limited**

Darycet International Limited, Nigeria (DIL) have been contracted by Total E & P Nigeria Limited (TEPNG) for construction of Obagi Operations and Security Camps (OSC) under OML58 Upgrade Phase 1 Project on EPC basis. DIL has engaged TCE for carrying out detailed engineering.

The construction is required to be carried out in 3 phases over a total period 45 months with the first 15 months allocated for detailed engineering. TCE will also be reviewing the Vendors' technical submissions.



DIL Sign-Off



Gum Manufacturing

#### **Project Independence 2 - Kraft Foods, Egypt**

Kraft foods has assigned TCE the engineering for their new facility for manufacturing of 20,000 tonnes of gum (sugar & sugar-free) products at Borg el Arab, near Alexandria, Egypt.

This is the first time TCE will be involved in Basic Engineering of a gum manufacturing facility. TCE scope of services includes Basic Design Engineering, Front End Engineering and Utility System Design.

The challenge is to accommodate the gum manufacturing facility within the existing building with minimum augmentation. The facility will consist of mixers feeding rolling and scoring (R&S) lines and coating pans. These will be supplemented by cut and wrap machines for sugar free slab products.

#### **Coal Related Plant Optimization – Definition (DRA) Phase for Duvha Power Station, ESKOM, South Africa. Package 2: Upgrade of the Coal Milling and Drying Process at the Boilers**

Duvha Power Station, part of the ESKOM fleet of coal fired power stations began operations in 1975 with its last unit being commissioned in 1984. With 6 x 600 MW units situated in the Mpumalanga region of S. Africa, the 3600 MW capacity, 26 year old power station is currently bearing the brunt of low coal quality leading to operational issues in coal handling milling, combustion and draught system and emission levels.

TCE has been awarded the Package 2 – Upgrade of the Coal Milling and Drying Process at the Boilers. The intention of the study is to facilitate refurbishment of the plant equipment (mills, air heaters, fans) and restoring efficiencies. The prime objective of the study is to assess the present plant and confirm the best feasible option so that coal related generation losses are eliminated.



Duvha Power Station, ESKOM



Poster Presentation on Biofuel from Waste Cooking Oil

#### **Biofuel from Waste Cooking Oil – Qatar Foundation Annual Research Forum**

Cooking oil is used daily at home and the hospitality industry. The used vegetable oils are just disposed off, which not only leads to environmental pollution, but also an enormous wastage. The used vegetable oils have the potential to be a feedstock for production of bio fuel by trans-esterification reaction and consequently leading to a low cost bio fuel production.

The objective of the study was to find an alternative and sustainable energy solution from using waste vegetable oil for replacement of fossil fuel. The article deals with description of the continuous trans-esterification process along with optimization of the process parameters. It also covers the technology that is utilized for the generation of biofuel with design of portable biofuel generation plant with higher efficiency.





# Qatar Quorum

A visit to TCE-QSTP LLC office at Doha, Qatar in October'11, gave TCE a peek into the operations of one of TCE's swankiest international offices. Nestled in the midst of the Qatar Science and Technology Park (QSTP) the trendy office suite seemed ideal for Research & Development, which is its primary focus. The TCE team found some time to share its high points with TCE.

Pramod Mirji, Dr. Sakthivel, Anthony Nixon, Dr. Kumar Agnihotra and Ganesh Murthy shared their ideas, thoughts and plans for the future.

## Research Focus

The office has earmarked a few core areas for research which include Materials, Renewable Energy & Biofuels, Applications of Nano Technology, Green Buildings, Software Applications for Construction, Catalyst Development and Oil & Gas. The office has a two pronged approach for acquiring research projects.

One approach is to seek collaboration with some of the renowned tech-universities which have a presence here in Qatar like Texas A&M (USA), Qatar University and North Atlantic Univ. (Canada). The idea is to lend expertise to the ongoing research projects at these universities.



Team TCE-QSTP

## Lounge Discussion



Lobby leading to the office

Another approach is to submit research proposals to *Qatar National Research Priority Funds (QNRPF)* which provides funding for innovative research applications. This can also be done in association with leading universities or research institutions.

Both the approaches do not call for any research infrastructure from our end. This aligns with TCE's USP as a knowledge provider.

*"We have identified some very innovative R&D topics and are in the process of submitting proposals to QNRPF in collaboration with universities. We have also contacted some corporate bodies for application research in solar energy and cement manufacture"* says the team.

## Knowledge Focus

The team members have also published review papers in international journals on topics viz., Recovery of spent catalysts used in gas to liquid process, Production of biofuels from waste cooking oil, Application of Nano technology in manufacturing hybrid solar cells, Application of polymer composites, and Solid state synthesis of Nano-particles. The World Petroleum Congress (WPC) has accepted Dr. Sakthivel's paper on spent catalyst recovery for presentation in the forthcoming 20<sup>th</sup> WPC scheduled in Doha.

TCE-QSTP is also involved in creating awareness for Nano Technology and Solar Energy amongst school students. The team has conducted numerous knowledge sharing sessions at high school level. *"We have covered close to 1100 school students with our climate change awareness program which got us the green today award"* shares the team.

## Business Focus

In addition to R&D, the team is also engaged in live projects offering engineering services.

While Pramod Mirji handles lead/enquiry generation for business acquisition, the team derives commercial support from the international business development team as well as the technical expertise across TCE. The current need of clientele for local presence of TCE with a sizeable team is also being addressed by augmenting the team size in a phased manner. Our recent success in acquiring projects from Doha Petroleum and Trans Gulf, Qatar bear testimony to the fact that TCE is surely gaining ground in the Qatari market. Power generation & distribution, Infrastructure, Oil & Gas, Waste Water, Chemical and other sectors are promising areas for business focus considering TCE's prowess in these areas. TCE's presence in the middle-east in most of these key areas, is an added advantage.

In addition, the team is also pursuing business opportunities in training wherein TCEites would offer services as faculty in training institutions.

## People Focus

Here's what the team had to say about Qatar & TCE-QSTP-LLC:

*"What I like about Qatar is that it is a process oriented country" "I am very optimistic about TCE-QSTP tapping the Qatar Market"*

*"Qatar is a green field area for R&D and TCE therefore has a promising future in this front" "The exposure that I am gaining makes me self-motivated"*

*"Today Qatar is the centre of growth in the middle east and we can leverage on this growth" "we are here to set a trend for innovation in TCE"*

*"I am lucky to be here" "The decision to move into a different culture gives you a chance to Expose yourself, Push yourself and Believe in yourself"*



# Celebrations With a Meaning



TCE-JSR celebrated Diwali with Missionaries of Charity - Nirmal Hriday where TCEites distributed sweets and crackers to the inmates. TCE-Pune – Under the initiative “Talking Books”, first set of recorded CD’s were handed over to the representative of Pune Blind School & Home for boys by the volunteers.

At TCE-Bangalore, Asha Centre For Developmental Disabilities organized an exhibition cum sale of various Diwali products made by senior students from their Vocational training Centre.

*While the season ushered in a number of celebrations, TCE offices across the country chose to lend a meaningful direction to their festivities by giving back to the society.*



## The Joy of Giving

*The “Joy of Giving” week saw a lot of activity from offices across the country. Books, clothes, shredded paper and more went on to light up lives in the festival season.*

TCEites at Pune pooled in their contributions and presented three CC TV cameras to an NGO.

TCE-Bangalore in association with Goonj (an NGO) organised a books & clothes collection drive. 26 carton boxes of clothes and books were contributed by TCEites.

TCE-Chennai supported the WOW (Wealth out of Waste) concept by ITC Ltd & RAMKY Group by giving shredded paper. The proceeds from the initiatives are used to procure stationery for schools and orphanages.



# Onam and Navartri



TCE-B ladies welcomed King Mahabali on the occasion of Onam, in traditional attire (*Mundu-Veshti*) and served a sumptuous lunch.

Karnataka bears a festive look throughout the Navrathri season. While Mysore is the Dasara Hub, Bangalore & Chennai is not far behind. The most endearing feature of Vijaya Dasami in S. India is perhaps the 'Gombe Habba' or 'Doll Display'.

TCEx captured the festivities - 'doll display' at TCE-Chennai & K R Adishesan's (Bangalore) residence.

*Festivities across TCE offices began with the arrival of King Mahabali for Onam and continued with the "Gombe Habba" of Navaratri*



## Diwali Dhamaka

*Lighting of small earthen lamps welcoming Lakshmi, the Goddess of wealth & prosperity, Multi-colored Rangoli designs, floral decorations and fireworks lend vivid, colorful imagery and grandeur to this festival which heralds joy, mirth and happiness for the ensuing year*

Goddess Lakshmi was welcomed by TCEites at TCE-JSR in the most colorful way .

The employees of TCE-B showcased their talents with intricate designs of Rangoli and Mehendi.

TCE-Raj Plaza invited Goddess Lakshmi with a vandanam song. Various competition winners won prizes during Diwali.





# Diwali Dhamaka



**TCE Raj plaza** celebrated Diwali-2011 in very a energetic and colorful way

The crown of the decoration was a giant TCE family tree depicting the wide spread of TCE's business in all sectors and standing tall on the roots of TCE values.

**TCE Pune** Lady Employees followed the concept of "Yellow Day" during the festive season and the photograph was published in the 'Maharashtra Times'- Pune edition on 30.09.2011.

*Celebrations at TCE showcased a mix of Indian Culture and Values nurtured in the veins of the TCE*



*Jingle Bells rang all around at TCE with Santa and his bag of goodies*

**TCEites @ Bangalore** spent a Saturday with their tiny tots and had loads of fun with masquerading, painting and quizzes galore for Children's Day.

Christmas had Santa visiting **TCE-Chennai & Blr** to bless TCEites with good fortune and left behind his Secret Angels to shower gifts and smiles.



# Picnics Galore



## Outings

All work and no play could make TCEites dull and boring. So, they rejuvenated themselves by going on picnics to the beach and trekking the mountains.

*Balance of Work and play*



## Expanding Knowledge

### TCE –B celebrated Library Week December 12<sup>th</sup> to 16<sup>th</sup>, 2011

Library week began with the inauguration of *Jnanadeep* Book Bank by OH-TCE-B. *Jnanadeep* is Book Bank for TCEites from TCEites consisting of reference books on all topics. Events during the week had a group discussion on the topic “TCE Library by 2020”, followed by a talk on “Plagiarism” by Mr. Rajendra Babu from Wipro and an exhibition of technical and non-technical books.



*Books are ones best friend. The Library week @ TCE-B emphasised this by reaching out to the TCEites, with events centred around the world of books.*





*Reigning Champions made their mark on the crease @ TCE-JSR & TCE-B during their Annual Cricket Championships.*



## CIG Games

TCE participated in an inter-corporate multi sports extravaganza - CIG, organized by Sportz Consult. More than 350 competitors (Male & Female corporate executives) from 40 companies participated in this event held at the Goregoan Sports Club in October 2011.

## TCCI Southern Chapter

The TCCI- Southern Chapter- comprising of all TATA companies in Bangalore met at TCE Bangalore . The agenda was to discuss the specifics of TATA Sangam, a Cultural and Sports event held at Bangalore every year.

Mr.Bhaskar Bhat, MD of Titan Industries and TSC president presided over the meeting. There was representation from other Tata companies like TCS, Tata Power, Tata BP Solar, Taj Vivanta, Tata Housing, Tata Capital, Tata Asset Management, Tata Sky, Tata Steel, Tata Global Beverages and Tata Motors.

TCE was represented by Mr. Anjan Bhattacharya, Mr. Ananthachar, Mr.R V Sheshagiri, Mr. Shahameer Syed & Mr. Anil Deshpande. Look out for more details on this event in the next edition of TCExpression.





This quarter was flush with knowledge sharing activities with TCEites presenting in noted seminars and workshops spread over Kochi, Mumbai, New Delhi, Bangalore and Doha.

Who	What	What else
 Mr. K C Keshre-GM-TCE-D	“Various options of single line diagrams for hydropower projects”	Published at Central Bureau of Irrigation and Power
Dr. Poonam Ahluwalia and Ms. Susmita Gupta along with Dr. Rajeev Garg*	“Natural Drains- Need for a concrete identity and parallel use”	Published in Water Today
 Dr. Poonam Ahluwalia Sr. Manager-TCE-Delhi	“Heavy metal leaching potential of discarded mobile phone wastes”: a laboratory-based study  1. Environmental and Occupational Health: Issues and Challenges” 2. Green Technologies in the Water/ Wastewater Sector”, “Research Priorities, Capacity Building & Collaboration Issues In Water & Sanitation” and “Ecosanitation”	Published in International Journal of Environmental Technology and Management (Vol. 14, Nos. 5/6, 2011).  Presented papers at 2nd National Conference on Green Energy Alternatives for Rural and Urban Development and International Symposium & at the International conference on SUSTAINABLE HABITA
 Mr. D.G Sonwane –GM along with representatives of TCE- Bangalore and TCE – Delhi	‘Water management- BAPL- A case study” (Authors: D. G Sonwane and Umashankar)	Paper presentation at World Aqua Conference held in Delhi
 Mr. GD Nigudkar –Dy. GM- TCE-Raj Plaza	“Pipe conveyors allow Mumbai power plant to use imported low-ash coal”	Paper published in “Powder and Bulk Engineering International, USA”
Ms.Kavita H Mudgal – Librarian - TCE-Raj Plaza	“KM in TCS : A Case Study”	Paper published an article in ISST Journal of Advances in Librarianship(Vol. 2, No. 1, 2011)

\* Co-authored by Experts beyond TCE





Who	What	What else
Dr. Bomi Patel – GM- TCE-Raj Plaza	“Ecology balance through solar energy”	Published in Chemical News (Official Journal of The Indian Chemical Council)(Vol. 8, No.5, 2011).
Mr.Ajit Deshmukh- Manager and E.Ramkumar- Asst. Manager TCE-Raj Plaza	“SSI analysis in dynamic domain for structures resting on rock media”	Paper presented in SMiRT 21, held in New Delhi
 Mr. Ramadevan K of TCE-Raj Plaza	“A Candle in the darkness” where- in he writes about the eternal grace and dignity of Mother Teresa and pays tribute to her with a beautiful sketch.	An article published in TATAWorld
 Ms. Divya M N –Librarian and Dr. Syed Shahameer Sr. Manager –TCE-B	"Library and Information Services @ TATA Consulting Engineers Limited (TCE): A Case Study"	Presented at a Social Conference SoFERENCE – 2011 Organized by TCS, Special Libraries Association, Asian Chapter and Karnataka Librarians Association(KALA)
 Ms. B.V.Sushma – Asst. Mgr. TCE-B	"Design of bored cast-in situ pile system in a highly varying ground profile"	Presented at Indian Geotechnical Conference IGC - 2011 held at Cochin
 Dr. S Sakthivel – Asst. Manager of TCE QSTP-LLC	“GTL Process and its Catalysis: A Systematic Review”	Presented 20th World Petroleum Congress in Doha
 Mr. M Sundararajan- Chief Manager-TCE-B	Presentation on Importance of Valves in Power Plant And Case Studies on Valves in UMPP (Ultra Mega Power Plant)	Presented at Valves conference-2011- Roadmap to Technological Leadership Organized by CII Venue-Mumbai, India



Mr. B R Parthasarathy (left) in association with Bloomberg Television receiving award from Chairman of International Property



World Class Architecture – TCE Siruseri

## Asia Pacific & Global Award

TCS Siruseri is a 70 acre complex, located in the IT highway of Chennai. It stands out as an iconic development in the cyber corridor, distinct in its style, grandeur, aesthetics and much more. The architecture is unique, the buildings are engineering marvels, the construction methodology is novel, and the facilities are cut above the rest.

The Project had several challenges to convert this world class Architectural marvel into reality and mammoth efforts from each stakeholder finally made Dream come true as the Project received the Asia Pacific award in May 2011 at Shanghai- China and Global award on 12 Dec 2011 in London.

TCE, as the Project Management Consultants was responsible for converting this architectural intent into reality at Indian Construction Environment

## National Award for Export Excellence

TCE is the proud recipient of the EEPC India National Award for Export Excellence. TCE was adjudged as the star performer in 2009-2010 in Engineering Services (Medium Enterprise Category). The Award was received by the Deputy Managing Director Mr. J P Haran, at New Delhi.





## TCE Champions the Innovation Cause

The TATA Innovista contest received a thumping response from TCE.

A total of 92 entries were registered by TCEite Teams across the offices to set a new “all time high” record.

It was a tough job for the internal examiners to evaluate the contributions. O K Muthappa, U Gopalakrishnan, T V Sarma, B B Gharat, A S Ashtikar , N W Ranadive , Dr. R. Lalchandani & Vinay V Joglekar, VP- Business Excellence examined the concepts with a ‘fine toothed comb’ to arrive at the finalists. Evaluation support was also lent by Subramaniam Wutha (Consultant to Tata Group on IPR matters) & Shrikant Chandratrey of TQMS.

Here’s a glimpse of the Innovative top 10 entries from TCE.

**Raj Plaza – Winner 1** - Transmission portability improvement introducing conical shields

MG Pendse  
N M Mandlik  
M S Repe



**Bangalore – Winner 2** -A new approach of FGD design in existing coal powered thermal power plant

A K Chaudhary, Anjan Bhattacharya  
Surendra Naidu, Ankur Arora, Greeshma V



**247 Park – Nuclear – Winner 3**

Cooling Tower Size Optimization  
Prashant Wani, P K Rakshit



**Pune – 4<sup>th</sup> place**

Modification in large span EOT grider crane  
M D Deshpande, Sachin Deshpande  
H K Paramar, Abhishek Deshmukh

**Kolkata – 5<sup>th</sup> place**

Consultancy service for slime dams in Joda and Noamundi mines  
Sudipta De, Dr. M B Roy

**Chennai – 6<sup>th</sup> place**

Design in One Click  
Joshua Richard, Rama Rao Para

**CNBU Jamshedpur – 7<sup>th</sup> place**

Reinforcement Ladder and CAGE for working inside well  
M V K S S Sastry, B K Singh

**Kolkata– 8<sup>th</sup> place**

Cut & fill volume optimization  
Y K Patanwar

**Pune – 9<sup>th</sup> place**

Industry Update Newsletter  
Tilottama Shirsath

**Jamshedpur – 10<sup>th</sup> place**

Structural Coffor dam for construction of raw water intake channel  
G R Rao, Neeraj Malhotra  
Biswanath Dey, Ankur Singh

## Sky Serpent

Today’s largest wind farms are the size of small towns, made up of turbines 30 stories tall with blades the size of 747 wings. Those behemoths produce a great deal of power, but manufacturing, transporting, and installing them is both expensive and difficult.

The solution, says inventor Doug Selsam, is to think smaller: Capture more power with less material by putting 2, 10, someday dozens of smaller rotors on the same shaft linked to the same generator.

“The wind-turbine design out there right now is a thousand years old,” Selsam points out, as he lets one of his carved wooden blades speed to a blur in the makeshift wind tunnel he’s made of the alley behind his Fullerton, California, apartment. He brainstormed his multi-rotor approach in the early ‘80s, in a fluid-dynamics class at the University of California at Irvine.

**How the Sky Serpent Works:** Aligned at the optimal angle, each rotor receives its own wind, increasing efficiency. Of course, more rotors also means more-complicated physics. The key to increasing efficiency is to make sure each rotor catches its own fresh flow of wind and not just the wake from the one next to it, as previous multi-rotor turbines have done. That requires figuring out the optimal angle for the shaft in relation to the wind and the ideal spacing between the rotors. The payoff is machines that use one tenth the blade material of today’s mega-turbines yet produce the same wattage.

“We’ve tested all kinds of wacko things that people think should make a lot of wind energy,” says Brent Scheibel, a former turbine tester for General Electric who now runs a wind-testing facility in Tehachapi, California. “The laws of physics take most of them out of the equation very early. Doug’s idea is one of the very, very few that I’ve seen that actually has a strong chance of making strides into the commercial world.”

Selsam says two rotors is just a start. Someday he sees his multi-rotor turbines stretching for miles across the sky.

Source: [www.popsoci.com](http://www.popsoci.com)



Wind wizard Doug Selsam sits beneath a prototype 25-rotor turbine that can produce three kilowatts of power. The other end is held aloft by a balloon.





## Business Architecture

Architectural workshop was held at Mumbai. Architects, seniors from Management and different business heads from various TCE office locations attended this workshop. The central theme of the workshop was 'Architecture as a major driver for Business' which included Challenges and Action Plans.



A teambuilding workshop was held at the Ramada Powai & Convention Centre. 45 participants from HR, Administration, IT, Business Excellence, Legal, Compliance and Secretarial departments went through interactive and experiential group activities that nurtured a sense of team spirit and brought out the best qualities in the group. The workshop also identified inherent strengths and weaknesses and exposed the group to an exciting new learning world outside the routine work life.

## A World of Learning







## Emotional South Africa

It is difficult to control emotions, particularly if they are related- however remotely- to the motherland. I am so sure of this, ask anyone who is away overseas.

There is a stronger India- South Africa relation than that meets the eye. It may be from Mahatma Gandhi's past or his autobiography the story of my experiment with truth, or the recent BRICS, or Gary Christen's coaching efficacy, one is reminded of South Africa. Having made this country home for some time now, I wanted a piece of history to be seen, experienced and be a part of it in this perspective.



View from Harrismith

As usual I approached my group of friends to explore with me. While Shivanand and Nagaraj were unwilling to travel in this inclement weather, Sridhar and Santhosh were ready to take the risk. Emotions were running high for no apparent reasons. Argument also broke on which car we take. Whether Nisaan Tiida or Nagaraj's Yarris or Sridhar's Accent? Finally we decided to drive to Durban in Accent. It was mid-June, peak winter with mercury resting most of the times at minus three and unwilling to climb beyond ten degrees in the KZN province. We watched weather report for a warmer weekend, which was elusive and hence made up our mind to pack ourselves in all available outfit.

Our first halt was Harrismith. Harrismith is well known as a convenient re-fuelling stop. The town is home to the largest truck stop in the Southern Hemisphere. By the time ordered coffee was brought to our car, it was just lukewarm. The boy couldn't clean windscreen as water was frozen. We also heard from him that lots of farm animals were frozen to death.

From then on, the drive was the best we enjoyed. With not much of traffic and no restrictions on speed, needle remained on 180 mark for almost twenty minutes. When we were nearing Umgeni river bed, a direction post confused us as there were more than ten water falls in the vicinity. Having circled for about twenty minutes to spot a good one, we decided to see the tallest one hence drove towards Howick falls. Howick is a 100 meter waterfall, largest in KwaZulu-Natal Province.



Which Direction?

The falls were most likely first seen by European explorers in the early 19th century. According to local legend the pool at the bottom of the falls is the residence of the Inkanyamba a giant serpent-like creature. Because of its chequered history, this area has become a principal tourist attraction for all those traveling towards Durban.

It was time for a quick snack. Nagaraj opened a bag to take out the sandwiches we prepared that morning, but there were no sandwiches. He had left them on the breakfast table back home! Blame game sparks started flying. All were hungry beyond the tolerance limit. I lost my patience and shouted at him and others for their negligent act. Never expected this sort of an outburst, all fell silent. Well, the day was certainly not in my favour.

Sridhar took the wheels and I sat back in the passenger seat. I was so absorbed in my thoughts that I did not notice we were passing Pietermaritzburg. Pietermaritzburg is a beautiful town with sprawling buildings, tree lined bungalows, typical of colonial era. This town was the last settlement of the British Empire.



South Africans are very emotional about its history. I asked directions to railway station the first person I met. I requested Sridhar to drive back to the town. Reluctantly, as has happened many times earlier on, he obliged. When reached, all were unwilling to get down from the comfort of warm interiors of the car.



**Pietermaritzburg railway station**

The station is a stop for long-distance passenger rail services. The nice-looking red brick Railway Station building is from the Victorian age. This is where Mahatma Gandhi was evicted from train in 1893. How can we afford to miss seeing this station, a piece of history? After the luggage was tossed out on to the platform and when the train steamed away, Mahatma got into the waiting room. 'It was winter. The cold was extremely bitter. My over-coat was in my luggage, but I did not dare to ask for it lest I should be insulted again, so I sat and shivered'. His words from the autobiography I was reading till then were echoing in my mind. One can understand the biting cold when he encounters it. I was experiencing that cold moment at that time! After reading the inscriptions on a plaque on the wall, unknowingly my eyes filled with mist. I was trying to recollect what I read couple of months back.



In 1997, in a moving ceremony, India's then High Commissioner to South Africa, Gopalakrishna Gandhi, received the Freedom of Pietermaritzburg award on behalf of his grandfather from Nelson Mandela. An emotional Gopalakrishna said 'When Gandhi was evicted from the train, an Indian visiting South Africa fell but when Gandhi rose an Indian South African rose'.

When I mentioned this, the group fell silent again. This time it was silence of emotions.

*Text and photos by:  
Ravi Naik - Dy. GM*

*Johannesburg, December 2011*



## WORDS

Words are so potent

That they can:

Make promises...

Break relations...

Take hearts...

Forsake pains...

Fake truths...

But also sooth

The heart that yearns,

More than that, they teach

Whatever man learns...

So words are the best solutions

To the problems,

Words themselves made...

*Divyesh Joshi – TCE-Sr. Engineer- Raj Plaza.*



My wife never trusts me with an umbrella as she apprehends that it would invariably get lost sooner than later. She insists on sending my son along with an umbrella to accompany me to catch the chartered bus to office to retrieve the umbrella on my boarding the bus. Attachment to such mundane objects appears strange; but perhaps, is necessary for those who are not accustomed to carrying paraphernalia such as umbrella, cap or beret, walking stick etc.

My grandfather was very particular in carrying with him an umbrella whether it was sun or rain. We would often observe him placing the neatly folded umbrella at appropriate places to cross small pot holes on the streets. And when we went to get a professional portrait of him, he insisted on perching his



umbrella in front of him while posing for the picture. Our fascination for umbrellas grew when the more fortunate amongst our family members traveled abroad and brought back fancy umbrellas as presents. We admired these seemingly art objects and tucked them in our almirahs with a sense of possessive pride to be displayed to our envious neighbors and friends as if these beauty objects were our own creation.

It appeared intriguing as to why our relatives always chose only umbrellas as presents - was it always raining in the foreign lands? - were our relatives really concerned about our not getting wet during the rains in India? It was only during my recent official trip to the Middle East that the whole truth unfolded. When my foreign jaunt was nearing completion, and on searching for gifts for my relatives at home, it became clear that all items were very expensive and unaffordable except the fancy umbrellas.

In the movie 'Rajni Gandhi', Amol Palekar meets Vidhya Sinha when she offers to share her umbrella with him. The meeting evolves into a very successful romance between the two with a happy ending when they become life partners. Opportunities do arise when many others share their umbrellas with winsome ladies; but such episodes do not necessarily end up in life long association.

So it was surprising when recently my wife insisted that we buy an umbrella for the untimely rains, as it was literally raining umbrellas at home. She however clarified that we required cheap desi umbrella for protection against the rains.

**V Sethuraman- Consultant-TCE Raj Plaza**



During Deepavali time, we greet each other "Happy Deepavali". We do that quite mechanically. I was wondering what exactly this greeting signifies. I thought that I should share my thoughts on what "Happy Deepavali" means to me. Incidentally "Deepavali" got corrupted to "Diwali" with the passage of time.

In "Happy Deepavali" there are two words - "Happy" and "Deepavali".

Let us first take the word "Deepavali". What does it mean? This word has two parts, "Deepa" and "Avali". "Deepa" means light and "Avali" means string or row. Therefore "Deepavali" means row of lights.

How is happiness related to "Deepavali", the row of lights?



When there is pitch darkness all around, one does not feel safe and secure. When one is in pitch darkness, if a small speck of light in the form of a lamp is brought in, one feels relieved because the person is able to find his or her bearings. If a row of lights is brought in, the room is lit up so nicely that one feels very happy to be relieved from the darkness. Don't we feel overjoyed and even clap our hands, when the lights come back, after a sudden power failure in the night and when we are struggling to find our bearings? Thus, there is no doubt that we experience happiness with the arrival of lights.

Is this adequate to get the full measure of happiness? No, it is not. In solving an engineering problem, we say that we solved the problem using a programme. When someone asks us, "do you know how this programme is made?" we say, "No, it is a 'black box' to us". What does this mean? 'Black box' indicates darkness and it signifies darkness of ignorance.

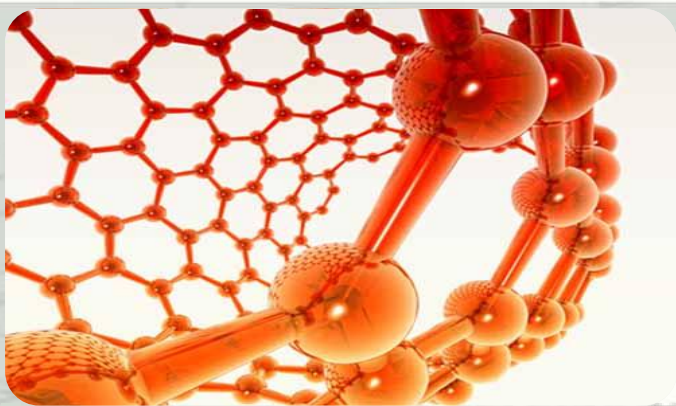
If someone asks, "What is 1+1?" and if we are ignorant of the answer, we can say that we are in the darkness of ignorance. If we gain the knowledge of "1+1=2", we can say that the darkness of ignorance has been replaced by the light of wisdom. There is tremendous joy or happiness, when one gets the knowledge. Don't we experience this happiness, when we solve a problem, which has been bugging us for long? Thus one gets happiness internally due to the light of knowledge. Thus one gets happiness due to lights around and one gets internal happiness due to the light of knowledge. Hence light and happiness are related to each other.

Now that I know the meaning and significance of both the words - "happy" and "Deepavali", I am satisfied that I wished you all "Happy Deepavali" and accepted the same greetings also meaningfully, rather than mechanically.

**Mr. K.Gopalakrishnan- Consultant TCE Chennai**

## Nanotechnology in Daily Lives

Although referred to as the “next big thing” in manufacturing and medicine, Nanotechnology is the “hottest” stuff in cosmetics”. The concept of nanotechnology itself is not new. As a matter of fact, the sub micronising concept has been around since 1959, and Professor Richard P. Feynman is credited with describing nanotechnology in a speech that alluded to size. He said, *There’s Plenty of Room at the Bottom*. At the time Feynman’s idea was seen as purely theoretical. The term ‘nanotechnology’ was first used in a 1986 book, *Engines of Creation* by K. Eric Drexler. One would get a few more names associated with firsts in use of the word “Nanotechnology”



French researchers have found that ancient Egyptians, Greeks and Romans were using nanotechnology over 4000 years ago !!!!! What application you would ask. In hair dye, is the reply.

Nanotechnology has been dominating the scientific and Innovation news lately, but what exactly is it and how can a common man see the benefits of nanotech? Firstly **Nano Size** is simply defined as one billionth of a meter. Just picturise a dimension of about 60,000 times smaller than the diameter of a normal human hair! That is what we are talking about. Nanotechnology(or just “nanotech”) in the consumer sector refers to the exploitation of almost molecular size materials ( many times smaller than microscopic) for various uses such as in dental bonding agents, in toothpaste, in cosmetics and health / medical products.

It transcends all boundaries of conventional sciences orchestrating joining different fields of sciences - biology, botany, physics, chemistry, and engineering. Since the size is close to the light wavelength ordinary microscopes will not help seeing the structures. To detect and ‘see’ nano particles we have different techniques – scanning electron microscopy,.

Today nanotechnology is being used in electronics, energy, computer science, medicine and cosmetic manufacturing in varied applications. Research in the medical field has shown that nanotechnology can help with the healing and repair of skin tissue. Cancer cell blasters can be transported to the target with precision so that only affected rogue cells can be killed without damaging the healthier cells around. A tall order but we are close. In the cosmetic arena it is believed that the smaller particles are more readily absorbed into the skin so that lesser quantity of chemicals can do greater wonders. It is believed that as new products are developed nanotechnology may be used to prevent graying hair and even combat hair loss.

Nanotechnology is surely elevating the development of skin care products to the next level, making them so high-tech that smaller players will have little space on the retailers’ shelves. Just about 10 players are causing a ripple in the field of cosmetics. L’Oreal for instance has used nanotech for Revitalift anti-wrinkle cream which contains “nanosomes of Pro-Retinol A”. Estee Lauder is another player with its own bag of tricks for the beauty conscious. Proctor & Gamble, Shiseido and Duprey Cosmetics are some other known names in this field .

Personal Care Industry is in a high tech orbit and due to its relative newness there is enough concern expressed all across. How safe nanotech cosmetics are and what are their long-term ill effects if any, are the questions to be yet conclusively answered. The FDA (Federal Drug Administration, US) and The Royal Society (UK) have issued statements calling for continued testing and transparency in research for the application of nanotechnology in skin care products. Some nanoparticles have received FDA approval. One such early approval is for both zinc oxide and titanium dioxide which have been included in sunscreen. Way back in 1996 itself the FDA is reported to have concluded that “... smaller, micronized particles of titanium dioxide are not new substances and that there is no evidence demonstrating that these micronized particles are unsafe.”

Nanotechnology is not going away; it will become a part of life and is expected to result in significant improvement in the quality of life as we know it.

**Dr. BPJ Patel**  
**BD-BU Head**  
**TCE Raj Plaza**



I was working on expansion of an old high voltage substation. Two new feeders were being added. The new feeders were equipped with modern digital relays whereas the existing feeders had old fashioned electromechanical type of relays. I was bit tired and so decided to relax in a chair in the control room. I was alone and it was almost midnight. I closed my eyes and fell asleep. Suddenly I heard whispers coming out from the old relay control panels. It appeared as if the relays were talking to each other.

“Namaskar OCR”, Differential Relay (DR) greeted Over Current Relay (OCR).

“Namaskar DR, How are you? Looking relaxed!” OCR responded.

“Yeah! We hardly had any job to do in our life time.” DR replied. “But we frequently need to act.” OCR replied.

“You have to, because of demand of power more than the capacity of the feeder. You only have to save the Grid from collapsing.” DR replied with appreciative remarks. The conversation was interrupted by Earth Fault Relay (EFR).

“Namaskar friends!” EFR greeted other old relays. Oh! How are you EFR? “Fine friends!” EFR replied.

“Yesterday why didn’t you operate in time? Do you know, it was because of your slackness, the entire city was in dark for two hours?” DR almost shouted on EFR.

“I am now getting old. Due to this arthritis, my disk was sluggish. Therefore before it could move completely, the other relay tripped the entire substation. I am sorry to say that my colleague could have waited for my response.” EFR clarifies.

“But the blame comes on entire panel” OCR reacted angrily. “Have you heard the testing engineer recommending his boss to retire all of us and replace with digital relays?” OCR further added.

“Yeah, I heard” EF Relay replied. Nervousness could be easily noted in his voice. A laughing noise emerging from the digital relays interrupted the conversation.

“Hi uncles, by now you must have accepted that your time has gone. You know, how fast and how perfectly we operate? Our one relay can even perform the function of 5-6 old relays.” The digital relays addressed to the old relays. This embarrassing taunt on the old relays was enough to upset them.

The old relay became sad on remarks of new relays. It hurt their sentiments. They realized that they had really become old. Though they served the substation with sincerity and honesty for past 30 years, the new generation relays made them outdated. The old relays were not unhappy with their getting retired.



In fact the thing worrying them was their production which was likely to be stopped. It means their species will soon be extinct from this Earth.

My sleep was suddenly disturbed due to the buzzing from digital relay panels. The alarm window flashed in the new panel “communication channel failure”. It meant the new relays would no more be working till the communication is restored. I immediately acknowledged the alarm and investigated the cause of trouble. I was thinking that the new generation digital relays are fast and perfect but only till they are communicated to in *their own language*. On the other side, the old relays serve silently with no dependency on any sort of communication protocol. They will not raise their voices even if they burn and sacrifice their lives.

It was really strange to note, “How human behavior and technology are going hand in hand with time”.

**K.C. Keshre, GM , TCE Delhi**

## Duo Performance

TATA Network Forum (TNF) – North organized “SPANDAN” (A Cultural Confluence) at Delhi. An amazing classical piece on violin was presented by **Ishika Goswami** daughter of **Dr. Monomoy Goswami** from TCE Delhi. Ishika’s performance, accompanied by Dr Goswami on Tabla, was the only participation from TCE in that program presented by selected performers of Tata Group of companies of North Zone



## The Rockstar of the East

An amateur Guitarist ( Base & Rhythm ), Jay Tiwari (TCE-JSR) also part of Band ‘**Kross**’ were declared as “**The Rockstar of the East**” while participating in “The Real Rockstar Hunt” by PVR Cinemas-UTV Stars & Super hits & 93.5 Red FM on 4th Nov. '11 in Kolkata.

‘**Kross**’ competed with **24** other Bands at Jamshedpur level , **3** other bands at the Eastern region level and emerged as “**The Rockstar of the East**”.

Later they performed Live in Delhi on 9th Nov. '11 in front of the 'Rockstar' movie cast and crew, and could grab “**Runners-up**” at national level .



## Lighter Side of Life

A smart young man goes to the Church.

He prays to God: Oh Lord, you have been taking care of this Universe for millions of years ever since the universe was formed. How large is a millennia to you?

God: Million years are like a second to me.

Young Man: Lord, on a similar scale, what is a million dollars to you?

God : Million dollars are like a penny to me.

Young Man : Lord, can you give me a penny?

God : Yes. Just a second.

**Ajit D Solankurkar**  
Consultant – TCE-M

Patient: Doctor, I have a problem with my dreams.

Doctor: Tell me what is the problem

Patient : "Every day I dream of playing foot ball"

Doctor: "Well, there is nothing wrong in that. It shows your passion for the game."

Patient: "See, the problem is that the team members are all donkeys and not human beings".

Doctor: "Oh. Not to worry. I will prescribe a pill which you should take for 9 days, before you go to bed and you would be ok."

Patient: Thank you doc. Can I start this pill from tomorrow?"

Doctor: "Why? You can start it from today itself. "

Patient: "No doctor. We have planned the FINALS TODAY."

**Keshavamurthy**  
Consultant – TCE-B





Dear Editorial team  
and Sponsor,

Congratulations on a  
well produced and  
informative Magazine  
which has been  
reintroduced.

Particularly loved the  
collective for baboons.

Well done Ms Vidya  
Desai.

Best wishes

Farokh N Subedar  
COO-TATA Sons,  
Director-TCE

"I must compliment the  
team in doing a great job  
of bringing out the first  
issue. It also leaves me  
with a lot of hope that  
we can look forward to  
something new in each  
forthcoming issue"

J P Haran – Dy. MD, TCE  
*During an interview with  
TCEx*

Congratulations to the  
editorial team.

The new "Avatara" of  
TCE newsletter is very  
interesting and  
impressive as well.

Indeed, there has been a  
dedicated hard work  
behind, which has  
resulted in shaping of  
TCExpression.

With best wishes,  
Shekhar Deshmukh  
Chief Manager  
TCE-Mumbai



The TCE Newsletter made its appearance in its current *avatar as* TCExpression in September 2011.

The formal launch of the quarterly in-house news magazine was on 19<sup>th</sup> September 2011. With the press of a button, the then MD & CEO, Mr. R. Srinivasan launched it to reach TCEites' monitors across offices and sites.

The launch ceremony was video conferenced across offices and was viewed by the entire editorial team from seven different locations.

## TCEx Launch



## Give Me A Name



**Ms. Kavita Mudgal** (TCE-Raj Plaza) won the 'Give Me a Name' contest for her entry which re-christened the news letter as *TCExpression*.

With 100+ entries from across TCE, it was a tough call for the panel of judges.

Kavita who received her prize from Mr. Rakesh Gupta, Snr, EVP remarked *"I am happy to receive this prize as "Give Me a Name Contest" was conducted across TCE. I have suggested TCExpression because communication means transmitting information and this newsletter acts as communication newsletter for every TCEite, customers, suppliers and partners, and it is also a channel for creative expression."*





TCE Expression introduces a new section to ring in the New Year and bring on the smiles. **Hard Hat Humour or H<sup>3</sup>** as we would like to call it, shall be featuring cartoons by our very own TCEites who have won the H<sup>3</sup> contest.

We take pride in welcoming aboard **Santosh Bhavan** (Lead Cartoonist) and **Karthik B & Varsha Kaveri K M** (Associate Cartoonists.)

**Winner 1**  
**Santosh Bhavan**  
**TCE-Pune**

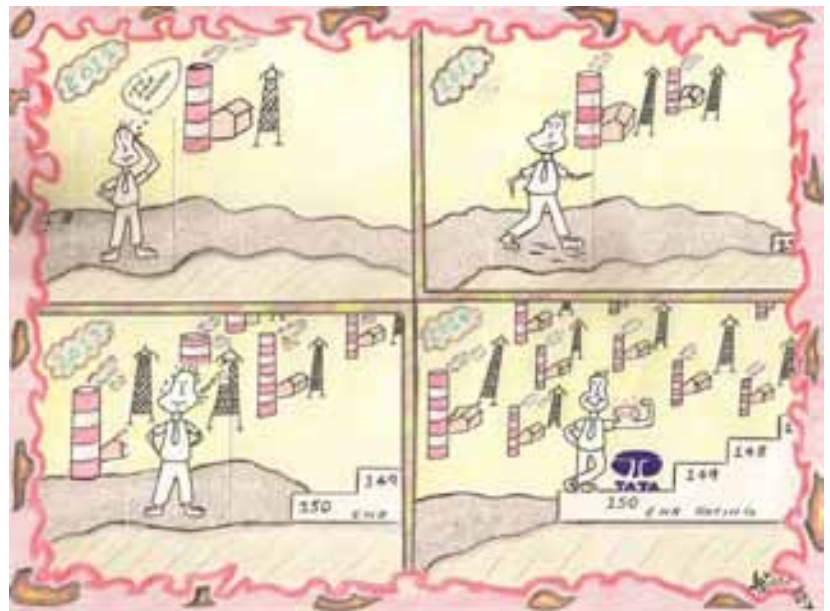
The H<sup>3</sup> contest drew a total of 23 entries which were evaluated by Mr. B G Gujjarappa, who is a Member of Indian Institute of Cartoonists and also Cartoonist for the Deccan Herald newspaper.



**Winner 2**  
**Karthik B – Asst. Engineer**  
**TCE-Bangalore**



**Winner 3**  
**Varsha Kaveri K M-Asst. Engineer**  
**TCE- Bangalore**





# TCExpression

## In House Newsletter

TCExpression Magazine is a quarterly communication channel and an in-house newsletter for Tata Consulting Engineers Ltd., that strives to capture the happenings across TCE and keep every TCEite (& the world beyond) informed, inspired and involved.



**TATA** CONSULTING ENGINEERS LIMITED  
Engineering A Better Tomorrow

For Restricted Circulation