Newsletter

Volume 5, Issue 3, March 2015

Mechanical Aspire

Achievements in Sports, Projects, Industry, Research and Education

## All about Nobel Prize- Part 15

## The First Nobel Prize was awarded to a Mechanical Engineer

Wilhelm Conrad Röntgen

The Nobel Prize in Physics 1901 was awarded to Wilhelm Conrad Röntgen

"in recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him".

**Wilhelm Conrad Röntgen** was born on March 27, 1845, at Lennep in the Lower Rhine Province of Germany, as the only child of a merchant in, and manufacturer of, cloth. His mother was Charlotte Constanze Frowein of Amsterdam, a member of an old Lennep family which had settled in Amsterdam. He did not show any special aptitude, but showed a love of nature and was fond of roaming in the open country and forests. He was especially apt at making mechanical contrivances, a characteristic which remained with him also in later life.

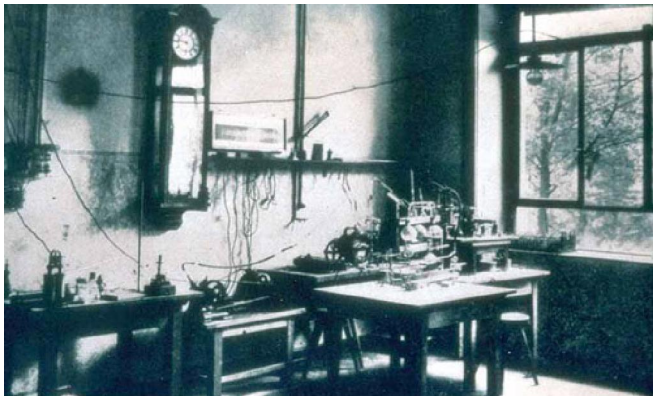
He entered the Polytechnic at Zurich by passing its examination, and began studies there **as a student of mechanical engineering**. He attended the lectures given by Clausius and also worked in the laboratory of Kundt. Both Kundt and Clausius exerted great influence on his development. In 1869 he graduated Ph.D. at the University of Zurich, was appointed assistant to Kundt and went with him to Würzburg in the same year, and returned three years later to Strasbourg.

In 1875 he was appointed Professor in the Academy of Agriculture at Hohenheim in Württemberg. In 1876 he returned to Strasbourg as Professor of Physics, but three years later he accepted the invitation to the Chair of Physics in the University of Giessen.

Röntgen's first work was published in 1870, dealing with the **specific heats of gases**, followed a few years later by a paper on the **thermal conductivity of crystals**. Among other problems he studied were the electrical and other characteristics of quartz; the **influence of pressure on the refractive indices of various fluids**; the modification of the planes of polarised light by electromagnetic influences; the variations in the functions of the temperature and the compressibility of water and other fluids; the phenomena accompanying the spreading of oil drops on water. **Röntgen's name, however, is chiefly associated with his discovery of the rays that he called X-rays.**

On a dark November evening in 1895, Wilhelm Conrad Röntgen was perplexed by a fluorescent screen in his laboratory that was glowing for no apparent reason. Röntgen's experiment on how cathode-ray tubes emit light appeared to be affecting something that was not part of the study. It took weeks spent eating and sleeping in his lab to identify the cause of this mysterious glow – a discovery with which Röntgen's name is linked for all time, and which earned him the very first Nobel Prize in Physics in 1901.

Röntgen's discovery of a new form of energy would be subsequently named after him, but he always preferred the term X-rays – from the mathematical designation for something unknown – as no one understood what these remarkable rays actually were. In a series of experiments Röntgen discovered X-rays could travel distances of metres, and could pass through materials such as cardboard, wood and aluminum unimpeded, but not denser materials such as lead and, perhaps more notably, bone.



Wilhelm Röntgen's laboratory at the University of Würzburg, where he made his discovery of x-rays.

When Rontgen immobilised for some moments the hand of his wife in the path of the rays over a photographic plate, he observed after development of the plate an image of his wife's hand which showed the shadows thrown by the bones of her hand and that of a ring she was wearing, surrounded by the penumbra of the flesh, which was more permeable to the rays and therefore threw a fainter shadow. **This was the first "röntgenogram" ever taken**. The stark images of Röntgen's first X-ray-photographs, in particular a ghostly picture of his wife Anna Bertha's hand, with bones and a ring on her third finger clearly visible, had a profound effect worldwide. Accounts and images of Röntgen's experiments appeared in almost every newspaper and scientific publication. *Doctors instantly realised this new photographic technique could help them look inside the human body without surgery, and* ***within weeks were using X-rays*** *to diagnose bone fractures, locate embedded bullets and identify causes of paralysis.*

World's first X-Ray


*In further experiments, Röntgen showed that the new rays are produced by the impact of cathode rays on a material object. Because their nature was then unknown, he gave them the name X-rays.*

*Later it was proved by others that they are of the same electromagnetic nature as light, but differ from it only in the higher frequency of their vibration.*

**Personal Life**

- **Röntgen refused to patent his findings**, convinced that his "**inventions and discoveries belong to the world at large**." That is why Researchers worldwide could experiment on X-rays.
- **He also donated the entire Nobel Prize money to his University.**
- Röntgen married Anna Bertha Ludwig of Zürich, whom he had met in the café run by her father. She was a niece of the poet Otto Ludwig. They married in 1872 in Apeldoorn, The Netherlands.
- They had no children, but in 1887 adopted Josephine Bertha Ludwig, then aged 6, daughter of Mrs. Röntgen's only brother.
- Four years after his wife, Röntgen died at Munich on February 10, 1923, from carcinoma of the intestine.

House in which Rontgen was born is now a museum

**Honors and awards**

Even before Nobel Prize,

Rontgen had been awarded several prizes

- Rumford Medal (1896)
- Matteucci Medal (1896)
- Elliott Cresson Medal (1897)
- Nobel Prize for Physics (1901)
- In November 2004 IUPAC named element number 111 roentgenium (Rg) in his honour. IUPAP adopted the name in November 2011.


In Wurzburg, where he discovered the X-Rays, a non-profit organization maintains Rontgen's laboratory and provides guided tours to the Rontgen Memorial site


Rontgen Laid to rest...

Roentgen discovered X-rays in a little room of the Physical Institute of the University "located on the Roentgenring close to the corner of the Koellikerstrasse. On the outside of the building there is a large plaque which reads as follows: 'In this building in the year 1895, W.C.Rontgen discovered the rays named after him'. The actual room where the discovery was made is still there […].

It is also possible to see the lecture room that Rontgen used. It is more or less the same as in his days. Of great interest also are three display cases containing some of Rontgen equipment, etc. Amongst other things exhibited here are: his Nobel Laureate Certificate; his hunting gun, with a very early photograph of the loading breech; an x-ray photograph of the hand of Professor G.*[sic!]* Koelliker (Professor of Anatomy), and another of his wife's hand; a commendation from the German Physics Society, signed by both Max Planck and Albert Einstein!"


In the memorial site, this structure depicts X-rays penetrating hard rock

## Corporate Story 3 – The Rane Group

This is a series aimed at creating awareness on powerful Industrial Groups that have a great potential to employ our students. It is hoped that students understand the companies and their underlying philosophies so that they can develop the right attitude to get employed.

Rane

Expanding Horizons

- Group turnover of 494 million USD for the year 2013 - 14
- Preferred supplier to major OEMs in India and Abroad
- Serves a variety of industry segments: Passenger Cars, Multi Utility Vehicles, Light Commercial Vehicles, Medium & Heavy Commercial Vehicles, Farm Tractors, Three-wheelers, Two-wheelers and Stationary Engines

**Technology**

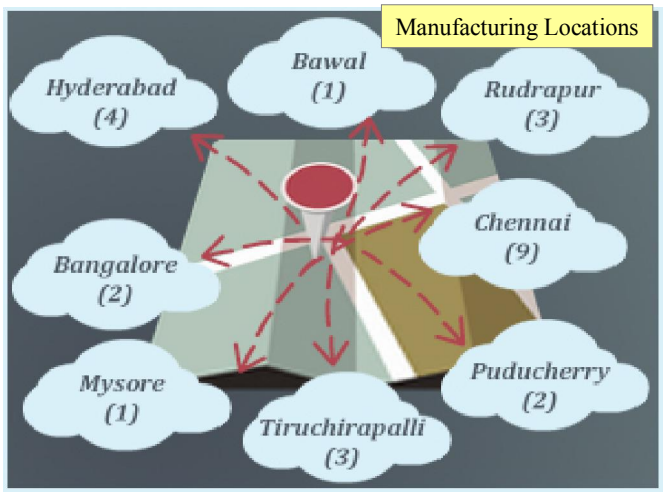
- Rane Group partners with a wide spectrum of auto majors to provide concept to product solutions. This is made possible by well integrated design, manufacturing & testing facilities at each of the group companies.
- Being manufacturers of safety and critical components, technology development has been a focus area in all the Rane Group companies. Rigorous testing, continuous upgradation of inhouse technology and support from strategic development partners has enabled Rane to enhance technical competencies at all levels.
- Leverage the technology portfolio of our 3 major partners – TRW, NSK and Nisshinbo.
- With a vision to become technologically self sufficient, we are steadily increasing our R&D Investments – from 0.5% of sales in the past to 1.5 % in the future.
- Technologies developed in recent past – Hydrostatic Steering Unit, New generation pumps-drooping flow, Seat belts-Pre-tensioner & Child restraint, Tilt & Telescopic column with integrated collapse, NVH reduction and lower telescopic load and Electric Power Steering.

**Modern Manufacturing Facilities**

Facilities consistently upgraded to meet technological advancements
Integrated production lines for all group companies on par with world standards

**Product Development & Testing Capabilities**

Significant portion of the group's turnover invested in Research and Product Development
Simulation techniques and exhaustive testing mechanisms implemented regarded as the industry standards




**Total Quality Management (TQM) - A Way of Life**

Rane Group companies adopted Total Quality Management (TQM) in the year 2000.

TQM is the foundation for Operational excellence.

Quality Management

- All seven companies are TS 16949 certified.
- Rane Group companies are in tune with International quality assurance standards.
- Pursuit of excellence is through implementation of Total Quality Management (TQM) practices.

- Rane firmly believes in,
    - Customer focus
    - Process orientation
    - Continuous improvements
    - Systematic approach to identifying and solving chronic problems using statistical thinking
    - Standard Operating Procedures, and
    - Fact based decision making

**The Path of Growth...**

| | |
|---|---|
| 2013 | Rane Brake Lining Limited wins Deming Grand Prize (formerly JQM)<br>Rane TRW Steering Systems Limited - Occupant Safety Division (OSD) commenced manufacturing of Airbags |
| 2012 | Rane (Madras) Limited wins Deming Grand Prize (formerly JQM) |
| 2011 | Rane TRW Steering Systems Limited (SGD) wins Japan Quality Medal (JQM) |
| 2008 | Rane NSK Steering Systems Limited commenced manufacturing of Electric Power Steering |
| 2007 | Rane (Madras) Limited wins Deming Prize |
| 2005 | Rane Engine Valve Limited wins Deming Prize<br>Rane TRW Steering Systems Limited - (Steering Gear Division) wins Deming Prize<br>Invested in High Pressure Die Casting products |
| 2003 | Rane Brake Lining Limited wins Deming Prize |
| 2000 | TQM launched under guidance of "Union of Japanese Scientists and Engineers", Japan |
| 1995 | TRW JV also commenced manufacture of occupant restraints<br>Established JV with NSK for Energy Absorbing Steering Columns<br>Founded Rane Institute for Employee Development |
| 1991 | Established JV with JMA for distribution of auto components |
| 1987 | Established JV with TRW for Power Steering Systems |
| 1975 | Started manufacture of Manual Steering Gears |
| 1974 | Established Kar Mobiles Limited to manufacture Automotive and Large Valves |
| 1964 | Started manufacture of Friction Material |
| 1960 | Established facility to make Tie Rod Ends |
| 1959 | Diversified into manufacturing and established plant for IC Engine Valves |
| 1936 | Incorporation as Public Limited company |
| 1929 | Rane was founded as a distributor of automobiles & parts |

**Awards**

| Deming Prize | Deming Grand Prize (formerly JQM) |
|---|---|
| 2003 – Rane Brake Lining Ltd.<br>2005 – Rane Engine Valve Ltd.<br>2005 – Rane TRW Steering Systems Ltd. (SGD)<br>2007 – Rane (Madras) Ltd. | 2011 – Rane TRW Steering Systems Ltd. (SGD)<br>2012 – Rane (Madras) Ltd.<br>2013 – Rane Brake Lining Ltd. |

**Rane Foundation - CSR initiatives**

- Rane Group contributes to societal causes through Rane Foundation, a Public Charitable Trust founded in the year 1967, and is the main arm for Rane Group's CSR initiatives
- Rane Foundation's initiatives are focused on education, healthcare, environment and community development
- All plants involved in development activities in their neighbourhood
- Established Rane Polytechnic Technical Campus (RPTC) - A self financed Polytechnic College to empower students with Technical knowledge and Industry Specific skills. Visit Rane Polytechnic Technical Campus (RPTC)

  Rane Foundation - CSR Initiatives: Read More

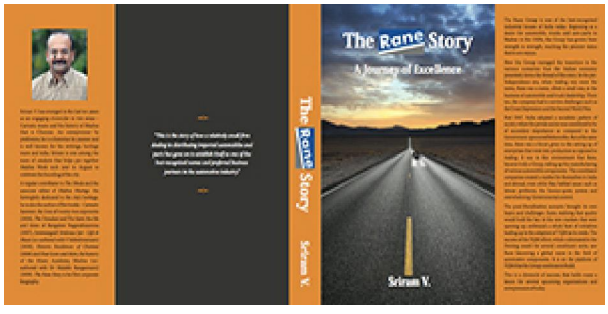
**Active Environment Concern**

- Twenty plants accredited to ISO 14001 certification
- The plant set standards higher than mandated by law to continuously reduce industrial waste and pollutants
- Rane Engine Valve Limited - Received Green Vendor Development Award (GVDP) 2011-12 from Hero Motocorp Ltd.
- Rane (Madras) Limited - Received Green Nurturing Program Award 2012 from Karnataka State Pollution Control Board

  Clean & Green Initiatives: Read More

**For a History of the Group and its businesses**, read the following links


http://www.rane.co.in/pdf/aboutus/rane_corporate_brochure.pdf




http://www.rane.co.in/pdf/aboutus/RaneHistory.pdf

a 326 page history about the amazing business strategy of Rane

## Info to Alumni – Campus Update

## SSN introduces a New celebration- Doctorate Scholars' Day

SSN Research Centre introduced a new concept of celebrating Doctorate Scholars Day, as suggested by the Research Advisory Council. On Feb 25, all Full Time Scholars made a presentation of their work in oral/ poster sessions. The presentations were evaluated by external experts and best three were awarded. President, Principal and Dean Research graced the occasion. The day long event was concluded with a dinner for all the Full time Scholars and all the SSN Ph.D. Supervisors.

## NSS wing swings into action

The NSS wing of SSN conducted its Annual camp at the Government Primary School at Periyar Nagar, Illalur circle, Thiruporur, between 18 and 24 Feb. The theme for the year was "Healthy Youth for Healthy India". The activities included survey of needs, cleaning up of the premises, Science exhibition, Health camp, Sports Activities, fencing the campus etc.

## Training on Fire Safety

M/s. Pentagon Fire Safety Equipments & Services demonstrated about the preventive and safety measures to be taken for avoiding fire accidents and also gave instructions about the method of operation of Fire Extinguishers in case of fire break out. All the Lab Assistants , Electricians, Security Guards, Staff and Students were invited to witness the demo at 2.30 p.m. in the parking lot of Mini-Auditorium on 11.02.2015 (Wednesday). **The event was Organized by Mr.K.Ganesh Prasad, Head of Construction and Facilities.**

All lab assistants of mech dept attended the program and found it very useful.

Workshop by Humanities dept

Dr.S.Thiruvenkataswami writes..

**English Department conducted a one day workshop on "Teaching Reading Skills" for English Teachers in Schools (Rural Areas) on 21st February 2015**

Dept of Mathematics conducted a two day workshop on Computational Fluid Dynamics during Feb 6 and 7. This workshop was sponsored by National Board of Higher Mathematics (convened by Dr.I.Jayakaran Amalraj and co-ordinated by Dr.M.Shanmugapriya.)

Info to Alumni- Dept Update

Mr.C. Arun Prakash reviewed two technical papers for the "International Journal of Recent advances in Mechanical Engineering"

Mr. C. Arun Prakash attended "TWO DAY NATIONAL WORKSHOP ON COMPUTATIONAL FLUID DYNAMICS", organized by Dept. of Mathematics at SSN College of Engineering (6-7 Feb)

Dr. R. Damodaram reviewed a technical paper for the international Journal of Materials and Manufacturing Processes.

Dr. N. Nallusamy delivered a special lecture on "Biodiesel - An alternate fuel for Diesel Engines & its current status" at SRM University, Vadapalani Campus, Chennai on 12 -2- 2015

Dr.N.Nallusamy attended the national seminar on "Heat Transfer Enhancement in Solar Energy systems" on 21-02-2015 at VIT University, Chennai

Dr. A.K. Lakshminarayan, Dr.M.Dhananchezian and Dr. K.Jayakumar attended two day workshop on " Advanced Characterization Techniques of Materials", at Anna University, Chennai (23-24 feb 2015)

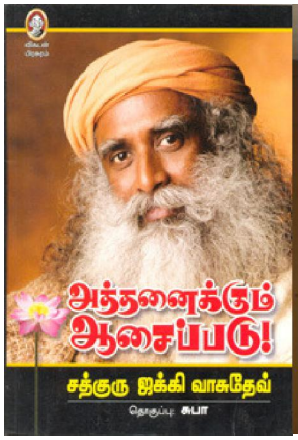
Mr. C. Arun Prakash's, Research Paper titled "VISION ALGORITHM FOR SEAM TRACKING IN AUTOMATIC WELDING SYSTEM" is published in International Journal of Recent advances in Mech. Engg.

Dr.K.S.Vijay Sekar's paper coauthored with Dr.S.Suresh Kumar and III Year / IV Year UG Mechanical students on " Comparative Study on the machining of Ti-6Al-4V Titanium Alloy and Inconel 718 Super Alloy" has been accepted for presentation in the INDO-BRAZIL Bilateral International Conference on ADVANCED MATERIALS AND MANUFACTURING – ICAMM 2015 to be held in Cape Institute of Technology, in March 27-28, 2015 and subsequently published in an International Journal.

## Student's Go-Kart wins award

PRECISIO, Mechanical Engineering Department, SSN CE Team Guided By Dr.Prakash won Best Endurance, Best Driver and Overall 4th Place in ISIE (IMPERIAL SOCIETY OF INNOVATIVE ENGINEERS) Indian Karting competition (National Level) from 27th to 29th January, 2015 at Kari Motor Speedway, Coimbatore.

## Arun at Book Review Meeting




SAARAL Tamil Mandram of our college conducts weekly book review meeting (every Wednesday) at ECE Seminar hall. So far 20 books have been reviewed. Last week (28-01-2015) I got an opportunity to introduce a book named "Athanaikum Aasaipadu" by "Sathguru Jaggi Vasudev" to the audience. It was a good experience to share the contents of the book.
C.Arun Prakash

## Report on Republic day Parade

## Student at the Republic Day Parade..

Akshay, Iyr Mech

On 26th January 2015, I was given the honour and privilege of being invited to attend the republic day parade in the prime minister's box. This was an initiative undertaken by the HR department of the Government of India.I was one among 100 meritorious students out of which 4 were from Tamil Nadu.

This experience was one of a kind and apart from getting a close glimpse of various dignitaries, I was able to watch the parade up close and cherish the amount of work that went into its successful undertaking.

Despite the inclement weather and being drenched by a sudden downpour, nothing seemed to deter any of our enthusiasm to enjoy the parade and its numerous facets, such as the marching battalions and the decorated floats of the different states. Moreover, this year's theme being women empowerment was aptly portrayed by the all-women battalions and was appreciated by all. However, the highlight of the parade was the air show which was absolutely stunning to watch despite the fog and near zero visibility. Over all it was a wonderful experience and I feel privileged to have received the same.

## Visveshwar at AIR and at Tirupathi

Visveshwar of Second Year B section, performed **flute recital** along with Prof Shertalai Sivakumar in Tirumala Tirupati and the concert was live telecast on 14.02.2014 from 6 pm to 7.30 pm in TTD's SVBC TV channel.

His maiden concert in All India Radio Chennai-A was broadcast on Feb 2, afternoon from 12.10 pm to 12.40 pm.
Some of his performances can be accessed at

**Kurai onrum illai** - https://www.youtube.com/watch?v=ZP3hWsfXQoU

**Ninu vina 240914** - https://www.youtube.com/watch?v=s7fRL6T0BmA

## Industry Interaction on TRIZ

Prof.V.E.Annamalai was invited by Confederation of Indian Industries (CII), Southern Region to conduct a webinar on **"Innovative Problem Solving Techniques (TRIZ)"** on 17 February 2015 : 1430 hrs to 1700 hrs at CII Office. 30 industry participants registered and attended the webinar from their locations. The participants gave a good feedback.

A sample feedback from TAFE runs as...

The Webinar on TRIZ was very much useful in the following ways:
The Conceptual Clarity given by Dr. Annamalai was excellent
This has altered the view / mindset about TRIZ before attending the Session
We are looking forward to Implement the TRIZ based Idea Generation on a Pilot basis.
Also, were able to locate the book referred by Dr.Annamalai
The Website was found to be useful according to some of my team members.
Overall the team really found it worth a Session.
On behalf of TAFE team please accept our acknowledgement
Best Regards.
S.B.Venkhatesh, Divisional Manager -Total Quality Management, TAFE

## AICTE sanctions Rs.6 Lakhs

I am glad to inform you that our proposal on Faculty Development Programme in Computer Aided Product Design has been approved by AICTE with 6 Lakhs financial grant in aid. We have to conduct within 6 months from now.--Dr.M.S.Alphin.
Other Coordinators Dr. M Selvaraj, Dr. M Nalla Mohammed, Dr S Suresh Kumar

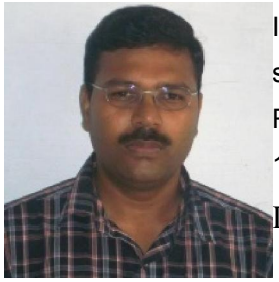
## Engineers India Ltd sanctions two projects

Engineers India Ltd. Has approved two projects as below.

Studies on Enhancement of Charging/Discharging Characteristics of an encapsulated Latent Heat Thermal Storage Unit proposed by Dr.N.LakshmiNarasimhan was selected for a grant of Rs. 1,00,000.

Development of a Low cost Automated Unmanned Aerial Vehicle for crop damage inspection, proposed by Dr.K.S.Vijaysekar was selected for a grant of Rs.50,000.

## SSN Faculty team selected for Robotics Finals at IIT B



I am happy to inform you that We have been selected for National Final's of eYantra Teacher's Robotics Competition, which will be held on 10 & 11 April 2015 at IIT Bombay.

Dr.K.S.Jayakumar

Dr. S. Rajkumar has been approved as Research Supervisor by Anna University, Chennai

Key Note Address


Dr.B.Anand Ronald writes...

The two day National level workshop on Latest Trends in Metal Cutting" LTMC 2015, was conducted at *Erode Sengunthar College of Engineering, Erode on 20-21 Feb. 2015*. The workshop was organised in collaboration with *SANDVIK Coromant* (a pioneer in cutting tool manufacturing). Participants (approx. 45) were faculty, post graduate and undergraduate students from different Engineering colleges in Tamilnadu. The workshop covered different aspects of Metal cutting.

**I was invited to give a Key note talk for 21 Feb. 2015.**

The talk covered Introduction to Grinding, Uses of Grinding, Grinding wheels, different methods by which the Grinding Process can be monitored, followed by a case study on Condition Monitoring during Grinding of Metal Matrix Composites.

The other speakers/ topics covered in the workshop were:

1.Er. D. Sathish, Territory Manager, Sandvik Asia Pvt. Ltd., Pune

Topics covered: Work piece materials machinability, ISO nomenclature, cutting forces and requirements of a cutting edge and cutting tool materials, manufacturing of cemented carbide inserts, Aerospace materials, Characteristics, machinability & solutions.

2.I.A. Shabeer Ahmed, Productivity Improvement Engineer, Sandvik Asia Pvt. Ltd., Pune

Topics Covered: Turning Theory, Milling Theory,– overview power calculation, calculation of cutting time, selection of tool holders, Productivity Improvement Engineer on Drilling Theory - Over view of Drilling, Calculation of cutting time, selection of tools.

3.Dr. P. Kumaravel, IRTT, Erode

Topics Covered: High speed machining

# Experiential Learning Program (ELP) on Automobiles


Dr.R.Prakash

Hands on training for Engine assembly was conducted on 7th and 10th of Feb 2015
Organized by Prof.N.Nallusamy and Dr.R.Prakash.

The trainer came from Goodwin Motors, Chennai. The Training programme was held between 8.45 AM and 3.15 PM on both the days ( 7.2.15 & 10.2.15).
Totally 35 students from II year A Section and 9 students from II year B Section attended the course. The nineteen students from A section attended the course on 7.2.15.
The remaining A section students and 9 students of B section attended the course on 10.2.15.

The training was started with theory about automobile components, types of engines and its working principle using LCD at Energy Lab. The students were split into 7 groups and each group was allotted separate engine.

On both days morning session they were given training for dismantling the engines for studying the inner parts of the engines. Afternoon sessions were used for assembling the same engine in presence of the Trainer. The Trainer brought 8 numbers of two wheeler engine for the training programme.

Faculty Write up on Short Term Course

# Recent Advances in Automotive Systems

**held at IIT MADRAS duringFEB 2-6, 2015.** Prakash writes...

Dr. C. S. Shankar Ram, Department of Engineering Design coordinator welcomed the gathering and delivered inaugural address.

Dr.N.Rao, JK Tyres delivered a lecture on " Tyre Modelling". His talk started with types of tyre and materials used in tyres. Further, he discussed recent advancement in tyre manufacturing process.

Mr. K.Sundaravadivelu, Mahindra talk focused on "Automotive HIL testing". He explained Model in Loop, Software in Loop and Hardware in Loop systems.

Dr. Somasekhar, IITM spoke on "Hydraulic Hybrid Vehicles". He delivered development in Automobile industries from IC Engines to Hybrid Vehicle. Also, explained working of Hydraulic Hybrid Vehicles.

Dr. A.Ramesh, IITM delivered a lecture on "Current Trends in Engines". He explained recent development in emission control systems and HCCI, RCCI Engines.

Dr. Arunkumar Sampath, Mahindra talk focused on "Electronics in Automobiles". He delivered electronics application in Automobile safety systems. He insists all the audience to use seat belt when use the car and advertise this message to all.

Dr.Jaiganesh, JK Tyres discussed about the "Vehicle Dynamic Testing". He explained about steering stability related to Vehicle Dynamics. Afternoon session he demonstrated Vehicle Dynamic Testing with live model.

Dr. Manivannan, IITM delivered a lecture on "Automotive ECU". He discussed about current trend in engine combustion system with electronic application.

Dr. Sujatha, IITM discussed about the "Automotive Signal Processing". She explained different types of suspension system model in Automobile.

Dr.E.Prasad,IITM delivered a lecture on "Learner Centered Teaching". He focused on learning outcome and Bloom's theory.

Dr.P.Chandramouli, IITM talk focused on "Multibody Dynamics Application to Automotive Analysis". He explained multibody dynamics application in automobile suspension system design.

Dr. Ramamurthy K, Dean Academic Courses, IITM discussed with participants regarding the STC and explained the admission process for M.Tech and Ph.D courses in IITM.

Prof. A.Ramesh, Chairman, Centre for Continuing Education, IITM concluded the course and distributed the certificate to participants.

The short term course was useful & informative.

Faculty Write up on Conf Attended Arun Prakash writes..

I attended an International Conference on Science, Technology and Management on Feb 1, 2015 organised at New Delhi. Three of our UG students ( ***Saileshwar. C. S, Ramakrishnan. K.S from final year, Inian Roy. A from third year***) accompanied me. We presented three technical papers and all the three papers are published in the **International Journal of Advanced Technology In Engineering and Science.** The details of the papers are as follows:

1. Arun Prakash. C, Ramakrishnan. K.S, Saileshwar.C.S, Rajkumar. R, VISION ALGORITHM FOR CAPSULE INSPECTION SYSTEM, *International Journal of Advanced Technology In Engineering and Science, Vol 3 (2015), pp 262-265.*
2. Inian Roy. A, Karthick raja. B, Chakkaravarthy. G, Arun Prakash. C, LINE FOLLOWING ROBOT BASED ON VISION TECHNIQUES, *International Journal of Advanced Technology In Engineering and Science, Vol 3 (2015), pp 266-269.*
3. Arun Prakash. C, Ramakrishnan. K.S, Saileshwar.C.S, Rajkumar. R, DESIGN OF VISION BASED INSPECTION SYSTEM FOR WASHERS, *International Journal of Advanced Technology In Engineering and Science, Vol 3 (2015), pp 270-274.*

I would like to thank our Management and the Department for permitting me to attend this conference.


*(From left) Ramakrishnan, Arun Prakash, Inian Roy, Saileshwar. (In the second pic) Rajkumar*

## Special Mention:

*Saileshwar. C.S and Rajkumar. R* of final year together has completed four technical papers. One has been presented at ISERMAT and accepted for publication in **Applied Mechanics and Materials** (*Listed in Annexure 2*) and one more paper has got accepted for publication in **International Journal of Applied Engineering Research** (*Listed in Annexure 2*). The other two papers have already been published in **International Journal of Advanced Technology In Engineering and Science.**

Saileshwar C.S has also completed one more paper which we have communicated to an International journal and currently he is working on another paper with me. These two guys spent their entire vacation leave working on the papers. A special appreciation to both of them.

## Faculty write up on Workshop attended at IIT Madras

Dr.Ananthapadmanaban and Mr .Harikrishna attended a 2 day knowledge dissemination workshop jointly conducted by I.I.T, Madras and Tagore Engineering College. The workshop was conducted at I.I.T,Madras on January 30th and 31st,2015.

L-R-Dr.D.Ananthapadmanaban, Dr.Koteshwara Rao,Dean(Research),Tagore Engineeering College,

Dr.Srinivasa Rao Bakshi,Department of Metallurgy and Materials,I.I.T,Madras and Mr.Harikrishna

The workshop was inaugurated by Professor B.S.Murty, Chairman, Materials Panel,Naval Research Board, DRDO, Government of India. The purpose of the workshop was to disseminate information while carrying out projects carried out for the Naval Research Board.

The first session was conducted by Dr.Srinivasa Rao Bakshi, Assistant Professor, Department of Metallurgical and Materials Engineering,

He explained the basics of Cold Metal Transfer. The second session was on Surfacing of DMR249A Steel with Austenitic Stainless steel using Cold Metal transfer.DMR249A Steel is an indigeneously developed steel which is being widely used in The Army and Navy. We Indians can be certainly proud of this achievement. This talk mainly focused on corrosion aspects and how to improve the corrosion resistance of Austenitic Steel in a marine environment. During the afternoon session of the first day ,we were shown a demonstration of friction stir welding and friction surfacing.

The first session of the second day was handled by Dr.Madhusudan Reddy, Deputy Director and Head-Metal Joining Lab,DMRL,Hyderabad. He gave an overview of research on solid state welding in India and stressed the need for technology transfer to Industry. The second session was handled by Dr.Koteeshwara Rao, Dean(Research),Tagore Engineering College. He spoke about the problems involved in joining Aluminium to Steel and also how to overcome this problem. Again, during the afternoon session ,demonstration of Cold Metal transfer Equipment was done.

This 2 day Knowledge dissemination workshop helped us in getting new concepts related to our respective fields of research. It also gave us some contacts, while at the same time helping us to renew old contacts. We are sure that this workshop will give us renewed energy to pursue our research with more vigor.

## Faculty write up on Workshop attended at AC Tech

Dr.L.Poovazhagan

I have participated in the workshop on High temperature ceramics conducted by AC tech., Chennai, on 19-2-2015. Workshop mainly focuses on traditional and household ceramics.

Two lectures were really interesting and related to Engg. ceramics namely: Piezoelectric ceramics and ceramic matrix composites.

Facilities available at AC tech (Ceramic department): High temperature sintering furnace and ball mills.

The following eminent professors delivered the lectures:
1. Prof. F.D.Gnanam, 2. Prof.Arun Ghosh (CGCRI, Kolkatta)
3. Prof.P.K.Panda (NAL, Bangalore) 4. Prof.M.Balasubramanian (IITM)

## Faculty write up on Workshop Conducted — Robotics

Robotics Lab at Department of Mechanical Engineering has conducted Two-Day Robotics workshop on 11$^{th}$ &12$^{th}$ February 2015 for 83 students of SSNCE. 60 students from Mechanical Engineering, 14 students from EEE and 4 students from ECE have attended the robotics workshop.

Ten students from MECH and ECE have acted as robotics trainer and they helped the participants during the practical session. The students worked on Firebird V mobile robotics platform and they learned the skills such as programming on the buzzer, LCD display, motion control, understanding different types of sensors and line following control of the robots and obstacle avoidance. The robotics competition was held among the participant's teams to motivate the robotics learning. This was co-ordinated by Dr.K.S.Jayakumar and Mr.K.L.Harikrishna

K.S.Jayakumar

K.L.Harikrishna

## Student write up on Internship experience at Alstom

Vishal Onkhar of second year B section writes....

Alstom and Chennai Metro Rail Limited (CMRL) are working together to introduce a modern urban rail network across the city. Alstom supplies monrails to Chennai Metro Rail Project (CMRL).I had the opportunity of interning at Alstom for one week (5 to 9 Jan2015).

Alstom is a French multinational company that is a global leader in power generation, power transmission and rail infrastructure .Alstom is a major rail vehicle manufacturer in the fields of passenger transportation.Alstom also holds the world rail speed record at a whopping 575km/hr. The company is a world leader in urban rail transport systems, building 25% of all the tramways and metro networks across the globe.

Over the course of the whole project, Alstom will provide CMRL with 42 Metropolis trains, some of which will arrive from Lapa, Brazil while the others will be manufactured at the Alstom plant in Tada, Sricity. All these trains will undergo Retrofitting and Testing at the Alstom Site in the CMRL Depot at Koyambedu. Phase I will involve the supply of 9 Metropolis models to CMRL to operate between Koyambedu and Alandur. Phase I is scheduled to be completed in March 2015-2016 and work on Phase II has already begun. All of the trains here are Metropolis models.


The 17 page report on various parts of the monorail can be accessed at dept library

SIGNIFICANCE OF THIS IN-PLANT TRAINING:

During the course of this training programme, I realized how much work and effort goes into making sure these trains are absolutely perfect. It is one thing to assemble the trains from the parts available, but it is something entirely different to make it run like clockwork. This attention to detail and the meticulousness of the employees here at Alstom is what captivated me from the start. For them, nothing less than perfect is acceptable. This is indeed a most commendable attitude and shows clearly why Alstom is one of the world leaders in rail infrastructure and manufacture.

Also, safety and environment conservation also are very important to Alstom as everything in these trains consumes much less energy and resources than other standard trains while giving so much more to the passengers like comfort, fast, economical and safe passage. The amount of thought and consideration for differently abled and elderly people too is worth much praise, for the train is so designed so as to ease their commute to the maximum. Truly, it must be said that Alstom is indeed building a better and brighter future for not just India but the whole world.

Alumni on a knowledge Sharing Mode- explains the relevance of what we study

I am Nitin Krishnan from 2009-2013 batch. I am doing my masters in the field of automotive technology.

I want to write an article every month which will somehow answer the question “why am I studying engineering?”. I am not the correct person to write this article. But if I start it and if someone else tries to help me with this article. It will be a great use for all our juniors and our department. Any negative feedback or related articles are welcomed at nitinkrishnan92@gmail.com. I thank HOD sir for giving this opportunity.

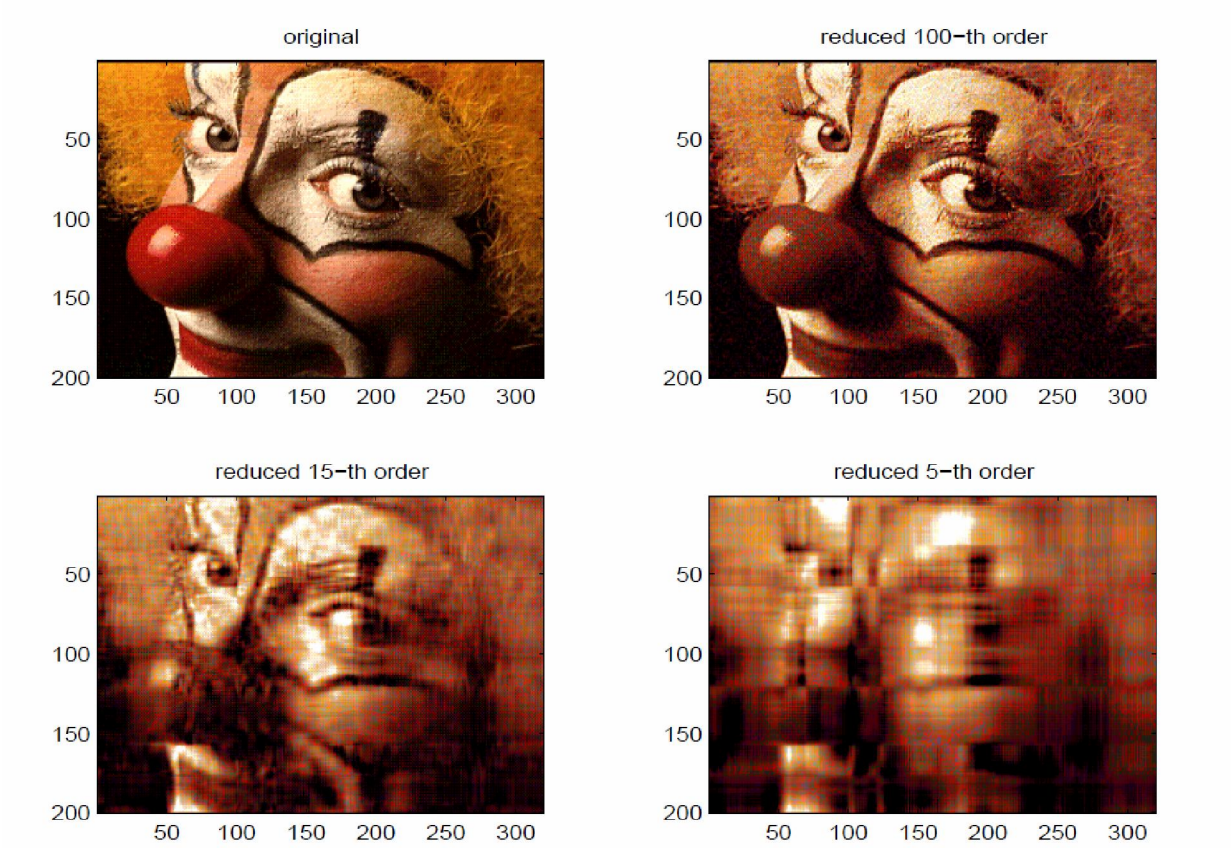
Hi!!! For the people who read my article last month, a big thanks!! This time I will keep it very simple. I will not be able to give the practical applications of all the things which are in the syllabus of Anna university. These articles are to stimulate you to think in a more practical way of what you study. Google has the solutions for all the questions. But the questions should be posed by you either to google or to the professor who is teaching us. Mathematics is needed for any research and in any field. If you get the basics of the mathematics right with its application, then you can just build your knowledge on that because it just builds based on the basics you learnt in B.E. I will try to stop with Mathematics application with this article and will try to write something more relevant to Mechanical engineering subjects from the next article. I got few good feedbacks. Thanks for that.

## RANK OF A MATRIX

Every first year student of engineering knows how to solve a question when asked “Find the rank of a matrix ". But first of all, why do you find a rank of a matrix? What is a matrix ? You have just seen some brackets with elements in it. We all would have thought it is just to test our mathematics skill. Nowadays “Matlab” calculates it in 1 second even if you give a matrix of dimension 1000*1000. So why do we even study it? Actually “A matrix is a grid, with each location in the grid containing some information”. Consider a chess board. It is 8*8 matrix with each box(element) containing some information. Either the box will have a piece or it will not have a piece. The information whether the piece is there or not is given by the element in the 8*8 matrix. Actually it is not just one element which denotes something. Each chess box is a matrix which denotes whether a piece is there or not.

We all would have heard the term Pixel. Pixel has many definitions. But to keep it simple , let us take that the pixel denotes the smallest element of an image. When you have 8 MP camera, you get clear picture. That is because the image you take using a 8 MP camera has eight million pixels. A image which is represented by 8 Mega Pixel(MP) is far more clearer than 3 MP camera because the same image is represented using extra five million elements ☺ . Each pixel gives some colour and each pixel is a matrix containing some values of the

basic colours RGB. So the picture you take is nothing but a LARGE matrix with many elements. Even in finite element analysis , we operate with matrices I think(Not sure). So any element can be composed of matrices. OK now WHY RANK !! See the picture below.




The top leftmost image is a clear picture of a joker image. Now consider that to be a large matrix. "**Rank of a matrix is the no of independent row and columns in the matrix-our book definition**" . So a bigger matrix say 1000*1000 can be represented even with 400*400 without changing any of the properties. Because what we do is just we rearrange the columns and rows by multiplying with some number while finding rank of a matrix. The below image has a Rank of 200. So there are 200 independent rows and columns. We have reduced the image with 1000*1000 to 200*200 and it will still look like almost same as the top left most image. But as you just cut the rows and columns one by one after you have reduced the matrix as 199*199,198*198….100*100, you could see that the quality of the image is reducing. The same thing when you reduce to 5*5,you can almost see nothing. Because you have been reducing from the 200 independent rows and columns which represent your clear image. Bigger matrices are good for quality. But they occupy lot of memory. So they reduce the bigger matrices to smaller matrices in order reduce the memory without reducing the quality of the picture. The point where the quality of the image is lost is being found out using the Rank of a matrix :-P .. This is why even Rank of a matrix is important ☺ .

"Imagine how the images taken from DSLR will look like when you send in a whatsapp message. It is "Compressed". What does that mean. It is just that the matrix is reduced without losing the orginal quality. Even a video frame composes of matrices. That is how mp4 files occupy less memory and poor quality ☺" . Just imagine about the things around you and you will find many fascinating things. Everything which we see in this world has been made by an engineer like us.

Alumni News

Harish Kumar Sundararaman, of First batch, is now Teaching Aid / Grader - Supply Chain Management at Arizona State University (W.P Carey School of Business). Pror to this, he was Senior Procurement Engineer at L&T Ltd., ECC Division, Chennai

Venkatakrishna Janakiraman, of First Batch, is now a Ph.D. student at The Ohio State University (Gear Lab). His Research work involves Developing a power flow and efficiency model for multi-stage planetary gear train, applications in robotics, automotive, aerospace, heavy machinery and wind turbine industries.
- Extending the model to include multi-input and multi-output configurations and self locking aspects.

Caught from the Net : Source Linkedin

B. Mallikarjun,
Founder | Managing Director,
SWIFT INFOCOM (INDIA) PVT. LTD.

# GATE 2016 Preparation Methodology, Feb 25, 2015

First of all get hold of GATE syllabus and few of the last year's questions papers. You can download syllabus elsewhere from your website.

Do topicwise/subjectwise analysis of at least recent 5 years GATE questions papers. Arrange topics/subjects in the GATE syllabus in descending order of weitage in recent 5 years papers.

When you start preparation for GATE, always start from the subject which interests you most, you are most comfortable with. Suppose Operations Research is your most favorite subject then start from that subject.

Engineers are pretty comfortable with Mathematics always. It is perhaps because of this they are in engineering. If you cannot zero in on any subject of liking, then as a thumb rule start from Engineering Mathematics.

Remember; always take that subject in the last which you dislike most (if any). Suppose you are NOT comfortable with Vibrations then take that subject at last for preparation. Unfortunately, if the subject you dislike most has the highest weightage in recent 5 years GATE question papers then you do not have any choice but to start reading that subject from scratch. In this process you will experience how most disliked subject turn into your favorite list.

If you work on this strategy and go on finishing your GATE syllabus, then your confidence will shoot up enormously.

REMEMBER; in any examination apart from your preparation what matters most is your confidence.

Always refer standard reference books for preparation. Guides/short notes for any subject should be the last option.

If possible prepare your own notes subject wise, topic wise. After you finish a topic/subject, immediately try objective questions on that topic/subject.

REMEMBER; at whatever length you read textbooks, everything cannot be covered. There are always

gaps left in your readings. These gaps should be filled in by practicing objective questions. Hence practice as many objective questions as you can. Unless, you set the standard time for practice tests, you cannot learn the importance of time management. Even a brilliant student with improper time management is doomed to perform badly in real GATE. Exactly this is where online tests come handy.

Do not forget ***PRACTICE MAKES MAN PERFECT***

**TIME MANAGEMENT** Prepare time table for your study.

REMEMBER, for any branch of engineering, GATE syllabus is so vast that unless you plan your study schedule in the available time, you are bound to overdo some topics/subjects at the cost of other topics/subjects. Stress only those topics/subjects which have greater weightage in GATE papers.

If possible earmark at least one month before the exam for only revision. Whatever you read, revise it after some time.

REMEMBER, it is characteristic of human memory that we tend to forget ( though in varying proportions) whatever we read if we donot revise it periodically. Do you remember lesson No. 4 in your English language subject when you were in 8th standard? In all probability you donot.

In summary do not undermine the importance of revision. Keep proper time for revision in your study schedule.

If you are in the final year if engineering then you have to balance your time on 3 fronts. i.e.

1. Regular Classes:- Do not neglect your regular college/classes/tests/exams. Do your seminar/project work seriously. It helps you in campus interviews/further study.
2. Campus interviews:- Keep on preparing and appearing for the campus interviews until you get selected in your dream company.
3. GATE preparation:- Continue your GATE preparation by reading standard books and practicing objective questions.

Hence time management is very very crucial for final year students.

**GROUP STUDY:-** If possible make a group of your friends who are also appearing for GATE. It is always beneficial if you discuss about theory topics, some typical objective questions among your group. If you think that if you help your friend in his preparation then he will score better than you then please shrug off this thinking.

REMEMBER, you are not competing with your friend, your competition is at national level.

**HELP OTHERS TO HELP THYSELF**

**IF YOU ARE IN THIRD YEAR**

Ideal time to start for preparation for GATE is when you are in the third year. When you are in the third year you van revise the subjects you have studied in first/second year and focus on third year subjects from GATE perspective. REMEMBER, old adage "EARLY BEGUN IS HALF DONE"

Early birds definitely have psychological advantage over late starters. Fully utilize the summer vacations after you finish your third year.

When you enter in the final year, at least 50% of the syllabus should be over. Try to finish all the syllabus by October and keep Dec and Jan months only for revision and practice tests.

REMEMBER, once you are in the final year regular academic activities, seminar projects, campus interviews would eat into most of your time.

*Best of Luck!!!*

| Amazing Innovation 1 | S-Oil solves parking problemand saves oil |
|---|---|

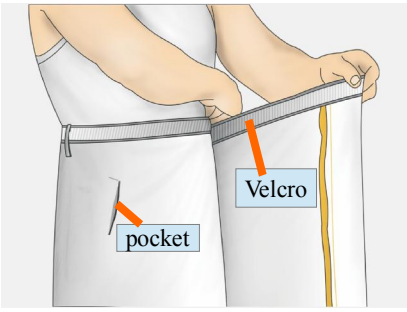
The Challenge:
S-Oil wanted to show it had a mission: to save oil. They knew South Korea's capital had some of the highest gasoline consumption in the world. What's more, car use was increasing, petrol costs rising, and parking spaces scarce. Every day, a Seoul driver wanders for 500m to find a space. Over a month, this comes to 15km of driving. People were using around a litre of gas just trying to park.

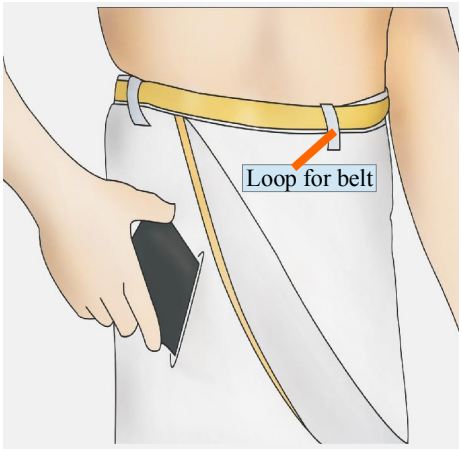
The Idea:
What if we could tell people there was a parking space right here? With HERE balloons, S-Oil did exactly that. They set up a bright yellow balloon in each space. The balloon falls when a car parks in the space, and rises again when the car leaves. Drivers could see the colourful balloons from far away and spot empty spaces. Quick parking means saving time and saving oil. That means happier drivers and a healthier planet.

Did it move?
The campaign certainly helped drivers to save oil. In just one day, 700 cars used 23 litres less oil. Over a whole year, they saved much more. S-Oil had engaged with people: now they knew it was a company that cared about saving oil. They even put the balloons on their own gas stations. People now thought about cutting gas costs when they thought about S-Oil. Watch the fantastic idea in action at the link.
m.youtube.com/watch?v=nw9g9OVHdJI Innovation stems when a pain is resolved!

| Amazing Innovation 2 | Dhothi with pocket, that can be stuck or held with a belt |
|---|---|

http://www.ramrajcotton.in/index.php/cotton-dhoti/readymade-dhoti-rdm491j.html




While many of us love to wear the dhothi, we hesitate due to the difficulty of retaining it on the waist and due to the non availability of pockets which necessitate a handbag. Ramraj Cottons has beautifully solved all these issues- by providing a Velcro, a loop system as in pants for using a belt if needed and also equipped it with a pocket. Isn't that really amazing? Innovation stems when a pain is resolved!

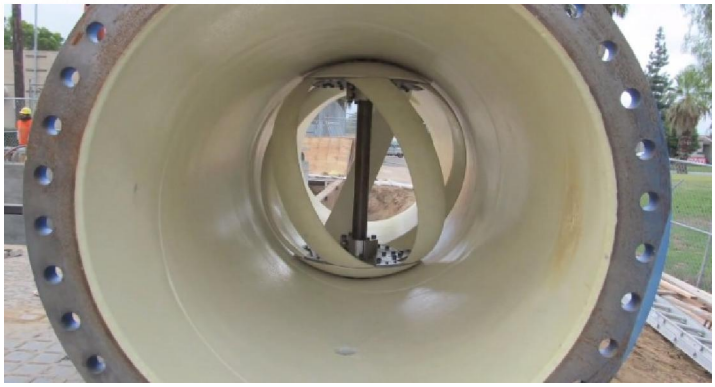
Quite Logically they advertise this as “Otticko- Katticko” meaning stick and wear.

| Amazing Innovation 3 | Energy harvesting from pipelines |
|---|---|

There's a lot of water constantly moving through the municipal pipelines of most major cities. While the water itself is already destined for various uses, why not harness its flow to produce hydroelectric power? Well, that's exactly what Lucid Energy's LucidPipe Power System does, and Portland, Oregon has just become the latest city to adopt it.

LucidPipe simply replaces a stretch of existing gravity-fed conventional pipeline, that's used for transporting potable water. As the water flows through, it spins four 42-inch (107-cm) turbines, each one of which is hooked up to a generator on the outside of the pipe. The presence of the turbines reportedly doesn't slow the water's flow rate significantly, so there's virtually no impact on pipeline efficiency. http://www.lucidenergy.com/

The 200-kW Portland system was privately financed by Harbourton Alternative Energy, and its installation was completed late last December.



It's now undergoing reliability and efficiency testing, which includes checking that its sensors and smart control system are working properly. It's scheduled to begin full capacity power generation by March.

Once up and running, it's expected to generate an average of 1,100 megawatt hours of energy per year, which is enough to power approximately 150 homes. Over the next 20 years, it should also generate about US$2 million in energy sales to Portland General Electric, which Harbourton plans on sharing with the City of Portland and the Portland Water Bureau in order to offset operational costs. At the end of that period, the Portland Water Bureau will have the right to purchase the system outright, along with all the energy it produces.

Amazing Innovation 4 | Smart White Board

The notes made on a whiteboard during a meeting or lecture might be important, but once the board is wiped they're gone.

The Equil Smartmarker, however, can make sure that's not the case. It can capture whiteboard notes and stream them to computers and mobile devices.


The functionality of the Smartmarker is similar to that of the Smart Kapp whiteboard, which pairs with a nearby mobile device via Bluetooth to stream any notes made on it to the internet for remote viewing. The Smartmarker, however, does not require the use of a special whiteboard.

The Smartmarker comprises a sleeve, into which a normal dry erase pen slots, and a sensor. The sensor attaches to a magnetic strip that can be stuck to one side of the writing surface using its adhesive rear. It can be used on most surfaces, including walls painted with dry erase paint, glass and traditional whiteboards. It can sense an area of up to 16 ft (4.9 m) across and 5 ft (1.5 m) vertically.

The sleeve allows the user to write on the whiteboard surface as usual, with different electronic tips used to communicate the use of different color pens. The sleeve continually communicates its location to the sensor via ultrasonic positioning.

The sensor, in turn, can then automatically relay the notes and drawings data to Android, iOS, Mac OS or Windows devices via Bluetooth. Alternatively, the data can be stored on the sensor's 4 GB of internal memory for exporting to another device at a later date via Bluetooth or USB.

Using the Equil Note app for iOS and Android, it is possible to save, edit and share notes to services like iCloud, Dropbox and Evernote. It is also possible to stream whiteboard activity via the internet to other computers and mobile devices.

Both the sleeve and the sensor are reported to have a battery life of up to 8 hours of continuous use. A charging case is provided for sleeve and pen, which can be plugged into a mains socket or a USB port. Once nested inside the case, a full charge for each from empty is said to take 2 hours.

Watch its use at

https://www.youtube.com/watch?feature=player_embedded&v=sDLPb1ZEDk8

More details at http://www.myequil.com/smartmarker/

# Mech Marvels 3- Submerging Bridge

The Corinth Canal joins the Gulf of Corinth with the Saronic Gulf in the Aegean Sea while cutting through the narrow strip of Corinth and parting the Peloponnesian peninsula from the Greek mainland. It was constructed between 1881 and 1893 and is considered to be a great technical success.

Despite the fact that the Corinth Canal helps us to avoid the 700-kilometer journey around the Peloponnese, it has the capacity for a draught of 7.3 meters and ships of a width of up to 16.5 meters only and hence, it is too narrow for new ocean freighters.

Besides this, the Corinth Canal has failed to draw the level of traffic as predicted by its operatives due to navigational difficulties and periodic closures for the restoration of landslides from its steep walls.

The canal has the one-way system where ships can only pass one at a time and larger ships have to be pulled by yanks. At the present time, the canal is being used by tourists ships with almost 11,000 ships using the Corinth Canal per year.

In Isthmia and Corinth, two submersible bridges were built across the Corinth Canal, one at each end in 1988. The bridge deck is lowered 8 meters beneath the water level to allow waterborne traffic to use the waterway.

The chief advantage of lowering the bridge and not raising it is that there is no restriction on height of ship traffic since there is no structure above the shipping channel.

This becomes very practical for Sail ships and tourist boats.

Furthermore, it is considered aesthetically attractive that an above-deck structure is absent.

On the other hand, the existence of the structure of underwater bridge restricts the draft of vessels in the waterway.

https://www.youtube.com/watch?feature=player_embedded&v=LNnd6PAavyM

## Forthcoming Events


Trends in Non Destructive Evaluation of Weldments,
9-10 March 2015
Organised by
Dept of Mech engg,
College of Engg, Guindy.

National Conference on Innovations and Advances in Mechanical Engineering
March 13, 2015
Dept of mech engg
Nadar Saraswathi College of Engg & techy, Theni

VIT UNIVERSITY
VELLORE • CHENNAI
www.vit.ac.in

*Two Day Workshop on*

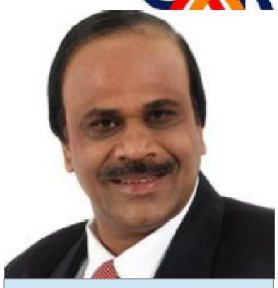
**CFD in Thermal Engineering**

24th and 25th of April 2015

At Vellore Campus

National Conference on
Recent Trends in Manufacturing Technology
RTMT 2015, 16-17 April, 2015
Organized by Dept of Manufacturing engg.,
Anna University.

| Corporate Wisdom -15 | Multiple Intelligence |
|---|---|

R.Ramakrishnan
Advisor, GMR GRoup

To understand being able-minded, you must first understand that every human being has multiple Intelligence.

Just to give you an example- your ability to understand , appreciate and perform music is one form of intelligence – Musical Intelligence.

This is completely different from your ability to think in pictures, to be creative- that is another form of intelligence- Spatial Intelligence.

The ability to use your body beyond the mere day-to-day functioning is Bodily Intelligence, which is needed for someone to succeed in sports.

The ability to relate with other people is interpersonal Intelligence.

Those of you good at Math- that is Numerical Intelligence.

Those who play with words, you are too good at grasping languages – that is Linguistic Intelligence.

People who usually make it to the top are those who develop themselves in Multiple Intelligence.

A Singer who knows to communicate well is always more successful than the one who knows only to sing.

A cricketer who is good at relating with other people has an edge- Like Mahendra Singh Dhoni- a successful captain.

A student who knows four languages has an advantage over those who know only two or three languages. That is the reason Indian students always do well, compared to students from most other countries, when they go overseas.

If you want to able-minded,
if you want to be competent,
if you want to have an edge over the rest,
then you are left with no choice but to develop yourself in Multiple Intelligence.

Have a great day & weekend
Ramki