



**TOTAL.**  
MECHANICAL

# EMANATION

MECHANICAL DEPARTMENT NEWSLETTER



I am very sure, the newsletter "EMANATION" will definitely convey the message to all the readers, the activities being organized to exhibit the talents and achievements of the staff and students. Globalization is the order of the day, which needs competitiveness, creativeness and hard work to enter in to the international market. One should develop attitude towards exploration and experimentation as important. One should develop attitude towards exploration and experimentation as important parameters for their presentation. Training of human resources is one of the principal factors in achieving sustainable economic and social development. This kind of form gives opportunities to the young minds to accelerate their thinking to exhibit their talents.



worthwhile. I hope our readers will continue to support us in this endeavour and continue reading!

In this edition of emanation articles on Trapping fast moving cars, Nano Tubes and New wonder materials lies in the store for you. Apart from this, you will have updates from many exiting events conducted by mechanical dept. which will include reports on pencil sketching by SAE, Emanation Quiz, Aero Modelling workshop and Kabaddi, Volleyball tournament organised by VTU. An informative write up on the Merchant Navy has also been included in the CAREER OPPORTUNITIES section of this edition. It features a career flowchart, requirements for Graduate Mechanical Engineer entry, Career as an Engineer officer and the top colleges in India to build a career in MERCHANT NAVY.

On this optimistic note, we wish you make the best use of this edition. Also TEAM EMANATION wishes you Best for your upcoming examinations.

Every successful project starts with an idea or a culmination of ideas by a group of likeminded people. Emanation is one such project. We have come up with a periodical that gives our readers the latest, bizarre and very useful information in mechanical engineering. The emanation project was launched on March 17th, to mark the beginning of our endeavour. The launch was made successful by the presence of our principal and the principal of K.S polytechnic, our HOD and the heads of all the other departments and our teachers. The opinions provided by the guests were considered and we hope this edition is proof of that. We couldn't have done anything without the immense support from our teachers B.V. Srinvasmurthy sir and Umashankar.M sir .This project has also had support from the management committee of K.S.I.T. This project has shown us how much work is involved in bringing together thoughts into action. It has also shown us how many sleepless nights we had to spend to make this project a reality. But there is a sense of enjoyment and satisfaction in seeing the hard copy of the periodical that makes it all

## CO-ORDINATORS

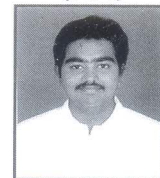
Prof. Srinivasa Murthy .B.V

Mr.Umashankar M

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CONGRATULATIONS!



TEAM EMANATION

Congratulates

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For Securing

Fourth Rank in BE (Mech. Engg)

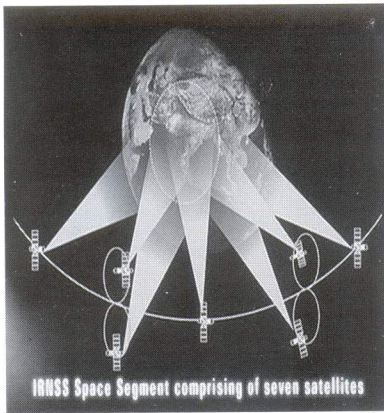
in University Examination – 2012-13

The mind is everything. What you think you become.

K.S.I.T MECHANICAL DEPT.



## Desi GPS!



India has a well-established space programme which is a source of strong national pride. IRNSS weighing 1,425 kilograms is an independent regional navigation satellite system, a result of one such programme by ISRO. It is designed to provide accurate position information service to users in India as well as the region extending up to

1500 km from its boundary. IRNSS will provide two types of services, namely, Standard Positioning Service (SPS) which is provided to all the users and Restricted Service (RS), which is an encrypted service provided only to the authorised users. The IRNSS System is expected to provide a position accuracy of better than 20 m in the primary service area.

IRNSS comprises of a space segment and a ground segment. The IRNSS space segment consists of seven satellites, with three satellites in geostationary orbit and four satellites in inclined geosynchronous orbit. IRNSS-1A, the first satellite of the IRNSS constellation, has already started functioning from its designated orbital slot after extensive orbit test and evaluation to confirm its satisfactory performance. IRNSS ground segment is responsible for navigation parameter generation and transmission, satellite control, ranging and integrity monitoring and time keeping.

The IRNSS is expected to be fully functional by 2015.

### Applications of IRNSS

- Terrestrial, Aerial and Marine Navigation
- Disaster Management
- Vehicle tracking and fleet management
- Integration with mobile phones
- Precise Timing
- Mapping and Geodetic data capture
- Terrestrial navigation aid for hikers and travellers

Visual and voice navigation for drivers The IRNSS is vitally necessary in times of war since most modern precision bombs and missiles depend on accurate positioning. Till now most of us have relied on the American GPS, very popular on smart phones but not good enough for military applications as it can't be relied upon for seamless coverage in times of war and the in-built error makes it un-suitable for precision strikes. India's satellite system is designed to cover a region of about 1500 km on either side of the border, essentially covering the geographical region from where India has a perception of threat, and both Pakistan and China are within the footprint. Why rely on the Americans when we could do just fine the Desi way!

## Sixth Sense in Mechanical Engineering - : Sensor Screw Measures Forces inside Machines

The sensor screw has its origin in special research area SFB 805, "Control of uncertainty in load-carrying mechanical systems" at the TU Darmstadt. If you are investigating uncertainties and ultimately want to overcome them, you need precise

measurements that are provided by sensors. "Until now, there really were no particularly good methods for attaching sensors," explains Matthias Brenneis who invented and developed the screw, based on a previous project at the Institute for Production Engineering and Forming Machines. "Adhesive compounds dissolve easily, especially in a harsh real-world production environment." In addition, externally mounted sensors provided readings from "outside"; however, these could differ from the forces actually acting in the interior of a machine or a component. "So why not combine a sensor and a machine component such as a screw using metal-forming?" wondered Matthias Brenneis. The advantages are obvious: screws are available practically everywhere and could be replaced by their "sensing" counterparts in entire production chains. Their operation is very simple and the little "measuring device" is hardly prone to faults. The sensor is located exactly where the forces are acting and therefore works very precisely, so that designing and dimensioning can be carried out more efficiently. The sensor screw can provide measurement data at certain points in time, but also continuously. Among other things, this makes precise quality controls possible. For example, if a work piece that is deformed or whose thickness varies is being transported through a roll train, the sensor screws that hold the rollers would register it immediately. Until now, quality-reducing deviations often become apparent only during the final inspection after the entire production process, resulting in expensive rejects. In order to be able to read and interpret the measurement data of the sensor screw, the TU researchers are developing suitable analysis software. "The goal is to obtain a lot of information from a few reliable data" summarizes Manuel Ludwig, who is in charge of this part of the project. The screw



## SIXTH SENSE

has passed through several stages, was made smaller, is approaching marketability and has been patented. The German Federal Ministry of

Economics and Technology is convinced by the new technology and has incorporated the project in its "Exist-Forschungstransfer" (Exist Research Transfer) program. For 18 months, the development of the sensor screw will now be supported with funding, ideally until it goes into production. The first clients are already using the technology in pioneering projects. The development of the sensor screw has now culminated in the spin-off of Consensus, a good example of the innovation and impetus coming from TU Darmstadt, the "University of Originators." But things will not end there, however, explains Jörg Stahlmann, who is in charge of Marketing and Sales at Consensus. "Our goal for the future is always to cooperate with the TU in order to open up new application fields." The Consensus founders would also like to benefit from the interdisciplinary knowledge that converges at the TU.

"This pool of expertise cannot be found in industry in this form" says Stahlmann. The TU development turns an everyday object into a smart high tech product and provides future users with a "sixth sense," as it were, when dealing with buildings and systems. A convincingly simple concept that Matthias Brenneis summarizes with a simple common denominator: "Good ideas are always easy to use."





# AURA...

## THE GIANT WHO TOUCHED TOMORROW



THE term "great" is often so loosely richly to him. His father's firm as applied to the lives of men one of those cosmopolitan houses so that we should ask our self's characteristic of Bombay, for associated what are the standards which justify it. With it was Premchand Roychand, one Two may be suggested. Gauged of all times-the hectic flow of money by these standards, none can question which poured into Bombay for the right of Jamsetji Nusserwanji Tata purchase of cotton during the American Civil War to be included in the Indian Valhalla. No value, and from that bitter experi- Hardened in the school of adversity, free once learnt a lesson he never forgot-the from any caste restriction and therefore importance of sound finance.

From Bombay they threw their financed with prodigal extravagance, tentacles East and West-to the rich Fortified with this rich experience and China market in opium and cotton, to adequate funds, none could be better Britain for the importation of Manu- equipped to play a great part in the factored goods which India could not industrial renaissance of India, make herself. Jaksetic Tata entered this But-and this is the distinguishing field at a great formative period. The feature of his life-Jaksetic Tata was beralizing influence of education in never content with the conventional part. English poured new and heady wine into the beginnings of the cotton textile receptive minds, and he received his industry were laid before. he entered the instruction in that great school, the field. Experience fell in his day, industrial progress in India tended to be imitative rather than creative. If one pioneer erected a mill, then a score followed in his wake; if cement or a sugar factory was established then others sprang up like mushrooms until the market was saturated or even glutted. Jaksetic Tata was always creative. When his contem-poraries were satisfied with producing low-grade yarn for export to the China market and rough cloths for home consumption, he looked farther afield, and selecting Nagpur, in the Central Provinces, put down his mill in the center of the cotton-growing lands and catered for the proximate market. The prosperity of the Empress Mills he established there against the advice of all his friends reads like a dream. His ambition was that the mills should pay a hundred per cent. In 1920 original holders of the scrip were receiving 360 per cent. At a time when most industrial-ists gave little thought to their work-people after they left the mill at the close of the day's toil, he bent his mind to all the social activities which we call to-day

by the generic title of welfare work. Later, he was to learn in the hard school of experience that it is far easier to establish a new factory than to resuscitate an old one, and the struggle to recreate the derelict mills he acquired at Coorla and in Ahmadabad took heavy toll of his energies; but he succeeded here as in everything else. The strain was so great that it possibly shortened his life.

Many men know how to acquire a fortune; it is given to fewer to under-stand how to use it. Money was never to Jamsetji Tata an end in itself. Not that he was indifferent to many things that wealth can bring. He looked upon the decaying silk industries of Mysore and brought Japanese experts to put them on modern lines. He fought successfully for cheaper freights to the Far East-with the result of stimulating Japanese competition in directions not altogether favorable. When new sites were available from the reclamations of the Port Trust and the land thrown upon the market by the creation of the Improvement Trust, many investors held aloof, afraid of the terms of the new leases. Not so Jamsetji Tata; he acquired and built in every part of the Island. Yet, embracing and beneficial as these activities were, they seem to me to be no more than the prelude to his great constructive work. Secure in possession of an ample fortune, with a big income from the Empress and other cotton mills, he bent his mind to three major schemes. Though they came to fruition after his death, his was the inspiration, is the pioneer work.

Then when his fortunes were estab-lished he looked abroad to see how best they could be utilised for the advantage of his country. It was said of a great writer that he took the whole world of learning for his province. Of Jamsetji Tata it might equally be said that the whole field of industry came within his ambit. Those associated activities- the Indian Institute of Science to train the higher personnel; the iron and steel works to start the true economic cycle; and the hydro-electric stations to furnish cheap power and conserve the coal resources-left an enduring mark on his own generation. He did not live to see the coping stone placed on this work; but so well were the foundations laid, so determined the enthusiasm inspired in his sons and colleagues, that they pressed it to completion. Of him truly can the epitaph be writ-he wrought the people lasting good.

## WORLDS' MOST EXPENSIVE MISTAKE



The world's greatest organization NASA, USA, launched a satellite named "ORBITER" (in the late 1998) was supposed to revolve round the planet Mars for about 26months and gather all the information that it could regarding the climatic behavior of the Earth's sister planet.

Unfortunately, the whole project was a huge failure cause of a component used, which was according to British specifications while the rest of the parts were of metric standards. NASA lost about \$125million just cause of a minute mistake in recognizing the fundamental dimensions of the component.

"Our inability to recognize and correct this simple error has had major implications," said JPL Director Edward Stone.

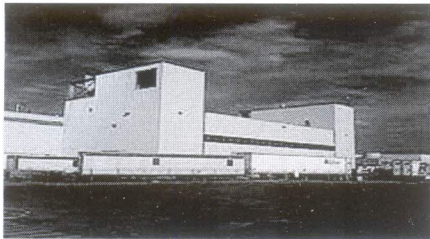
However, the Orbiter did manage to reach the destination but cause of this miscalculation it couldn't send any data (not even of 1Mb) to the station. After this simple logical mistake, which did prove expensive, NASA immediately setup a panel just to ensure that there is a proper check on every products they use in & out of the unit.

**Do not wait to strike till the iron is hot; but make it hot by striking.**

K.S.I.T MECHANICAL DEPT.



## THE NEW WONDER MATERIAL

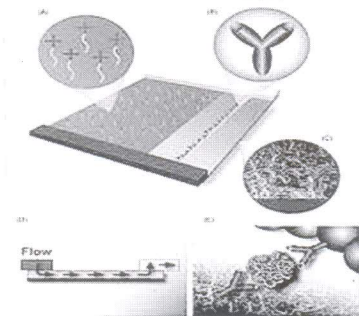


Punching your way out of a paper bag could become a lot harder, thanks to the development of a new kind of paper that is stronger than cast iron.

The hottest new

material in town is light, strong and conducts electricity. What's more, it's been around a long, long time. **Nanocrystalline cellulose (NCC)**, which is produced by processing wood pulp, is being hailed as the latest wonder material. Well, not only is NCC transparent but it is made from a tightly packed array of needle-like crystals which have a strength-to-weight ratio that is eight times better than stainless steel. Even better, it's incredibly cheap. Despite its great strength, "**nanopaper**" is produced from a biological material found in conventional **paper cellulose**. This long sugar molecule is a principal component of plant cell walls and is the most common organic compound on Earth.

### AVAILABILITY AND PRODUCTION



Cellulose is the most abundant biological polymer on the planet and it is found in the cell walls of plant and bacterial cells... Perhaps the most practical approach will simply be to paint or otherwise coat CNC composite materials in some material that keeps water away. For such a price - inexpensive strong and rigid

materials - we can be sure that innovations will follow to make the theoretical into practical. The beauty of this material is that it is so abundant we don't have to make it. We don't even have to use entire trees; nanocellulose is only 200 nanometres long. If we wanted we could use twigs and branches or even sawdust. We are turning waste into gold. The larger CelluForce facility opened in Montreal, Canada, in November 2011 and is now producing a tonne of NCC a day. It will be sold at just several dollars a kilogram within a couple of years.

### The production plant at Canada( CelluForce)

#### PROPERTIES

Mechanical testing shows it has a tensile strength of 214 mega Pascal, making it stronger than cast iron (130 MPa) and almost as strong as Structural steel (250 MPa). Normal paper has a tensile strength less than 1 MPa. The tests used strips 40 millimetres long by 5mm wide and about 50 micrometres thick. These are hard, dense and tough, and can be forced into different shapes and sizes. When freeze-dried, the material is lightweight, absorbent and good at insulating. In addition, the human body can deal with cellulose safely so NCC is less dangerous to process than inorganic composites. The secret to the nano paper's performance is not only the strength of the undamaged cellulose fibres, but also the way they are arranged into networks. Although strongly bound together, they are still able to slip and slide over each other to dissipate strains and stresses.

## ADVANTAGES AND APPLICATIONS

As it is cheaper than the carbon fibres, it can replace it in many applications. The field Medical Electronics is keen on *developing surgical equipment* using NCC .IBM is using it to create *components for computers*.

Even the US army is getting in on the act, using it to *make lightweight body armour and ballistic glass..The new La Ferrari ( Parts may be replaced by NCC)NCC will replace metal and plastic car parts* and could make *nonorganic plastics* obsolete in the not-too-distant future.

### DISADVANTAGES

As with most things, cellulose nanocrystals are not a perfect material. Their **greatest enemy is water**. Cellulose is not soluble in water, nor does it depolymerize. This could be overcome by using it in the places which are less affected by water.

Material &	Elastic Modulus
NCC 7.5 GPa	150 GPa
Kevlar 49 3.5 GPa	125 GPa
Carbon fibre 3.5 GPa	150 GPa
Carbon nanotubes 20 GPa	300 GPa
Stainless steel 0.5 GPa	200 GPa
Oak 0.1 GPa.	10 GPa

## NANOTUBES FOR DAMPENING VIBRATIONS

Research on a new class of nanostructured materials used to reduce vibrations in mechanical equipment and electronic devices, being developed by a team of scientists at Rensselaer Polytechnic Institute, will be featured in Nature Materials.

"The nanoscale building blocks we have developed have both micro and macro applications," said Nikhil Koratkar, assistant professor of mechanical, aerospace, and nuclear engineering at Rensselaer. "The new systems reduce and control vibrations within structures and will benefit the performance, safety, and reliability of future manufacturing equipment, sensitive laboratory equipment, and everyday electronic devices."

The Rensselaer research team, led by Koratkar, added carbon nanotube fillers to traditional vibration reduction materials to enhance their energy dissipation capability. Adding large quantities of nanoscale fillers increases the amount of surface area, and thereby increases frictional sliding that occurs at the filler-to-filler interface. The result is a decrease in vibrations. In 2004, Koratkar received a National Science Foundation (NSF) Faculty Early Career Development Award (CAREER) to fund the development of these new materials. Additional Rensselaer researchers on the project include Pulickel Ajayan, professor of materials science and Engg Pawel Koblinski, associate professor of materials science and engineering; and Jonghwan Suhr, a doctoral student in mechanical, aerospace, and nuclear engineering. The research is available in the Nature Materials journal online, and will be published in an upcoming print edition of the journal.



## FISHING OUT CARS!



You've driven over speed bumps before, but never over one like this. Meant to stop vehicles that slam through checkpoints without slowing, a net

flies from this innocuous looking speed bump to surround and capture a car, like something out of a Spiderman comic book. The U.S. Army asked the folks at **Pacific Scientific Energetic Materials Co.** in Chandler, to develop a device for use at checkpoints at Army bases mainly in the Middle East, said Bryan Stacey, senior business development manager at the company. Design engineer Mynor Castro invented the Pit-Ballistic Undercarriage Lanyard or the Pit-Bul, which masquerades as an innocuous speed bump. "It can stop vehicles going up to 45 miles per hour", Castro said.

With the Pit-Bul, the car can be returned to drivable condition in more than ten minutes by simply removing the mesh net from the wheels. "The Army has guns at checkpoints but sometimes people don't speak the language so they don't know they're supposed to stop," Castro said. "They wanted something to give them a little more time to tell a good guy from a bad guy. This will slow the vehicle down to give them a few seconds to consider what to do next." The system stops vehicles within 80 feet and also in a nonlethal manner, Stacey hastened to add. Most systems include a sensor placed ten feet in front of the speed bump; should a vehicle cross the checkpoint without stopping, the system releases spikes that puncture the tires and also pull the net from a small pit within the middle of the bump. The system can also be manually deployed by a person standing up to 300 feet beyond the checkpoint, Castro said, "When someone is traveling at 40 miles per hour, you don't have time to react," he said. The system reacts in 170 milliseconds. "If you put all your effort into blinking as fast as you can, that's 250 milliseconds," Castro added.



Pacific Scientific owns the intellectual property for the security system, which runs on rechargeable lithium ion batteries, and this year has begun selling it for installation at airports, casinos, power plants, and other secure locations, Stacey said. The portable speed bump can be up and running

**This portable vehicle arrestor can be set up for reuse in less than thirty minutes.**

within 15 minutes, he added.

## HUMANS IN ANTS' SHADES

Can you believe that human beings being the most intelligent of all species in the world relays on a mere and tiny pest like an ant????ANTS are some of the most annoying creatures in the

world, but they are also the most fabulous "architect" on which the modern human world is balancing on. The ants are comfort desires just like human beings. Some might think that it is a joke but it is a fact which the Arup Associates, a leading constructional company in Zimbabwe, under the leadership of Mick Pearce [a design engineer & an architect] took up the task to study, analyze and build a complex which is totally inspired on the way an "ant hill" is built. According to Mick Pearce, there are several factors on which the ant colony will look upon to before building the hill. The main factors are: the amount and the direction in which the sunlight would be incident on the hill at a particular time of the day, suitable sand required and its availability in the neighborhood, the very ground on which the hill is to be built, last but not the least, the predators location are also considered.

Mick Pearce, with all the information that he acquired from the research, started planning to build a complex, which is a DREAM PROJECT for many of the masonry companies. His dream was to create a building which won't require any sort of artificial or electronic interference for the "perfect human living". Mick Pearce got the opportunity to fulfill his dream and create the largest complex The Eastgate Centre in Harare, Zimbabwe.

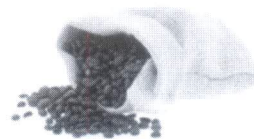
The Eastgate Centre is a huge complex made in order to store the food grains produced in Zimbabwe. It is largely made of concrete, has a ventilation system which operates in a similar way to that of an ant-hill. i.e., outside air that is drawn in, is either warmed or cooled by the building mass depending on which is hotter [the building concrete or the air]. It is then vented into the building's floors and offices before exiting via chimneys at the top. The complex also consists of two buildings side by side that are separated by an open space that is covered by glass and open to the local breezes. With the help of these actions the food grains are maintained at exactly 87 ° F, while the temperatures outside range from 35 ° F at night to 104 ° F during the day.

The EASTGATE Centre has natural air-conditioning system and it is also equipped with a complete electric proof package, i.e., during day time, no corner of the building needs any light at any instance of time because, the indigenous architectural design by the ants are very much sophisticated and are much accurate than the technologies developed by humans. This design of the building saves almost 87 to 90% of the electric charges that a regular building of its size would cost. On viewing the entire thing, we can say that the **ANTS HAVE A BETTER WAY OF COMFORT LIVING THAN ANY OF THE HUMAN BEING.**

## DID YOU KNOW?

**Spill the Beans**

Meaning: To reveal a secret



**History:** In Ancient Greece, beans were used to vote for candidates entering various organizations. One container for each candidate was set out before the group members, who would place a white bean in the container if they approved of the candidate and a black bean if they did not. Sometimes a clumsy voter would accidentally knock over the jar, revealing all of the beans and allowing everyone to see the otherwise confidential votes.



**Waking Up on the Wrong Side of the Bed**

Meaning: Waking up in a bad mood

**History:** The left side of the body or anything having to do with the left was often associated considered sinister. To ward off evil, innkeepers made sure the left side of the bed was pushed against a wall, so guests had no other option but to get up on the right side of the bed.

You become what you believe

K.S.I.T MECHANICAL DEPT.

