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AMEN

The Association of Mechanical Engineers

NEWSLETTER

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"Things should be made as simple as possible, but not any simpler"

– Einstein

ME Farewell on 15th April, Sunday. Photograph session (all graduating students B.tech.(Dual) and M.tech) at 4pm at basket ball ground followed by farewell function and dinner starting at 6 pm in the outreach auditorium. All AME members are coordinately invited

From The Department

National Conference of Research Scholars in Mechanical Engineering 07

"National Conference of Research Scholars in Mechanical Engineering" was organized by our Departmental Ph.D. students in association with AME at Outreach Centre during 23rd-24th March 2007. With the motto "LET'S CONNECT", it called for an integration of vision and approach between Research Scholars, Industry and Academics.

It was unique in its own way, as it was for the first time ever in India that such a gathering was being held, at departmental level, with participation from scholars across all IITs & IISc along with active participation of eminent faculty members and top level representatives from industry like General Electric-Bangalore, Geometric Software Solutions Co. Ltd.-Mumbai, MSC Software Corporation India Pvt. Ltd-Pune, Online Solutions Pvt. Ltd.-Chennai.

The conference started with an inauguration address by Deputy Director, IIT Kanpur during inauguration function on 23rd March. The conference featured 33 technical presentations by research scholars from across the country, in various research areas like computational fluid mechanics, Vibration control, solid mechanics, manufacturing sciences, fracture mechanics, combustion, alternative fuels, and MEMS. There were four keynote addresses during the conference including address by Dr. Balu Sarma (Technology Growth Leader, GE India Technology Center, Bangalore) entitled '"Transition from Academia to Industry - 10 Key Laws"', by Mr. Gerard Rego (VP & GM India Product Development, MSC Software India Pvt. Ltd, Pune) entitled "Simulation ~ Multidiscipline & Enterprise wide", by Mr. Manu Parpia (Founder & Vice Chairman Geometric Software Solutions Co. Ltd, Mumbai) entitled "The Challenge of Innovation in Engineering" and a very special address by Prof. A. K. Mallik entitled "Academics as Career". The Ph.D. students' panel discussion moderated by Dr. Samir Khandekar, Dr. P. Venkitanarayanan & Dr. Balu Sarma turn out to be very elaborative and useful, focusing on the basic doubts and dilemmas of Ph.D. students.

All the participants and delegates have shared their appreciation for the good management of various aspects of the conference, right from presentation sessions to the hospitality. In here, NCRSME-2007 TEAM would like to thank all the deans, Departmental faculty members, students and everyone else who had contributed in one way or another to make this event successful. Please visit the conference website www.iitk.ac.in/mech/ncrsme07/ for browsing the conference photographs.

NCRSME-2007 Team

What's it called?

-The plastic things on the end of shoelaces are called aglets.

-One that speaks two languages is called a bilingual

-In the early days of film making, people who worked on the sets were called movies. The films were called motion pictures.

-A building in which silence is enforced, like a library or school room, is referred to as a silentium.

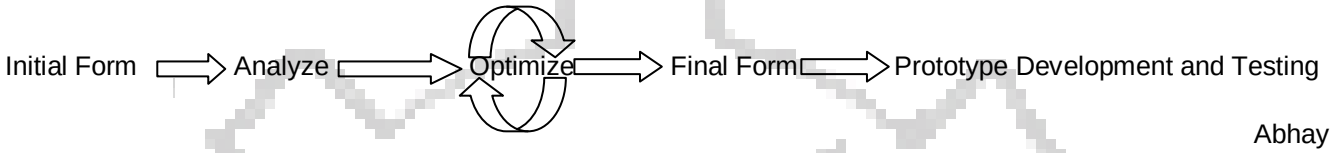
Principles of Engineering Design

Design is an activity that facilitates the realization of new products and processes through which technology satisfies the need and aspiration of society. Engineering design encompasses three key stages of realization:

Need - This first principle requires recognizing and understanding the nature of society, economics and humanity's needs. Reason, compassion, service and curiosity all contribute to the definition of need. If harmony exists at the level of individual, society, environment and existence, then only we move further in the designing process. Based upon the need, problem definition is done. Objective function and constraints are defined.

Vision - All designs arise from a creative response to a need. This comes from designer's vast experience and knowledge base of science & engineering. Brainstorming is usually done to create an **initial form** and then **analyzed** for requisite functionality, strength, reliability, environmental impact, feasible manufacturing, cost determination etc. These may be some design goals that could be improved **optimally** by altering the geometry and/or material of the component. Usually some optimization algorithm is used to optimize the objective function keeping all constraints satisfied. Analysis and optimization is an iterative process which is carried out till there is no scope for further improvement. This generates the **final form**. **Prototype development and testing** provide the ultimate check through physical evaluation before the design goes for production.

Delivery - The final principle involves delivering a solution to a recognized need. This requires assembling and managing resources and team members with the necessary skills and knowledge needed to create an appropriate and efficient design.



Abhay Kumar
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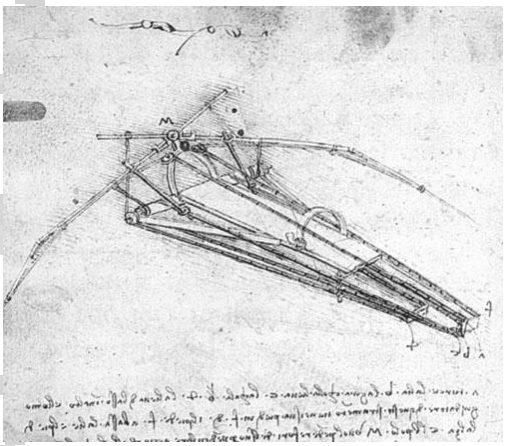
Ornithopter



An ornithopter (from Greek ornithos "bird" and pteron "wing") is an aircraft that flies by flapping of the wings. Since many examples of flapping-wing flight exist in nature, such as birds, bats, and insects, designers seek to imitate this mode of flight. Ornithopters are usually built on the same scale as these flying creatures. Some manned ornithopters have also been built. Although people are more aware of the unsuccessful attempts, some successful flights have also been reported.

The idea of constructing wings in order to imitate the flight of birds dates to the ancient Greek legend of Daedalus and Icarus. Roger Bacon, writing in 1260, was among the first to consider a technological means of flight. Around 1490, Leonardo da Vinci began to study the flight of birds. He grasped that humans are too heavy, and not strong enough, to fly using wings simply attached to the arms. Therefore he proposed a device in which the aviator lies down on a plank and works two large, membranous wings using hand levers, foot pedals, and a system of pulleys. He only made a small scale model.

The first ornithopters capable of flight were constructed in France in the 1870s. Gustav Trouvé's 1870 model flew a distance of 70 meters in a demonstration for the French Academy of Sciences. The wings flapped by gunpowder charges activating a bourdon tube. Jobert in 1871 used a rubber band to power a small model bird. Alphonse Penaud, Hureau de Villeneuve, Victor Tatin, and others soon followed with their own designs.

Around 1890, Lawrence Hargrave built several ornithopters powered by steam or compressed air. He introduced the use of small flapping wings providing the thrust for a larger fixed wing. This eliminated the need for gear reduction, thereby simplifying the construction. To achieve a more birdlike appearance, this approach is not generally favored today.

In the 1930s, Erich von Holst carried the rubber band powered bird model to a high state of development and great realism. Also in the 1930s, Alexander Lippisch and other researchers in Germany harnessed the piston internal combustion engine.

In 1929, the human-muscle-powered ornithopter designed by Alexander Lippisch flew a distance of 250 to 300 meters after tow launch. The flight was extended by the pilot's effort, but it is not clear whether the ornithopter and pilot performed well enough to remain briefly at equilibrium after the tow launch. Later tow-launched flights include Bedford Maule (1942), Emil Hartmann (1959), and Vladimir Toporov (1993). All faced similar limitations due to the use of human muscle power.

In 1942, Adalbert Schmid flew a motorized, manned ornithopter at Munich-Laim. It was driven by small flapping wings mounted at the sides of the fuselage, behind a larger fixed wing. Fitted with a 3 hp Sachs motorcycle engine, it made flights up to 15 minutes in duration. Schmid later constructed a 10 hp ornithopter based on the Grunau-Baby IIa sailplane, which was flown in 1947. The second aircraft had flapping outer wing panels.

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