Association for Machines and Mechanisms
News Bulletin

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## Our Objectives and Activities

The main objective of AMM is to contribute to mechanical design at all levels starting from academic research to industrial initiatives, thereby enhancing the quality and reliability of indigenous machines. With this in view, AMM organises the National Conference on Machines and Mechanisms, NaCoMM, and the workshops on Industrial Problems on Machines and Mechanisms, IPRoMM.

## Inside This Issue



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# Message from the Editor-in-Chief

## Handloom Sector and Technological Challenges in Modern Era

Handloom sector has not only been instrumental in fighting The British during freedom struggle but has also played a vital role in bridging the gap between different communities. As of now this sector has attained the status of a mature industry in some parts whereas in other parts, the people involved are struggling to make the two ends meet. In certain cases the workers are trying their level best to keep the cultural heritage alive. Though the handloom weavers are known for their art, knowledge, innovation and brilliance in designs, the sector has been reduced to traditional rural sectors involving all the members of the family or group of people in a particular locality or community.

The existing education system has almost neglected the handloom sector and thus any innovation and related change in the existing design has been left to the handloom weaving families by virtue of their experience alone. In recent past due to lack of information and fast changes owing to the consumer driven requirements, the practices in handloom sector have almost turned out to be static and apparently became redundant. The research institutions/centres, universities, and other institutions have not given much attention to the problems faced by this sector, unfortunately.

Handloom method of cloth production is environment-friendly and would be supportive of sustainable development policies aimed at reduction of negative impacts on environment and ecology and can be considered as an important channel for balanced and sustainable economic growth.

However, the handloom sector is facing number of problems today and the factors associated with these problems have their origin in conditions, which are outside the control and access of average handloom weaver. Such problems in handloom sector, at times, start and end with the attitudes of the weavers towards change, and the fear to compete with mechanized production. Though the sector has so far survived due to the consumer attitude, however, the condition and the situation is alarming.

It is ripe time that the handloom sector should incorporate design improvements by adopting the trends of the market to compete the challenges posed, which may not be simple. We need to focus on the technology and mechanization/modernization of the conventional handlooms. There is also a need to focus on its multidisciplinary approach, with respect to the sustenance, technological hindrances, if any, and economic growth of the people attached with this sector along with the concerns of globalisation and environmental degradation, particularly in relation to development.

Rajesh Sharma, Editor-in-chief

# Drawframe Autoleveller [#]

Drawframe is the final process of quality improvement in the short fibre spinning process and quality of the drawframe sliver determines the yarn quality. One of the important tasks a drawframe is to maintain absolute sliver fineness and this is achieved by incorporating autoleveller in drawframe. In drawframe, a number of slivers (generally 6 to 8) are drafted with the help of series of roller pairs to produce a more even sliver with required linear density. Figure 1 shows the typical roller arrangements of a drawframe. The rollers are so rotated that their peripheral speeds in the through flow direction increases from roller pair to roller pair, thus stretching (draft) of fibrous strand (i.e. sliver) takes place. Draft is defined as the ratio of the corresponding peripheral speeds.

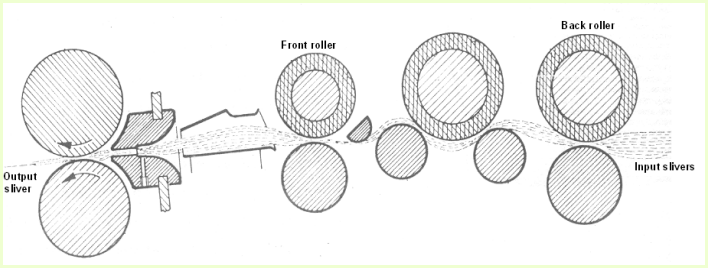



Figure 1. Typical roller arrangements of a drawframe

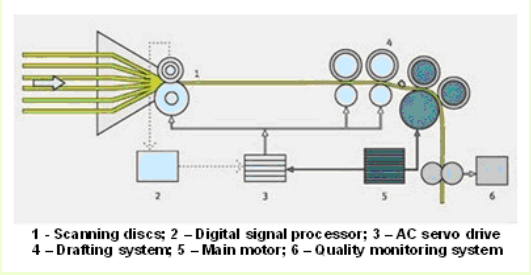



Figure 2. Principle of autoleveller

Autoleveller is an additional electronic sensing device which is meant for correcting the linear density variations in the delivered sliver by changing the draft of the drafting system, according to the feed variation. There are two types of autolevelling systems, i.e. open loop and closed loop. Most of the drawframe autolevellers are open loop autolevellers. In open loop autolevellers, sensing is done at the feeding end and the correction is done by changing the draft of the drafting system. Whereas, in closed loop system sensing is at the delivery side. Open loop system is very effective; because the correction length in open loop system is many-fold lower than closed loop system. But in case of closed loop system, it is confirmed that the delivered sliver is of required linear density. In case of open loop system, since the delivered material is not checked to know whether the correction has been done or not, sliver monitor is fixed to confirm that the delivered sliver has the required linear density. The major components of a modern autoleveller are:

- Scanning roller
- Signal converter
- Levelling CPU
- Servo drive (servo motor and servo leveller)
- Differential gear box (planetary gear box)

Function of the scanning roller is to measure the variation in the feed slivers. All slivers fed to the machine pass through a pair of scanning rollers. One of the scanning rollers is moveable. The variations in sliver mass of the incoming slivers displace the scanning roller. The distance moved by the scanning is proportional to the sliver mass fed. This displacement of scanning rollers is transformed into voltage by a signal converter and is fed to an electronic levelling processor. With analogue system, electronic levelling processor is a servo amplifier, but in the case of digital system, it a CPU. Figure 2 shows the schematic diagram of Rieter RSB D 40 autolevelling principle

It is the electronic levelling processor which furnishes the correct target value to the servo drive. The servo drive takes the information and converts it in such a way that servomotor RPM and direction is decided for appropriate correction. The differential gearing, with its controlled output speed, drives the middle and back roller, controlling the linear density of the sliver by the following two ways:

- If the slivers fed are too heavy, the entry speed is reduced, i.e. draft increased.
- If the slivers fed are too light, the entry speed is increased, i.e. draft reduced.

[#]Contributed by Apurba Das, Department of Textile Technology, Indian Institute of Technology, Delhi

## Recently Published Book

### Robotics: Fundamental Concepts and Analysis

ASHITAVA GHOSAL

OXFORD UNIVERSITY PRESS, 4th Impression, 2009


The book is designed to fully meet the requirements of undergraduate students of mechanical engineering for a course in robotics. With the inclusion of some key advanced topics, the book also serves as an introductory text for postgraduate students specializing in robotics. It emphasizes the fundamental mathematical concepts and analytical tools required for a topic, develops the relevant theory and algorithms, and then illustrates the theory with the help of worked-out examples. The book presents all key areas of kinematics, dynamics, and control of manipulators in a single text and treats the kinematics and dynamics of serial and parallel manipulators in a unified way. Newer robotic architectures such as parallel manipulators, flexible manipulators, and mobile robots have also been discussed at length. The book also uses computational software such as MATLAB and MAPLE. It is written in a comprehensive and concise manner, and includes several examples and exercises.

**Key Features:**

- Emphasizes the fundamental concepts and tools for analysis
  - Incorporates a lucid style of writing with easy-to-understand mathematics
  - Reinforces theoretical concepts through numerous examples
  - Includes a large number end-chapter exercises to test understanding
  - Provides insight into advanced topics such as flexible manipulators and mobile robots

**Review Report:**

Several good books have been published from time to time on analysis of robots and robotic theory. This book is different and occupies a very special place as it highlights the latest updates in the field without compromising on the fundamental aspects. It discusses the recent developments in areas, such as kinematics and dynamics of parallel robots, singularity analysis, flexible manipulators and wheeled mobile robots, which are of great interest to the robotics community. A very interesting and useful feature of this book is the specific observations, notes, and conclusions after every section and a neat summary at the end of chapters bringing out the salient aspects. This serves as an excellent recapitulation of the material presented and a sort of a ready reckoner which is very useful for a professional working in robotics.

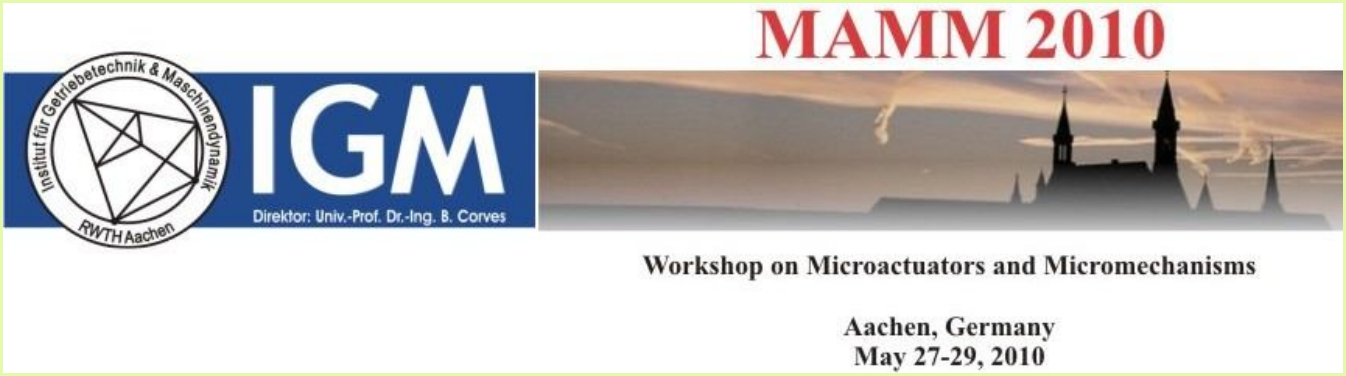
In almost all chapters, the last section(s) deals with the state-of-the-art and further, at relevant places, the author makes pointed references to advanced materials in the form of journal papers and books for further reading after making a statement or two as to what they contain. This is of immense value to research students. It is interesting to note that the author has extensively worked in almost every area of robotics and each chapter of the book contain notable journal publications co-authored with colleagues and his students.

This book is written in first person. The usage of ‘we’ makes the reader feel that he is never left alone in the maze of mathematical equations and derivations, and especially so for a beginner in robotics. The fundamental concepts, the analytical treatment and the computational exposure in the form of programs in Matlab and Maple presented in the book will help the student community acquire a good grasp of the subject. Solving the carefully chosen exercise problems at the end of each chapter should help the students get a deeper and better understanding of the concepts and techniques required for further research in robotics.

Overall, this book shall be a treasure for students, researchers and practicing professionals in robotic theory and analysis.

**Dr. R. Ranganath, MAeSi, FIE,**
**Deputy Project Director (Mechanisms),**
**Resourcesat 2 and Human Space Project, Spacecraft Mechanisms Group, ISRO Satellite Centre, Bangalore-560094**

## Forthcoming Events




Department of Mechanism Theory and Dynamics of Machines (IGM), RWTH Aachen University, Germany is organizing a Workshop on **Microactuators and Micromechanisms (MAMM 2010) w.e.f. May 27-29, 2010.**

This workshop is being organized under the Patronage of International Federation for the Promotion of Mechanism and Machine Science (**IFToMM),** Technical Committee Linkages & Cams, and Technical Committee Micromachines and is aimed to bring together scientists, industry experts and students and to provide a special opportunity for know-how exchange and collaboration in various disciplines referring to micro systems technology. MAMM 2010 is the first event of its kind at the IGM RWTH Aachen University.

Following are the topics for MAMM 2010:

- Microactuators
- Microsensors involving movable solids
- Micro-opto-mechanical devices
- Mechanical tools for cell and tissue studies
- Micromanipulation and micro-stages
- Micro-assembly
- Micro-scale flight and swimming
- Surgical tools incl. laparoscopy, endoscopy
- Micro-robotics
- Micron-scale power generation
- Miniature manufacturing machines

The official language of the workshop is English. Interested persons are requested to submit full paper by e-mail to mamm2010@igm.rwth-aachen.de.

Authors may refer the manuscript guidelines for preparation of the articles/manuscript at which are available at:

http://www.igm.rwthaachen.de/index.php?id=mamm2010.

### Important Dates:

Acceptance notification: January 31, 2010
Final full paper submission: March 28, 2010

For more details please visit:
http://www.igm.rwth-aachen.de/index.php?id=696

# Forthcoming Events


The First IFToMM Asian Conference on Mechanism and Machine Theory (Asian-MMS 2010) will be held during October 21-25 2010, at Taipei, Taiwan. The Conference aims to enhance cross communication among researchers, industry professionals and students from Asian countries from the broad ranges of disciplines referring to mechanism and machine science.

Papers are invited on topics related with mechanism and machine science in the aspects of theory, design, practice, and applications, including but not limited to:

- Theoretical kinematics
- Computational kinematics
- Mechanism design
- Dynamics of machinery
- Experimental mechanics
- Linkages and manipulators
- Micro-mechanisms and micro-machines
- Biomechanics and bio-mechanics
- Robotics
- Industrial and non-industrial applications
- History of mechanism science
- Vehicle mechanism, dynamics and design
- Experimental method in mechanism
- Nature and machines
- Education in mechanism and machine science

**Important Dates**

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|---|---|
| Extended abstract submission deadline | April 15, 2010 |
| Panel review notification | May 15, 2010 (early registration starts) |
| Full-length paper submission deadline | July 31, 2010 |
| Full-length paper acceptance notification | August 15, 2010 |
| Full paper in electronic form due | Sept. 15, 2010 |

**Abstract Submission Guidelines**

One page Abstract of Maximum 1500 words must be submitted through Online Abstract Submission System. The official language of the conference is English. For details please visit http://www.asianmms2010.ntu.edu.tw/Call_for_Paper.asp

**Conference Secretariat**

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# Brief Report NaCoMM-09/Forthcoming Events


Inauguration of NaCoMM 2009: Release of conference souvenir
by AMM President Prof. C. Amarnath

## Brief Report on NaCoMM 2009

"If one can not visit a conference, get the conference!" That is what I said to one of the faculty members during my visit to NIT Durgapur in 2007. As a follow-up of that comment, the Department of Mechanical Engineering at NIT Durgapur took initiatives to host the 14th National Conference in Machines and Mechanisms (NaCoMM) in 2009. After two years' of preparations, finally, the NaCoMM 09 was concluded on Dec. 18, 2009. The two-day conference (Dec. 17-18) featured Student Mechanism Competition for the first time, besides regular paper presentations. It was attended by about 120-150 people with about 60 papers presented. The CD-Proceedings include about 70 accepted papers from Robotics, Mechanisms, and other relevant areas.

Contributed by Prof. S.K. Saha, IIT Delhi

## Forthcoming Conference


The 11th International Conference on Control, Automation, Robotics and Vision (ICARCV) is being organised by the Nanyang Technological University of Singapore. ICARCV 2010 will mainly be covering the topics of related to **Control, Automation, Robotics and Vision**. Papers must be written in English and should describe original work. For details please visit http://www.icarcv.org/2010/

**Important Dates:**

| | |
|---|---|
| Deadline for Full Paper submission | April 1, 2010 |
| Notification of Acceptance | July 1, 2010 |
| Deadline for Camera Ready Manuscript Submission | September, 1 2010 |
| Deadline for Authors' Registration | September, 1 2010 |

# Industry Watch

## Beginning of Multi-physics Simulations[!]

Physics is the science mainly used to understand the structure of the natural world and explain natural phenomena. The laws of physics can be precisely expressed using differential equations which in turn represent a system. When these laws of physics are taken from different fields of applied physics e.g. heat transfer, acoustics, structural mechanics, etc. the model is said to be a multiphysics model. Most of the mechanical engineering systems are actually multiphysics systems, which we simplify into one type using assumptions. But to achieve exact match with the physical system, we need to model and simulate the system in multiphysics domain. Multiphysics simulations involve multiple physical models e.g., combining chemical kinetics and fluid mechanics or combining finite elements with molecular dynamics.

As the complications in the systems increases, the analysts are required to model the systems with the approach that is closer to the reality. This gives rise to these types of simulations. The engine simulations to provide lightweight design by reducing the moving masses and spring mass, modeling of blood flow through veins and arteries, fluid structure interaction in catheters so that they do not damage the blood vessels, modeling of highly complicated new welding techniques in aerospace industry, electromagnetic shielding of aircraft structures in case of lightening hit, etc. are few examples where these simulations have proved to be very useful for the analysts.

Multiphysics typically involve solving coupled systems of partial differential equations. This is basically equation-based modeling where Algebraic equations, ODEs, PDEs, are used to describe material properties, source terms, or extra terms in the underlying equations. There are many commercially available software packages for simulating multiphysics models. Most of them mainly rely on the Finite Element Method or similar standard numerical methods for simulating coupled physics like thermal stress, electromechanical interaction, fluid structure interaction, fluid flow with heat transfer and chemical reactions, electromagnetic heating, etc.

[!]**Prasad Bhangale, Ph.D.,**
**John Deere Technology Center – India**
**Email: prasadbhangale@gmail.com**

### 3rd European Conference on Mechanism Science

**EUCOMES 2010**

Cluj-Napoca, Romania
**September 14 - 18, 2010**

**Important Dates**

- Full Paper submission: February 10, 2010
- Notification of acceptance: April 1, 2010
- Final paper submission: April 20, 2010

For more details please visit:

http://www.eucomes2010.utcluj.ro