

Association for Machines and Mechanisms News Bulletin

Volume 10, No. 3

July 2018



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 International & National Conference on Machines and Mechanisms, iNaCoMM, and the workshops on Industrial Problems on Machines and Mechanisms, IPRoMM regularly.

Inside This Issue

1. Message from the Editor-in-Chief
2. About the AMM
3. Contributed Article
4. Forthcoming Events

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Message from the Editor-in-Chief

Volume 10 No.3 July 2018 issue is being published amidst the rainy season with the lush green surroundings. While in Kerala there is a devastating flood and also flood situation in different parts of India, there are some areas where there is less than average rain. True, there is wide diversity existing in India!

This issue of the Bulletin of the Association for Machines and Mechanisms (AMM) is also brought out by the continuing Editorial Board Members. This issue of the Bulletin is published with **Dr. Ranjit Kumar Barai, (ZVP, East)** taking steps to bring out this issue. The Editor-in-Chief takes the sole responsibility for slightly late publication of this issue and he does not wish to cite any excuse behind it. He is really sorry for the same.

An article bearing the title, “**Development of a Magnetic Reciprocating Engine**” is contributed mainly by a group of students of Department of Mechanical Engineering, Kalyani Government Engineering College, Kalyani. Hope readers would find the article interesting that outlines an innovative work.

Information Brochures of a number of forthcoming events is included in this issue as usual. Hope AMM community will participate in large number to make the 5th IFToMM Asian Mechanisms and Machine Science Conference 2018 being organised in Bangalore on December 18-19 2018 a grand success.

AMM members and others are requested to send contribute articles and technical briefs to the editorial team for October 2018 issue. Constructive suggestions, comments for improvement of the Bulletin of the AMM are most welcome.

On behalf of the Editorial Team of the Bulletin of AMM, I thank all concerned for their support, good wishes and suggestions for bringing out of this Bulletin.

Prof. Santanu Das
Editor-in-Chief

About the Association of Machines and Mechanisms (AMM)

The AMM headquarter is currently located at the Department of Engineering Design, IIT Madras. A new set of office bearers have taken charge of the affairs of AMM. AMM invites both individual and corporate membership from Indian academia, research organizations and industry. Membership benefits and other information about AMM are available at www.ammindia.org. The body of Zonal Vice Presidents (ZVPs) is active over the past several years with representations from the four corners of the country. They are playing the role of nodal agencies so as to decentralise the AMM official activities and to organise workshops under the aegis of AMM to popularise the mechanism science in their respective regions. They also form the editorial team of this news bulletin. AMM invites contributory articles from its members and others working in the various fields of mechanisms science for this quarterly news bulletin. Interested people can contact the editorial team.

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**Good decisions come from experience.
But experience comes from bad decisions.
This is life; so, never regret.
Learn from mistakes and GO AHEAD.**

--- Anonymous

Development of a Magnetic Reciprocating Engine

Avishek Mukherjee¹, Monojit Layek², Swarup Jana³, Bisal Karmakar⁴ and Santanu Das⁵

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1. INTRODUCTION

21st century is an era of innovation, science and technology. However, in case of vehicle industry, traditional fuels are still widely used in this innovative era. As a result, environment gets polluted. Though electrical engines are good substitutes for diesel and petrol engines, these are not much effective. So the concept of Magnetic Reciprocating Engine may overcome the above mentioned problems and may be the future of vehicle industry.

2. DESIGN AND WORKING PRINCIPLE

Keeping the above mentioned issues in mind, an engine is designed and developed in this work. It is easy to manufacture compared to the traditional engine. It is also eco-friendly and has a broad future scope of modification. Working principle of this engine is totally based upon the concept of magnetic repulsion and attraction property.

In Fig.1, it is shown that there is an electromagnet which is fixed at its mean position. A movable structure, which has two permanent magnets at both ends, should move along the vertical axis of the electromagnet. Behind this, a circuit (Fig.2) is connected with the ends of copper winding around electromagnet. This circuit has a vital role to change the direction of current after a certain interval. It contains a SMPS (Switch mode power supply), four solid state relay switches, an Arduino board, a photoelectric sensor, and a breadboard. This circuit is designed to control the polarity of electromagnet by changing the direction of current w.r.t. the piston position. A photoelectric sensor is used to detect the position of piston and sense the data to send it to Arduino board which controls the relay switch and changes the direction of current accordingly. Top view of the engine is shown in Fig.3.

Working principle of this engine has to be explained with help of Fig 1. At first, it is supposed that the electromagnet has North Pole at upper end and south at bottom end. At the same time, permanent magnet 1 (PM-1) has North Pole at bottom end and permanent magnet 2 (PM-2) has North Pole at its upper end. As a result, electromagnet repels PM-1 and attracts PM-2 simultaneously. This way piston will have an upward movement.

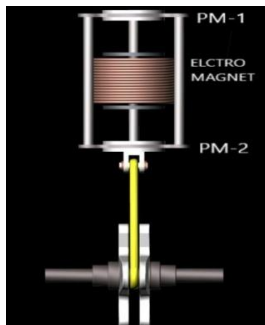


Fig.1 Side view of the Engine



Fig.2 Circuit

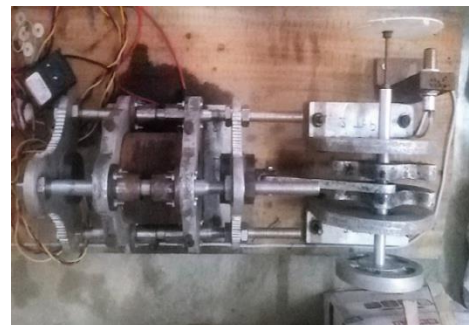


Fig.3 Top view of the engine

When the PM-2 comes closer to electromagnet, current in Copper winding has to be reversed. So the previous pole setup of electromagnet gets reversed but poles of PM-1 and PM-2 remain the same. So, in the same manner, PM-2 is repelled by electromagnet, and PM-1 is attracted simultaneously, and the piston will move downward. This way, piston will have a continuous reciprocation if this process will occur in a cyclic manner. A slider crank mechanism is attached with one end of the piston that converts this reciprocating motion into rotary motion. A flywheel is fitted with the crank shaft as usual.

3. MATERIAL USED

A soft iron core is used as electromagnetic core which is wrapped by several number of turns of copper wire co-axially, and a Sintered Neodymium (Nd₂Fe₁₄B) Magnet is used as permanent magnet. All other components of this design are made of Aluminium. Neodymium magnets are the strongest type of permanent magnet commercially available.

4. CALCULATIONS

Using the equations, torque is calculated with the change in crank angle. It is found that there are two power strokes in 360 degrees of crank rotation and the graph between angle of rotation and mean torque is given in Fig.4. Isometric schematic view of the engine is given in Fig.5.

$$F = (\mu_0/4\pi) (q_1q_2/x^2)$$

$$\text{Or, } F = (\mu_0/4\pi) q_1q_2 ((1/(80+x)^2) + (1/(80-x)^2))$$

$$\text{Or, } T = r F = r (\mu_0/4\pi) q_1q_2 ((1/(80+x)^2) + (1/(80-x)^2))$$

$$\text{where, } x = r (n - \sqrt{(n^2 - \sin^2\theta)}) + r (1 - \cos\theta) \quad q_1 = (N I A / L)$$

$$\text{Input} = (36 \text{ V}) (15 \text{ A}) = 540 \text{ W}$$

$$T_{\text{mean}} = (\int (T d\theta))_{(0, 2\pi)} / (2\pi)$$

$$\text{Output} = (2\pi N T_{\text{mean}}) / 60$$

$$\text{So, Efficiency} = \eta = (2\pi N T_{\text{mean}}) / (60 \times 540)$$

where,

F= Force between two magnetic dipole

q₁ & q₂= pole strength of electromagnet and permanent magnet

T= Torque acted upon crank

X= Displacement of piston= f(angle made by crank with horizontal)

N= L/r

L= length of connecting rod

N= No. of turns in electromagnet

I= Current passing through Cu wire

T_{mean}= Mean torque

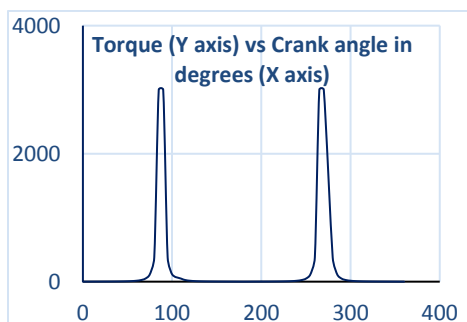


Fig.4 Plot of torque with crank angle obtained through simulation

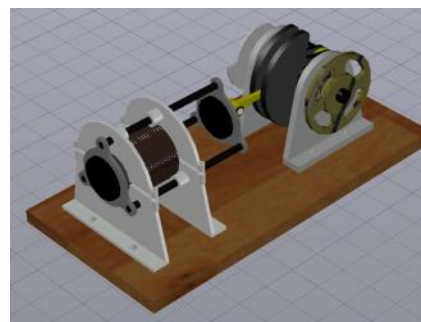


Fig.5 Schematic Isometric view of the assembly

5. POSSIBLE APPLICATIONS

As its efficiency is thought of to be higher compared to an I.C. engine or Electrical engine, it can be used in automobile or industrial applications. In valve controlling system of IC engine, the principle of this engine can be employed. It can also be used instead of pneumatic actuators, and in the field where reciprocating concept plays a vital role, like reciprocating pump and compressor.

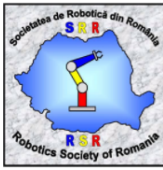
6. IMPLEMENTATION ISSUE

During fabrication of this engine, it should be noticed that the position of electromagnet will be perfectly constrained with the help of a clamping device otherwise the device becomes unstable due to vibration caused by reciprocation. Permanent magnet should be properly and tightly located at their position. Connection should be properly done and there should be a leak proof cover of magnetic proof material so that there will be no flux loss from the system.

REFERENCE

- [1] https://en.wikipedia.org/wiki/Neodymium_magnet, accessed on March 06 2018.
- [2] P. Hota, M. Rathore and D. Shaikh, Magnetic repulsion piston engine, International Journal of Science and Research, Vol. 4, No.12, pp.338-344, 2015.
- [3] S. Menta, V.Konduru and S.V. Kalahsti, Magnetic piston engine, International Journal of Mechanical Engineering and Robotic Research, Vol.3, No.1, pp.59-66, 2014.
- [4] S. Dhangar, A. Korane and D. Barve, Magnetic piston operated engine, International Journal of Advanced Research in Science and Engineering, Vol. 4, No.6, pp.219-225, 2018.
- [5] <https://www.slideshare.net/vishalsatsangi/magnetic-repulsion-piston-engine>, accessed on July 5 2018.

Forthcoming Events



The XXIV International Conference on Robotics

ROBOTICS 2018

September 20 - 21, 2018, Iasi, Romania



Conference Website: www.robotics2018.tuiasi.ro

General information:

It is our pleasure to invite you to ROBOTICS 2018, organized by "Gheorghe Asachi" Technical University of Iasi, Romania, during September 20 - 21, 2018. The conference aims at bringing together under a unique forum, scientists from academia and industry to discuss the state of the art and the new trends in robotics and to present recent research results and prospects for development in this rapidly evolving area.

All materials must be written in English. Submitted papers will undergo a peer review process, coordinated by the International Program Committee. **All the selected and presented papers will be published in IOP Conference Series: Materials Science and Engineering (ISI Web of Science).**

Organized by:

"GHEORGHE ASACHI" TECHNICAL UNIVERSITY OF IASI
FACULTY of MECHANICAL ENGINEERING
FACULTY of AUTOMATIC CONTROL AND COMPUTER ENGINEERING

With the support of:
ROBOTICS SOCIETY of ROMANIA - SRR

Important deadlines:

March 18, 2018:	Submission of papers
May 15, 2018:	Notification of acceptance
June 15, 2018:	Final camera ready manuscript and registration of at least one of the authors
September 20 – 21, 2018:	Conference

For any questions please contact the organizers at robotics2018@tuiasi.ro

Forthcoming Events

FIRST ANNOUNCEMENT AND CALL FOR PARTICIPATION



4th Students International Olympiad on MECHANISM AND MACHINE SCIENCE

October 24-26, 2018, Lima, Peru



PUCP

SIOMMS 2018

www.pucp.edu.pe/siomms2018

The **Pontificia Universidad Católica del Perú** is pleased to invite university teams to participate in the 4th Students International Olympiad on Mechanism and Machine Science (SIOMMS) that will be held on October 24-26, 2018. This fourth global Olympiad will be arranged following the decision of the Executive Council of International Federation for the Promotion of Mechanism and Machine Science (IFTOMM). It will follow the previous ones in Izhevsk State Technical University (ISTU), Izhevsk, Russia in 2011, Shanghai Jiao Tong University (SJTU), Shanghai, China in 2013 and Universidad Carlos III de Madrid, Spain in 2016.



PROBLEM TOPICS

- Structural analysis and synthesis of mechanisms
- Kinematics of flat mechanisms
- Force analysis of mechanisms
- Kinematic analysis of cam mechanisms
- Gearings (kinematics, geometry, efficiency)
- Adjustment of dynamic characteristics, mechanical governors
- Balancing of rotating masses

LANGUAGE

The working language of the Olympiad is English.

TEAMS

Teams consisting of three (3) bachelor and master students and one (1) or more tutors are invited to take part in the Olympiad. Each university may send only one team. The choice of students for each university team may be conducted on the basis of its own local selection competition.

LOCAL ORGANIZING COMMITTEE Pontificia Universidad Católica del Perú

- Jorge Rodríguez Hernández (Chair).
- Jorge Alencastre Miranda (Vice-Chair).
- Kurt Paulsen Moscoso.

- David Berrios Bárcena.
- Pedro Flores Álvarez.
- Daniel Lavayén Farfán.
- Mario Torres Melgarejo.

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- Y. Takeda, Japan.
- E. Krylov, Russia.
- K. Zimmermann, Germany.
- L. Zentner, Germany.
- M. Ceccarelli, Italy.
- P. Flores, Portugal.
- B. Corves, Germany.
- J. Alencastre, Peru.
- O. Penisi, Argentina.
- V. Petuya, Spain.
- C. López Cajún, México.
- A. Pérez-Gracia, USA.

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REGISTRATION FEES

The registration fee is 150 USD for each participant, which covers the participation in the Olympiad,

meals and social program. The accommodation has to be covered by the participants extra. The payment will be detailed by website.

IMPORTANT DATES

Submission of electronic application form: March 28, 2018.
Registration fee payment: June 30, 2018.

APPLICATION

The application will be via website.

TRANSPORTATION

Lima is the capital city of Peru and is one of the most important cities of Latin America. Lima is located in the central coast, along the Pacific Ocean. Lima has excellent public transport within the city and has a very modern airport in the port of Callao.

HOST CITY

Peru's capital has more than 10 million people, made up of different races of the world. The historic center of Lima was declared World Heritage Site by UNESCO. Lima is a city with great cultural diversity that is why there are a large number of museums. In Lima you will find everything you are looking for as cultures, adventures, beaches, dining,



T 626 2000 www.pucp.edu.pe/siomms2018

Campus principal: Av. Universitaria 1801, San Miguel - Lima 32, Perú



**Third
Call for
papers**

**Dates
to note**

Asian MMS 2018 is the fifth in the series of biennial conferences held under the patronage of International Federation for the Promotion of Mechanism and Machine Science (IFToMM) and Association for Machines and Mechanisms (AMM) to bring together researchers, industry professionals, and students, primarily from the Asian countries but also world at large. Previous conferences were held at Taipei ('10), Tokyo ('12), Tianjin ('14), and Guangzhou ('16). The conference focuses on all topics related to mechanisms and machines.



Abstract	Apr. 10, '18	Call for special session proposals is now closed	
Acceptance	May, 1, '18	Pre-conference symposia	Dec. 17, 2018
Full paper	Jul. 1, '18	Conference [Plenary talks; invited talks; oral presentations;	Dec. 18, 2018
Acceptance	Sep. 1, '18	interactive poster sessions; and more]	Dec. 19, 2018
Final paper	Sep. 15, '18	Conference picnic [A trip to scenic and historic places]	Dec. 20, 2018

Topics

Plan to submit a paper, organize a special session, and attend the conference, right now!

- Theoretical kinematics
- Computational kinematics
- Machine elements
- Actuators and sensors involving mechanics
- Gearing and transmissions
- Linkages and cams
- Mechanism design
- Dynamics of machinery
- Tribology
- Vehicle mechanisms, dynamics, and design
- Reliability in machines and mechanisms
- Experimental methods in mechanisms
- Robotics and mechatronics
- Biomechanics
- Micro/nano mechanisms and systems
- Medical/healthcare devices
- Nature and machines
- Compliant mechanisms
- History of mechanism and machine science
- Education in mechanism and machine science
- Reconfigurable mechanisms
- Parallel and serial manipulators

Registration (opens on Sep. 1, 2018; 20% early-bird discount until Oct. 15, 2018)

Regular	INR 12,000 *
Regular (IFToMM/AMM members)	INR 10,000 *
Students	INR 3,000 *
Students (IFToMM/AMM members)	INR 2,500 *
Pre-conference symposia	INR 2,500
Conference picnic (Dec. 20, 2018)	INR 2,500

*includes pre-conference symposia

About Bengaluru

Bengaluru, known as the science city of India because it has numerous educational and research institutions and as garden city because of its cool climate and greenery, is a major metropolitan city. It is also an IT hub with thriving start-up companies and major industries, public and private.

About Indian Institute of Science

Indian Institute of Science (IISc), established in 1909, is India's top-ranked university and is in the top 10 of world's small universities. Its vibrant and verdant campus with world-class infrastructure is one of the finest university campuses in the world.

Accommodation

IISc has guesthouses on campus and there are 3-star hotels around IISc.

Travel

Bengaluru International Airport is well connected to all major cities in the world. Bengaluru has good public transportation system and taxi service.

www.iisc.ac.in/conf/AsianMMS2018

Conference Chair G. K. Ananthasuresh, Indian Institute of Science

Conference Secretariat Safvan Palathingal

Email: asianmms2018@gmail.com



IFTOMM

15th IFTOMM
World Congress
June 30 - July 4

2019

www.iftomm2019.com

Call for Papers

15th IFTOMM World Congress will be held in Krakow, Poland in June 30 – July 4, 2019. IFTOMM World Congress is held every 4 years and is the largest congress on mechanism and machine science. It will provide opportunity for researchers, scholars and students with interests in the theory and practice of mechanisms and machines for new ideas, sharing experiences, and discussing future developments. We hereby would like to extend our sincere welcome to you and to ensure all of you a wonderful congress and a memorable visit during your stay in Krakow during 2019 IFTOMM World Congress!

Sincerely yours
Organizing Committee

TOPICS OF THE CONGRESS

Papers are welcome on the general areas of the theory and practice of machines and mechanisms, but not limited, to the topics of the IFTOMM Technical Committees and Permanent Commissions, namely:

- ☒ Biomechanical engineering
- ☒ Computational kinematics
- ☒ Design methodology
- ☒ Biomechanical engineering
- ☒ Computational kinematics
- ☒ Design methodology
- ☒ Dynamics of machinery
- ☒ Education
- ☒ Gearing and transmissions
- ☒ History of MMS
- ☒ Linkage and mechanical controls
- ☒ Mechatronics
- ☒ Micromechanisms
- ☒ Multibody dynamics
- ☒ Reliability of machines and mechanisms
- ☒ Robotics
- ☒ Rotor dynamics
- ☒ Standardization of terminology
- ☒ Sustainable energy systems
- ☒ Transportation machinery
- ☒ Tribology
- ☒ Vibration

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- Prof. Marek Wojtyra – Warsaw
- Prof. Cezary Zieliński – Warsaw
- Prof. Teresa Zielińska – Warsaw

PRESENTATION AND PROCEEDINGS

The official language is English. Registered participants will receive one Digital Proceedings. Proceedings will be indexed in WoS, SCOPUS (will be confirmed later).

Conference proceedings will be published as an e-book by Springer which is indexed in Web of Science, Scopus and others.

PAPERSUBMISSION

All papers must be submitted electronically and they will be reviewed. Authors are requested to submit a full length paper, 4 pages (minimum) to 10 pages (maximum). The abstracts are NOT acceptable. The format will follow the IFTOMM template that is available in the congress webpage

IMPORTANT DATES

15 August, 2018	Registration Start
15 November, 2018	Full Paper submission deadline
15 January 2019	TC acceptance of the paper
15 February, 2019	Camera ready
15 March, 2019	Notification on final paper Acceptance
31 March, 2019	Deadline for paying fee of presenting authors
31 March, 2019	Final Full paper submission
30 June – July 4, 2019	IFTOMM Congress

CONGRESSLOCATION

The conference will take place in the Auditorium Maximum of the Jagiellonian University. Krakow is the capital of Małopolska province located on the south of Poland, large academic and cultural centre and is one of the most visited cities in Poland. There are numerous historical monuments, good hotels, restaurants and recreational opportunities. It is not a simple task to describe the unique character of Krakow to those who still have not had the opportunity to visit this city. This uniqueness is primarily due to the rare cultural heritage embodied within the city walls. Here, in the year 1000, a Roman Catholic bishopric was founded. Here, the residential royal castle was constructed on the Wawel Hill, becoming the site for the coronations and burials of kings, as Krakow was the capital of Poland from the 11th to 17th century.

ACCOMODATION

A variety of hotels with special rate in different standards with the room rate ranging from EURO 50 to EURO 150 will be listed in the IFTOMM 2019 website.

TRAVEL INFORMATION

Krakow airport is located about 10 km from the city centre and has a number of direct flight connections with major European airports (Munich, Frankfurt, Vienna, Berlin, Paris, Brussels, London, and others).
International airport in Kraków (10 km from the city)
<http://www.krakowairport.pl/en>
International airport in Katowice (60 km from the city)
<http://www.katowice-airport.com>

Contact:
Prof. Tadeusz Uhl - Chair of the OC for 2019 WC
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e-mail: congress@iftomm2019.com
www.iftomm2019.com

Registration type	Early registration (before 31 March)	Regular registration (after 31 March)	On-site registration
Delegates from IFTOMM MO	500 EUR	600 EUR	650 EUR
Delegates from non - IFTOMM MO	550 EUR	650 EUR	700 EUR
Student	350 EUR	400 EUR	450 EUR
Accompanying person	200 EUR	250 EUR	300 EUR



Editorial Board

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