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Proceedings of the
Conference on
Future Directions & Strategies in
Mechanical Engineering Education-
Beyond 2000



Department of Mechanical Engineering
University of Moratuwa, Sri Lanka
25 July 2001



UNIVERSITY OF MORATUWA
SRI LANKA

Proceedings of the Conference on
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University of Moratuwa

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This volume of proceedings comprises papers presented at the Conference on Future Directions and Strategies for Mechanical Engineering Education - Beyond 2000 organized by the Department of Mechanical Engineering, University of Moratuwa and held in the premises of the University on 25 July 2001.

The views and findings presented in the papers are those of the authors, and are intended to create the background for a productive discussion in formulating strategy.

Edited by

Julian F. Nanayakkara

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MESSAGE FROM THE VICE CHANCELLOR



**Prof. Dayantha S. Wijeyesekera,
Vice Chancellor
University of Moratuwa, Sri Lanka.**

It is with great pleasure I send this message on the occasion of the Conference on "Future Directions and Strategies in Mechanical Engineering Education - Beyond 2000", organised by the Department of Mechanical Engineering of the University of Moratuwa.

The University has a planned programme underway for meeting the objectives of the higher education reforms that have been proposed by the government. There will be positive benefits from an industry forum of this nature by way of improved dialogue between the University and the industry. I expect that the outcomes of the conference will reinforce the work of the University Industry Consultative Board that has been established and provide an impetus to provide a new outlook to the educational programmes of the Faculty of Engineering and more specifically to those of the Department of Mechanical Engineering. The department has been in the forefront of research and development activities in the University with very dedicated and motivated staff of all categories.

I wish every success to the effort of the organisers of the conference and hope that this exercise will bear fruit.



MESSAGE FROM THE DEAN FACULTY OF ENGINEERING



**Professor Malik Ranasinghe
Dean, faculty of Engineering,
University of Moratuwa, Sri Lanka.**

On behalf of the Faculty of Engineering, University of Moratuwa, I am honoured to send this message for the Conference on Future Directions and Strategies on Mechanical Engineering, Beyond 2000, organised by the Department of Mechanical Engineering at the University of Moratuwa. I congratulate the Head and all the members of the Department of Mechanical Engineering at the University of Moratuwa for organising this conference, which is timely.

The conference is timely because the Faculty of Engineering is in the process of reforming its curriculum to train engineers who will meet the needs of industry and society more effectively and efficiently. The Department undertook the immense task of organising this event despite their heavy work schedules imposed on them due to on going curriculum reforms in addition to the backlog clearance activities to meet HE The President's target to admit the April 2002 'A' level students by September 2002.

The Faculty of Engineering at the University of Moratuwa takes pride, as the place in Sri Lanka that trains Engineers most sought after by Industry and as the place that is most sought for entry by new undergraduates. Despite this achievement, the Faculty of Engineering is in the process of reforming its curriculum, adopting a course-unit (modular) based Semester system to train Engineers of tomorrow. The course unit system, as opposed to the rigid curriculum of the year-end examination system, provides flexibility to the undergraduates and the faculty to adapt to the fast changing needs of the industry and society.

Since the first group of engineers trained in the course unit system will come to industry by end of 2004, it is important for the Faculty to have continuous dialogue with industry in particular and society in general. We have had meetings and we have listened very carefully to what industry said are its requirements for an engineer of tomorrow. All of those requirements are incorporated into our new curriculum, which we believe will now produce a highly technically competent engineer who will be able to adapt to the changing requirements of industry using the flexibility of the technical curriculum and the soft skills obtained from the non-technical curricula.

The deliberations at this conference, on future directions and strategies on mechanical engineering beyond 2000, will help the Department of Mechanical Engineering to focus itself better to the needs of the industry in its efforts to produce the best Mechanical Engineer in the country. I can assure the distinguished participants of this important conference that the Faculty of Engineering at the University of Moratuwa is always listening to views of industry and society, ready to change in whatever way that is necessary to meet those needs.

On behalf of the Faculty of Engineering, I thank all the distinguished participants most sincerely for contributing to our continuing effort to train engineers who are effective and useful to industry and society. The untiring efforts of the Head and the members of the Department of Mechanical Engineering to facilitate this opportunity to listen to industry and society are gratefully acknowledged.

Thank you!

Why this Conference?



Dr. S. Rohan Tittagala
Head of the Department
Mechanical Engineering
University of Moratuwa, Sri Lanka.
Chairman - Conference Organising Committee

Traditionally because of the diversity in their training, Mechanical Engineers have been in a unique position of bridging the gap among various engineering disciplines. However, if this status quo is to remain in the future, Mechanical Engineering Education will need to align itself towards the rapidly changing technologies and industrial practices. The Conference will address this important issue. The "future directions and strategies" in the context of this Conference are intended to extend far beyond the confines of undergraduate education.

The presentations and the ideas exchanged at this forum, we expect, will stimulate thinking and focus our attention on similar lines towards a common objective. To this end we appreciate the tremendous support and contribution received from fellow academia and industry.

How do we proceed from here on? Effective action-oriented mechanisms capable of translating ideas into practice to be established. One such positive step already taken is the establishment of Industry Consultative Boards (ICBs) at Faculty and Department levels. Action at departmental level will be promoted through the DICBs and interdisciplinary approaches at faculty level will be facilitated by the FICBs.

Editors Note



**Dr. L. D. J. F. Nanayakkara,
Senior Lecturer,
Department of Mechanical Engineering,
University of Moratuwa, Sri Lanka.**

The criticism of the work of the educators by the industry has never been more intense than today. Hence the need for a forum for making such comments constructive. However, most Mechanical Engineering professionals who work in industry are naturally more efficient when working with machine tools rather than with writing tools. Some prefer to speak of things that concern them rather than write. Hence the limited collection of write-ups here. The organising committee is keen to verify whether they represent the majority view of the industry. The conference of 25TH July, 2001 is for this purpose and formulating strategies for Mechanical Engineering Education. The gathering comprises specially invited professionals as well as volunteers from industry and universities, both local as well as overseas, who work in various spheres that are based on mechanical engineering. They will be making their contribution by debating the issues for arriving at a common consensus on the directions and strategies for industrial development through mechanical engineering education.

Having witnessed environments where the actions of speaking, writing and debating on ideologies go on unabated but with no end results, all of us do recognise the fact that the most important task ahead of us is to drive the vital changes necessary. The latter will be the subject of the editor's next job that will be completed soon after the conference. The consensus of the profession and the strategic plan for spearheading Mechanical Engineering Education beyond will also be published as a supplementary volume to the main proceedings.

We look forward to your precious contribution to this project.



We Acknowledge

This publication, which comes in two volumes, is the result of the keen interest taken and the generous contribution given by the distinguished writers of the papers and those who expressed points of view for the national cause of educating the Mechanical Engineer for world-class performance. The referees who reviewed the papers by making valuable comments did a marvelous job and we are grateful to them.

Gratitude is also expressed for the part-funding support received from the Science and Technology Personnel Development Project (STPDP) of the Ministry of Science and Technology, Sri Lanka.

Editor and the Organising Committee



CONTENTS

Page No.

Trends in Mechanical Engineering Education: the International scenario and its relevance to Sri Lanka. Prof. J.S.S. Gunasekera (Keynote Address)	1
SESSION 1	
Mechanical Engineering - A Historical Perspective Emeritus Professor P.A. De Silva	10
Engineering Education for the 21st Century Dr. S. Sivaloganathan	15
Mechanical Engineering - weak-hearted or undervalued. Dr. S. Devapriya Dewasurendra	27
Curriculum Needs to Develop attributes of Engineering Graduates for success in 21st Century Industry – Relevance of changes in the USA to Sri Lanka Dr. Jatila Ranasinghe and Mr. Gratian Peiris	40
SESSION 2	
Engineering education and Requirements of Industry. Mr. L.P. Jayasinghe	63
Future Scope and Strategies in Energy Education Dr. R.A. Attalage, Dr.KKCK and Dr AGT. Sugathapala	72
Marine Engineering Education in Sri Lanka Dr. T.A. Piyasiri	85
The Future of Automobiles in Sri Lanka Dr. W. M. S. R. Weerasinghe	88
Support base for Electrical/Electronic industry Mr. Tisil Cooray	92
Integration of Mechatronics - Strategies and some case studies. Dr. Rohan Tittagala and Rohitha Senadeera	95

SESSION 3

Approaches for teaching Mechanical Engineering in Sri Lanka - Use of Modelling and Simulation 102
Mr. S. Ganesapiragas ,Dr. L.D.J.F. Nanayakkara
and Dr SR Tittagala

Development of Inventive, Innovative and Design abilities. Why and How? 113
Dr. M.A.R.V. Fernando

Design skills with business attitudes. 129
Prof. Kapila Jayasinghe and Mr. B.S. Samarasiri

Manufacturing Education - The Industry Interface 137
Dr. S.R. Tittagala

Need for Education Process Re-engineering (EPR) 141
Dr. L.D.J.F. Nanayakkara

POINTS OF VIEW

STUDYING TO BE A PRACTITIONER: A BRIEF DISCUSSION OF FUTURE STRATEGIES FOR MECHANICAL ENGINEERING EDUCATION 155

Mr.Udaya P Kahangamage

ROLE OF DEPARTMENT OF MECHANICAL ENGINEERING BEYOND 2000 159

Mr. D. Priyantha Abeysinghe

REFLECTIONS AND SUGGESTIONS BASED ON PAST CURRICULA IN MECHANICAL ENGINEERING 161

Dr. M.P.U. Bandara,

STRATEGIES FOR TEACHING ENGINEERING MECHANICS 164

Dr S.Kanapathipillai

PROSPECTS IN AEROSPACE ENGINEERING 166

Mr. Ranjan L. Alwis,

REQUIREMENTS FOR RESEARCH AND DEVELOPMENT (R&D) 168

Mr. M.W. Leelaratne

FUTURE DEMANDS AND REQUIREMENTS OF MECHANICAL ENGINEERING GRADUAND Mr. Peter Y.T. Sun	171
IDEAS FOR IMPROVING CURRICULA Prof. Terrence Sisira Perera	173
THE IMPORTANCE OF INTRODUCING COMPUTERISED MAINTENANCE MANAGEMENT SYSTEMS (CMMS) INTO MECHANICAL ENGINEERING SYSSLABUS Mr. Bimal Rajapakse,	175
ENGINEERING EDUCATION & INDUSTRY Mr.V.G.K. Vidyaratne	177
MATCHING CURRICULA TO INDUSTRY NEEDS IN MECHANICAL ENGINEERING Mr. Duminda Thilakawardena	180
INSTITUTE-INDUSTRY PARTNERHSIP Mr. Nihal Cooray	182
PROPOSALS FOR FUTURE MECHANICAL ENGINEERING CURRICULA Mr. Manol Perera	183



**CONFERENCE ON
FUTURE DIRECTIONS & STRATEGIES IN MECHANICAL
ENGINEERING EDUCATION – BEYOND 2000**

KEYNOTE ADDRESS

by

Professor Jay S. Gunasekera *D.Sc., Ph.D., P.E.*

Chairman – Department of Mechanical Engineering,
Ohio University, U.S.A.

PROGRAMME

9.00 a.m. Commencement of Proceedings
Lighting of Traditional Oil Lamp

WELCOME ADDRESS

- by Project Manager & Editor
Dr. L.D.J.F. Nanayakkara

INAUGURAL SESSION

9.10 a.m. Conference Objectives
- Address by the Head, Department of Mechanical Engineering
Dr. Rohan Tittagala

9.15 a.m. Address by the Dean - Faculty of Engineering
Professor Malik Ranasinghe

9.20 a.m. Address by the Vice - Chancellor, University of Moratuwa
Professor Dayantha S. Wijeyesekera

9.25 a.m. Historical Perspective & the Future
Emeritus Professor P.A. De Silva

9.40 a.m. Keynote Address
Professor Jay S. Gunasekera

10.00 a.m. – 10.15 a.m. ----- **TEA** -----

TECHNICAL SESSION 1 Theme : EDUCATIONAL STRATEGY & INDUSTRY
(Chairman : Professor C. Lakshman V. Jayatileke)

10.15 a.m. – 11.30 a.m. Conference Papers & Discussion

TECHNICAL SESSION 2 Theme : MECHANICAL ENGINEERING – THE SCOPE
(Chairman : Professor Upali S. Kuruppu)

11.30 a.m. – 12.45 p.m. Conference Papers & Discussion

12.45 p.m. – 1.45 p.m. ----- **LUNCH** -----

1.45 p.m. – 2.30 p.m. **SHUTTLE VISIT TO LABORATORIES**

TECHNICAL SESSION 3 Theme : REQUIREMENTS FOR EDUCATION
(Chairman : Professor N.R. Arthenayake)

2.30 p.m. – 3.45 p.m. Conference Papers & Discussion

3.45 p.m. – 4.00 p.m. ----- **TEA** -----

POINTS OF VIEW/DISCUSSION

4.00 p.m. – 5.00 p.m. FORMULATION OF STRATEGIES

----- **END OF PROCEEDINGS** -----