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PERPUSTAKAAN HAMZAH SENDUT  
UNIVERSITI SAINS MALAYSIA



## MAKLUMAT PERDAGANGAN DAN PERNIAGAAN / TRADE AND COMMERCIAL INFORMATION

### MALAYSIA AMONG WORLD'S TOP THREE CONTENDERS FOR OFFSHORING BUSINESS

Malaysia is among the top three contenders for offshoring business in the world according to the 2004 Offshore Location Attractiveness Index compiled by the global management consulting firm A.T. Kearney, sources were quoted. Malaysia is ranked 3<sup>rd</sup> behind India (1<sup>st</sup>) and China (2<sup>nd</sup>) but ahead of Singapore (5<sup>th</sup>), Philippines (6<sup>th</sup>) and Thailand (13<sup>th</sup>). In its report, A.T. Kearney considers Malaysia a "natural choice" for offshore services in view of its low costs, particularly for infrastructure, the most attractive business environment among emerging markets, strong global exposure of the workforce, and government support for the information and communications technology (ICT) sector. Other significant initiatives cited by A.T. Kearney include the government's investments in infrastructure and developing the intelligent cities of Cyberjaya and Putrajaya as part of the Multimedia Super Corridor project. Thus, numerous companies – Motorola, Ericsson, IBM, Shell, DHL, HSBC and BMW- have located their regional offshore service centers in Cyberjaya.

### DANISCO TO DOUBLE OUTPUT WITH NEW PLANT IN PENANG

Danisco A/S, the world's biggest maker of additives for ice cream, said it will double its flavouring production in Asia with a new plant in Malaysia, sources were quoted. Copenhagen-based Danisco said it will spend US\$3 million (US\$1=RM3.80) on building the plant in Penang, which will be completed in mid-2005. The Penang plant will replace one in Singapore. Danisco also has a flavourings factory in China that covers the Chinese market.

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### MALAYSIA WELCOMES US BIOTECH FIRMS

Malaysia has the potential to house US biotechnology companies' offshore base to develop medicine. Science, Technology and Innovation Minister Datuk Dr Jamaludin Mohd Jarjis said Malaysia offers a reasonably lower operating cost for the purpose. Pre-clinical trials like animal testing also can be carried out in Malaysia at lower costs. He also said that Malaysia could be a platform for these biotechnology companies to make and retail their medicine on a commercial basis within the Asia-Pacific market, sources were quoted.

## **PENANG PORT UPGRADING TO WEB-BASED CONTAINER HANDLING SYSTEM**

Penang Port Sdn Bhd is upgrading its container handling system - PELKON II, to a web-based system, modelled after the system used in Shanghai Port, sources were quoted. The new system will incorporate the latest technologies and include EDI functions and new modules such as autogate and online billing. The ongoing work on Phase 2B of the North Butterworth Container Terminal (NBCT) project would see the extension of the berth by a further 100m to make it 900m-long. Upon completion, NBCT was expected to be able to handle one million TEUs per annum. PPSB is also working on the redevelopment of Swettenham Pier into an international cruise terminal and the construction of a marina at Church Street Pier. In another development, PPSB has completed construction of a second Vegetable Oil Tanker Pier (VOTP) at Butterworth Wharves. With this additional VOTP, the port is able to handle two vegetable oil tanker vessels at any one time.

## **INFINEON TO INVEST RM3.8B IN KULIM PLANT**

German chipmaker Infineon Technologies AG will invest RM3.8 billion in a new plant in the Kulim Hi-Tech Park that will make semiconductors used in automotive and industrial power applications, sources were quoted. Ground-breaking is planned for early 2005, with ramp-up scheduled for 2006. At full capacity, the plant will employ about 1,700 people. Infineon is Europe's leading manufacturer of automotive semiconductors with an overall sales market share of 15%. Worldwide, the company ranks second with an overall sales market share of 8.7% in 2003. Infineon is listed on the DAX Index of the Frankfurt Stock Exchange and on the New York Stock Exchange. Over the past 30 years, Infineon has developed a world-class manufacturing facility in Malacca. The new plant complements Infineon's existing production sites for non-memory products in Munich-Perlach, Regensburg, Villach and Dresden as well as Altis Semiconductors, a joint venture with IBM in Essonnes, France. Due to strong penetration of electronics in vehicles as well as the ongoing substitution of semiconductor solutions for mechanical components, the worldwide automotive semiconductor market is expected to experience growth of about 10% over the next few years.

## **MAKLUMAT PENGELUARAN / PRODUCT INFORMATION**

### **VERBATIM INTRODUCES NEW DISC LABEL**

LightScribe ink, CD and DVD discs developed by Verbatim and Hewlett-Packard will be sold in the United States early in 2005, sources were quoted. When combined with a LightScribe-enabled drive, consumers can use the same laser that burned data to the disc to make a distinctive-looking label for the other side of the disc. Currently, disc content descriptions can only be written directly on the disc by hand with a marker, and artwork can only be printed onto labels and then affixed to the discs or printed directly onto the discs with specialized disc printers. Verbatim's LightScribe discs are compatible with the LightScribe-enabled drives made by HP. Although LightScribe features have been added, the discs also are compatible with all current CD and DVD standards. With LightScribe-enabled CD and DVD drives, titles and artwork can be printed directly on Verbatim LightScribe CD and DVD discs with the drive's laser pickup. First-generation discs will be monochrome, while second generation will be able to accept multicolor printing.

### **CA eTRUST REDUCES RISK BY REDUCING INFORMATION OVERLOAD**

Computer Associates International, Inc. (NYSE:CA) has announced eTrust Security Command Center r8, a powerful solution for managing and responding to security events across the enterprise, sources were quoted. By dramatically reducing security information overload and intelligently automating security workflows, eTrust Security Command Center significantly reduces business risk and helps ensure regulatory compliance while improving the productivity of IT security teams. IT organizations face significant challenges as they attempt to convert the vast amount of raw security-related data across the enterprise into the actionable information they need to effectively combat the growing volume and variety of threats they face on a daily basis," said Toby Weiss, senior vice president of eTrust security management at CA. eTrust Security Command Center delivers this critical intelligence -- enabling customers to filter, prioritize and act upon security information in order to protect the business.

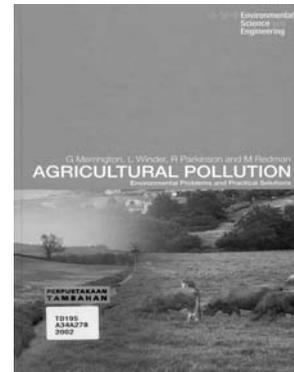
## INCREASING MEASUREMENT REUSE AND PRODUCTIVITY IN THE LAB

National Instruments SignalExpress™ is an interactive measurement environment for performing ad hoc and automated measurements in the lab. Using SignalExpress, design engineers can control multiple instruments and perform a variety of measurements from a single software user interface. In addition to performing single measurements, engineers can save instrument configurations and measurement routines for repeated measurements as SignalExpress projects that they can easily reuse. Engineers also can use SignalExpress to quickly correlate signals acquired from multiple devices or channels on a given device. They can import simulated results from SPICE software tools for side-by-side correlation with measured results. The SignalExpress sweeping and limit test operations also save engineers time when they perform stimulus and response measurements across a range of frequency, voltage, or current settings. Design engineers can greatly increase measurement reuse and productivity in the lab by identifying the major bottlenecks and applying measurement automation tools such as NI SignalExpress, sources were quoted.

## WEB PORTAL FOCUSES ON INDUSTRIAL PCS

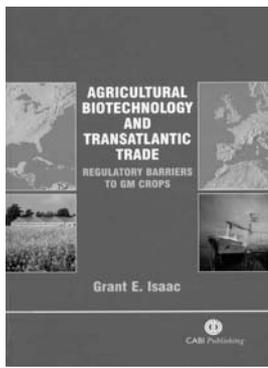
IPCNET is a new web portal for industrial PC manufacturers, integrators and distributors. Its primary objective is to provide a centralised one-stop place for industrial PC manufacturers and suppliers who want to address their channel effectively, and for their customers to obtain the information necessary to make good buying decisions, sources were quoted. Instant availability of reliable technical descriptions, details on additional options and compatibility of components is crucial for customers in this highly professional market. It provides all supply chain participants -manufacturers, distributors, system integrators, resellers and end users - support in the traditional areas of concern in this industry, assist in simplifying selling and purchasing processes and give IPC products the attention they deserve. IPCNET contains databases of IPC products with comprehensive product descriptions, the quickest advanced product search by technical parameters and an in-depth product comparison. A projects/quotation centre assists in building new projects and requesting quotations from suppliers of component products. The site also features product announcements and the latest news from the industry.

## ULASAN BUKU / *BOOK REVIEWS*



**AGRICULTURAL pollution: environmental problems and practical solutions.** Merrington, Graham, *et al.*  
London: Spon Press, 2002. (TD195.A34A278 2002)

*A*gricultural Pollution: Environmental Problems and Practical Solutions provides a balanced synthesis of the forms, magnitude and extent of agricultural pollution, and the potential solutions to the environmental risks posed by agricultural activity. The book covers key scientific areas of agricultural pollution, and applied and practical measures to resolve the pollution due to food production. All this is put in the context of policy frameworks that underpin how these solutions are delivered.



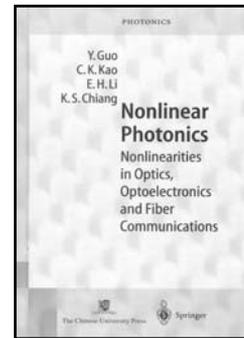
**AGRICULTURAL biotechnology and transatlantic trade: regulatory barriers to GM crops.** Isaac, Grant E.  
Wallingford: CABI Publishing, 2002.  
(HD9999.G452I73 2002)

This book essentially represents an initial attempt not only to identify the challenge of transatlantic regulatory regionalism and social regulatory barriers to trade diplomacy, but further to propose a regulatory development and integration strategy capable of overcoming this challenge. An interdisciplinary research approach is employed because identifying a jurisdiction's regulatory development and integration strategies involves a survey of economic, political, sociological and legal factors.



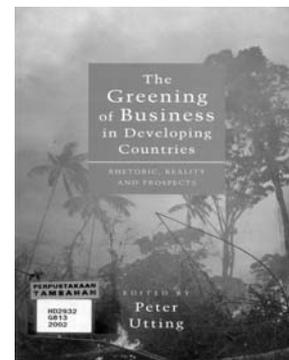
**INTERCULTURAL management.** Jacob, Nina.  
London : Kogan Page, 2003. (HD31. J15 2003)

*Intercultural Management* is an emerging but increasingly vital area of investigation. It is of particular interest to global managers who work for multinational corporations that are located in different countries. Essentially, *Intercultural Management* concerns itself with the management of workforces functioning in culturally different operating contexts.



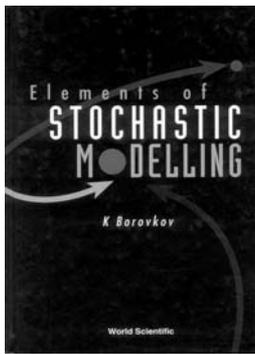
**NONLINEAR photonics: nonlinearities in optics, optoelectronics and fiber communications.** Guo, Y., *et al.* Berlin: Springer-Verlag, 2002.  
(TA1522.N813 2002)

Nonlinearities in optics, optoelectronics and fiber communications are discussed systematically in this book. The text addresses the three categories of materials: fibers, semiconductors and nonlinear crystals, with emphasis on the theoretical treatment of their optical absorption and refractive index. Also given is an in-depth analysis of techniques for the suppression and utilization of nonlinear photonic effects in broadband, long haul and high capacity dense wavelength-division multiplexing (DWDM) and optical time-division multiplexing (OTDM) fiber systems.



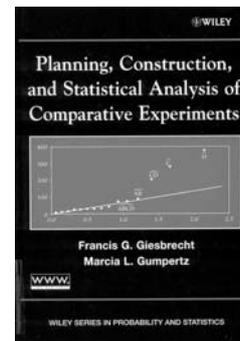
**The GREENING of business in developing countries: rhetoric, reality and prospects.** Utting, Peter, ed.  
New York: Zed Books in association with UNRISD, 2002. (HD2932.G813 2002)

This book explores what is happening in the developing world. The original research contained in this volume spans a number of major sectors - manufacturing, oil extraction, logging, and bioprospecting.



**ELEMENTS of stochastic modelling.** Borovkov, K.A. Singapore: World Scientific, 2003. (QA274.B736 2003)

This book reviews the basics of probability theory and then covers the following topics: Markov chains, Markov decision processes, jump Markov processes, elements of queueing theory, basic renewal theory, elements of time series and simulation. Rigorous proofs are often replaced with sketches of arguments - with indications as to why a particular result holds, and also how it is connected with other results - and illustrated by examples. Wherever possible, the book includes references to more specialised texts containing both proofs and more advanced material related to the topics covered.



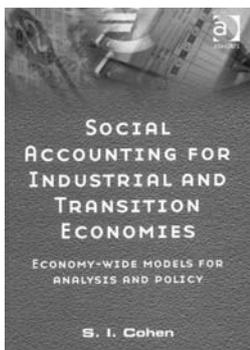
**PLANNING, construction, and statistical analysis of comparative experiments.** Giesbrecht, Francis G. & Gumpertz, Marcia L. Hoboken: Wiley-Interscience, 2004. (QA279.G455 2004)

This book provides guidance on planning efficient investigations. It compiles designs for a wide range of experimental situations not previously found in accessible form. Focusing on applications in the physical, engineering, biological, and social sciences, *Planning, Construction, and Statistical Analysis of Comparative Experiments* is a valuable guide to designing experiments and correctly analyzing and interpreting the results. The object is always to strike the right balance between mathematical necessities and practical constraints.



**MARKETING stripped bare: an insider's guide to the secret rules.** Forsyth, Patrick. London: Kogan Page, 2003. (HF5415.13. F735 2003)

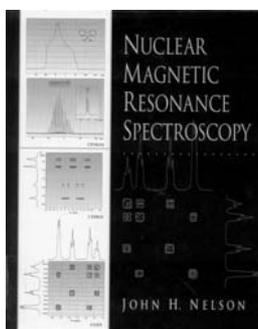
The book covers marketing, sales and communication skills. Topics covered include 'How marketing works'; 'What marketing people actually do'; 'Why marketing is essential for business success'; and also 'What's hot in marketing'.



**SOCIAL accounting for industrial and transition economies: economy-wide models for analysis and policy.** Cohen, S.I. Aldershot, Hampshire: Ashgate, 2002. (HC240.9.I5C678 2002)

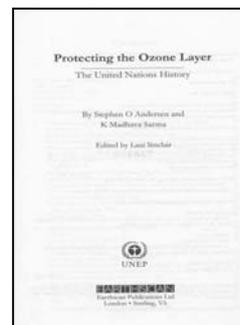
Covering a wide range of topics including growth, distribution, regional development, demographic change, industrial restructuring and CGE-modelled transition policies. Each chapter in this book:

- ◆ Assesses the relevant empirical literature
- ◆ Applies the analytical framework to the area concerned
- ◆ Elaborates on the additional refinements introduced
- ◆ Discusses the obtained results



**NUCLEAR magnetic resonance spectroscopy.** Nelson, John H. Upper Saddle River: Prentice Hall, 2003. (QD95.4.N8N427 2003)

This book contains a fair amount of chemical-shift and coupling-constant data for seven of the more widely studied nuclides ( $^1\text{H}$ ,  $^{11}\text{B}$ ,  $^{13}\text{C}$ ,  $^{15}\text{N}$ ,  $^{19}\text{F}$ ,  $^{31}\text{P}$  and  $^{195}\text{Pt}$ ), but is not a compendium of such data. References to compendia are given in the appropriate places in the text. The book is largely empirical, but the theoretical basis for most of the more important aspects is presented.



**PROTECTING the ozone layer: the United Nations history.** Andersen, Stephen O. & Sarma, K. Madhava; edited by Sinclair, Lani. London: Earthscan Publications, 2002. (QC879.7.A544 2002)

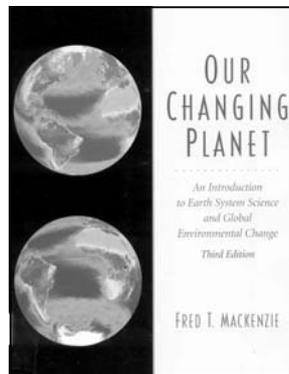
This book is an account of how many stakeholder-governments, scientists, industry, non-governmental organizations and the United Nations system set aside their differences and came together to ward off a common, potentially catastrophic threat. Indeed, the agreements marked the first application of the 'precautionary principle' by which action is taken, even before the science is certain, to prevent an emerging problem from becoming a crisis, rather than waiting too late to avoid irreparable harm. This book is also a timely contribution by UNEP (United Nations Environment Programme) to the World Summit on Sustainable Development which offers the international community an opportunity to act on the unfulfilled promises of the 'Earth Summit' ten years earlier in Rio de Janeiro, and to address the urgent and enormous unfinished business on the agenda of environment and development.



**STRATEGIC management.** Sadler, Philip. 2nd ed. London: Kogan Page, 2003. (HD30.28.C928 2003)

*Strategic Management* covers all the need-to-know topics, including:

- ◆ the nature of strategic management;
- ◆ analysing industry and competition;
- ◆ resources, capabilities and competitive advantage;
- ◆ strategies for cost advantage and differentiation advantage;
- ◆ emerging industries and the management of technology
- ◆ vertical integration;
- ◆ diversification;
- ◆ global industries.



**OUR changing planet: an introduction to earth system science and global environmental change.** Mackenzie, Fred T. 3rd ed. Upper Saddle River: Prentice Hall, 2003. (GE105.M156 2003)

*Our Changing Planet* is consideration of aspects of both natural and human-induced global environmental change. Part I deals with the natural exogenic system of Earth. It emphasizes the historical (geologic) perspective of change and discusses processes and change in the lithosphere, atmosphere, hydrosphere, and biosphere systems. Part II demonstrates how human activities influence the natural system and the consequences of human-induced change for ecosystems, humans, and human infrastructures.

**MAKLUMAT PENYELIDIKAN DARI USM**  
***RESEARCH INFORMATION FROM USM***

**ROBOT PROPULSION SYSTEM FOR MARINE APPLICATION**

Mohd Rizal Arshad and Zaidi Mohd Ripin  
School of Electronic & Electrical Engineering  
USM Engineering Campus

**Abstract**

From this project, a prototype mobile robot electro-mechanical propulsion system for marine or underwater application has been built. The propulsion system is a modular and compact system. It consists of an intelligent control circuits utilizing a programmed micro-controller, motor driver circuit and associated circuit for sensor input. This system controls four bilge pump-type motor arranged in a pre-set configuration for efficient motion. The electric motor can withstand a depth of up to 50 meters. An underwater vehicle frame has also been built and used as the testing platform for the designed propulsion system. It is portable and quite robust for various types of application. The marine propulsion system, for example, can be used for ship hull inspection and as a mine destroyer in a military application. This propulsion system can also be combined with a robotic/automation sensor module for more effective usage.

**DELEGATION STYLES AND LEADERSHIP PERCEPTIONS: A COMPARISON OF MALAYSIAN AND AMERICAN MANAGERS**

Daphne L. Sim, Mahfooz A. Ansari and Muhamad Jantan  
School of Management  
USM Main Campus

**Abstract**

Can managers be perceived as good leaders through a culture of empowerment in multinational settings? This question was answered by employing a 3 (delegation styles: advisory; informational; extreme) x 2 (manager gender: male; female) x 2 (country: Malaysia; USA) factorial design--with the first factor as within-subjects and the last two as between-subjects. A sample of 218 was drawn from one semiconductor multinational firm--118 from one Malaysian site and 100 from three US sites. The analysis revealed that both the US and Malaysian managers almost equally favoured informational delegation style, but they differed significantly in terms of attributing extreme and advisory delegation styles: the US managers outperformed Malaysian managers in attributing extreme delegation style, whereas Malaysian managers outperformed the US managers in attributing advisory delegation style. This finding was more pronounced for female than for male managers. Key implications of the findings both for theory and for practice are discussed, potential limitations are specified, and directions for future research are suggested.

**STUDIES ON THE SURFACE NANOSTRUCTURE OF INTRACELLULAR GRANULES PRODUCED BY MICROORGANISMS USING ATOMIC FORCE MICROSCOPY**

K. Sudesh Kumar and Mohd Isa Abd. Majid  
School of Biological Sciences  
USM Main Campus

**Abstract**

Atomic force microscopy (AFM) imaging requires that the samples be firmly adsorbed to a solid substrate. In this study, we have evaluated the suitability of glass cover slip, glass cover slip layered with polyelectrolyte films, freshly cleaved mica and silicon wafer as substrates for the adsorption of freshly isolated polyhydroxyalkanoate (PHA) granules. Multilayered polyelectrolyte films on glass coverslips were found to be a good substrate to gently adsorb the PHA granules. A final polycationic layer resulted in good adsorption with minimal aggregation of the granules. PHA granules were also found to adsorb directly onto glass coverslips, freshly cleaved mica and silicone wafer. In all cases, the freshly adsorbed PHA granules appeared soft and can be readily deformed, indicating that they are still in the amorphous state. Among the various deposition techniques that were tested, electrostatic adsorption of the granules from solution seemed to give the best reproducible results. The study showed for the first time, that proteins associated with PHA granules can be imaged directly and characterised using AFM. In addition, AFM images obtained in this study provide direct evidence for the binding of granule-associated-proteins (GAPs) to the hydrophobic PHA surface.

## RESTORATION TECHNIQUES FOR MAMMOGRAM AND ULTRASOUND IMAGES

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School of Electrical and Electronic Engineering<sup>2</sup>  
USM Engineering Campus

### Abstract

Unprocessed mammograms and ultrasound images are sometimes difficult to assess through the naked eye. Images that are inflicted with degradations due to overexposure, inadequate lighting or faulty electronic imaging equipment can be rendered useful through the process of image restoration. Degradations such as defocus or various types of noises can be removed and thus made more suitable for interpretations in the medical field. For this purpose, a software package named Image Restoration 2 (IR2) was developed. The software was tested on mammograms and ultrasound images obtained from the Hospital Besar Ipoh, Hospital Besar Kuala Lumpur and Hospital Besar Taiping. Three types of degradations have been studied in this research, namely the defocus, short tailed noise and long tailed noise. This paper will present the implementation of the IR2 software.

## FINE SILICA PARTICLES AS A FEEDSTOCK FOR VARIOUS ADVANCE MATERIAL APPLICATION

Kharirun Azizi Mohd. Azizli and Samayamuthirian Palaniandy  
School of Material & Mineral Sources Engineering  
USM Engineering Campus

### Abstract

The planetary mill is an energy intensive grinding mill utilized in fine grinding. The effect of operational parameters on the product particle size, energy consumption and the heat generation in the grinding pot was studied. The significant effect of the operational parameters on the fine grinding process was verified via statistical analysis. The structural changes of silica particles during fine grinding were studied using x-ray diffraction method. The perfect mixing ball mill and the air swept ball mill models were fitted with the planetary mill's sizing data and operational parameters using the standard JKSimMet, Broadbent and Callcott and modified version of Broadbent and Callcoat breakage functions in the model fitting process. The optimum condition was achieved with 58.8  $\mu\text{m}$  particles fed at 0.0375 kg/h with 20% media charge. Maximum particle breakage was obtained at 125 rpm with a mixture of various sizes of steel balls. It was also noted, that the power consumption which ranged from 0.9Kw to 1.1Kw was influenced by all the operational parameters except for grinding media size. Furthermore, the heat generation in the grinding pot, ranging from 3.4Kj to 7.1Kj was affected by all the operational parameters. The structural changes during the fine grinding process were more significant with increased grinding time and smaller particle size. The crystalline phase of silica particle was found to transform to amorphous phase during fine grinding process. The maximum intensity of crystalline silica was 45.3% after 2.5 hours and it disappeared after 192 hours grinding. The fine grinding process in planetary mill could be described by the perfect mixing ball mill model and the modified version of Broadbent and Callcott breakage function. The particle breakage rates obtained for knot 1 was 2.05, followed by 3.09 for knot 2 and 3.55 for knot 3.

## [D-5] EFFECTS OF AZOSPIRILLUM INOCULATION ON PYTOHORMONE PRODUCTION AND PLANT GROWTH ENHANCEMENT OF TISSUE CULTURED OIL PALM PLANTLETS

Azlin Che Om and Amir Hamzah Ahmad Ghazali  
School of Biological Sciences  
USM Main Campus

### Abstract

*Azospirillum spp.* which is known as a Plant Growth Promoting Rhizobacteria (PGRP) could enhance growth of the non-leguminous host plants either through nitrogen fixation activities, phytohormones production or enhance nutrient and water uptake. Two experiments were conducted; Experiment 1: to observe the ability of *Azospirillum* strains (*A. brasilense*; Sp7 and *A. liporefum*; CCM 3863) to produce indole-3-acetic acid (IAA) and Experiment 2: to observe the effect of inoculation on growth of oil palm plantlets after 28 days of inoculation. Results from the experiments showed that, inoculation of *Azospirillum* could enhance plant growth (top and root dry weight) and simultaneously stimulated accumulation of essential nutrients (N, P and K) within tissues of oil palm plantlets D<sub>28</sub>. The indole-3-acetic acid (IAA) produce by the *Azospirillum* was suggested to be the main factor for the enhanced growth of the host plants. The experiments indicated that both strains of *Azospirillum* (Sp7 and CCM 3863) have the potential for promoting growth of the host plants and could be recommended for oil palm plantlets production.

## SHAPE ANALYSIS OF STRUCTURES SUBJECTED TO CONSTRAINTS IN NATURAL VIBRATION FREQUENCIES AND MODE SHAPES

Choong Kok Keong<sup>1</sup>, Abu Bakar Mohd Diah, Taksiah Abdul Majid and Badorul Hisham Abu Bakar  
School of Civil Engineering<sup>1</sup>  
USM Engineering Campus

### Abstract

This paper deals with problems in finding the shapes of structures which satisfy the constraints imposed on their natural vibration frequencies and mode shapes. An algorithm which makes use of generalized inverse matrix is adopted. The purpose of this paper is to investigate and verify the applicability of shape finding analysis method using generalized inverse matrix. Governing equations are first presented. This is then followed by description of solution algorithm based on the use of generalized inverse. The equations to be solved are derived from the condition of existence of solutions. An iterative solution algorithm which makes use of Newton-Raphson method is explained. Results of analysis carried out on three examples are then presented and discussed. From the results of analysis, it can be concluded that the applicability of shape finding analysis method using generalized inverse matrix is satisfactory. Problems to be overcome such as shortening of computing time and effect of initial assumed shape on final solution need to be investigated further.

## ULTRAVIOLET RADIATION CURED BIO-FIBRE COMPOSITES FROM OIL PALM EMPTY FRUIT BUNCH

M.A. Faiza, R.N. Kumar and H.D. Rozman  
School of Industrial Technology  
USM Main Campus

### Abstract

In this study, development of ultra-violet (UV) cured biofibre composites is reported. The composites were based on the pulp made from empty fruit bunch (EFB) as the reinforcing agent and unsaturated polyester as the matrix. The EFB fibres were treated with different concentrations of sodium hydroxide (NaOH) solutions. The results showed that the Kappa number of the EFB decreased as the NaOH concentration was increased. The composites were produced from EFB fibres, which were treated with 22% and 28% NaOH solutions. The flexural, tensile and impact strength of the composites made from 22% NaOH treated EFB showed an increasing trend as the percentage of EFB was increased. However, those with 28% NaOH treated EFB decreased as the percentage of EFB was increased. Generally, the results showed that composites with EFB fibres treated with 22% NaOH displayed higher flexural, tensile and impact strength. However, no significant difference was observed for both types of composite with respect to flexural modulus. The study revealed the influence of two important factors, (a) the decrease of the light absorptivity (as a result of the removal of lignin) (b) the degradation of the fibre strength as a result of higher concentration of NaOH treatment.

## FIRING THE RAW MATERIAL LIMESTONE WITH WASTE SUGAR CANE IN JMK PILOT KLIN FOR PRODUCTION OF LIME AND MANUFACTURING MONOCALCIUM PHOSPHATE MONOHYDRATE

Jalal Abdullah Aziz  
School of Chemical Engineering  
USM Engineering Campus

### Abstract

A complete pilot plant was designed and fabricated for firing on limestone to produce lime. One tonne of high calcium limestone (>95% CaCO<sub>3</sub>) from Ipoh, Malaysia was prepared in the average particle size of 33mm. Firing of limestone was executed and the analysis on the product was carried out. It showed that the conversion of 6kg limestone to lime after 3 hours firing by using heat of 20kW at the average calcinations temperature of 930°C was 95%. The lime was highly reactive with the reactivity R<sub>DIN</sub> value of 128. The experimentation for manufacturing monocalcium phosphate monohydrate by using the lime and phosphoric acid was carried out. The analysis showed that the monocalcium phosphate monohydrate contained 56.68% of P<sub>2</sub>O<sub>5</sub> and 16.94% of Ca with 20.98% of loss on ignition at 800°C.

## **OPTIMISATION, MODELING AND SIMULATION OF VERTICAL ROLLER MILL IN CEMENT RAW MIX GRINDING CIRCUIT**

Samayamutthirian Palaniandy and Khairun Azizi Mohd. Azizli  
School of Material & Mineral Sources Engineering  
USM Engineering Campus

### **Abstract**

Energy consumption during the raw mix and cement grinding process in the cement plant is the most critical issue that has been debated till now as 90% of the energy consumed will be lost as heat and noise energy. Optimisation of cement grinding process will help to reduce the production cost and with current drastic development in the computer technology, computer simulation is the best way to optimise the process. A good and reliable plant data (operational, feed and product characterisation data) is essential to build a new model. In this study, a series of sampling were conducted around the raw mix grinding circuit and also clinker samples were taken to study the effect of the free quartz content in the raw mix on the clinker. The data obtained from the plant sampling was fitted with the Perfect mixing ball mill model using steady state mineral processing software, the JKSimMet. Two breakage functions were chosen for the model fitting process, the standard JKSimMet breakage function and the breakage function calculated from Broadbent and Callcott equation. The raw mix grinding process in the vertical roller mill could be described by the perfect mixing ball mill model and breakage obtained from the model fitting process. The presence of free quartz in clay affected the grinding efficiency of the vertical roller mill and also the quality of the clinker produced.

## **POLLUTANT LOAD IN CLOSED DRAINAGE SYSTEM AT PRAI INDUSTRIAL ZONES 1 AND 2, PENANG**

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School of Industrial Technology<sup>1</sup> and School for Distance Education<sup>2</sup>  
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### **Abstract**

A closed drainage system (CDS) serves a major industrial zone in Penang where heavy industries such as chemical process, petrochemical, fertilizer and heavy metal are located. The CDS serves dual role both in flood mitigation in the industrial area as well as an immediate receiving water body prior to the release of the effluent into the sea. The effluents discharged from the factories into the CDS must be according to the limit set by the Department of Environment. Initial site surveillance and wastewater analysis revealed the alarming state of the water in the CDS. The condition has a trailing effect of exacerbating the mudflat regions lining the adjacent coastal zones with toxic contaminants. To ascertain the status of the wastewater circulating within the CDS, a study was conducted on the pollution loads, pollutant characterization and its flow pattern in the CDS serving the PIZ 1 and 2. Parameters such as BOD<sub>5</sub>, COD, suspended solids, cadmium, lead, oil and grease and copper exceeded the limits of Standard B at the sampling point of MPSP (Seberang Perai Municipal Council) pumping station. The level of cadmium detected was as high as 0.203 mg/l which was 10 times exceeding the regulation, while oil and grease content was also high at 62.93 mg/l, a value 6 times the limit set by the Department of Environment. The presence of organic pollutants of fatty acid compounds was determined using GC-MS (Gas chromatography mass spectrophotometer). This group of pollutants may be considered as a background chemical pollutant load of the receiving waters through the effluent discharge point from the individual premises.

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