



الجامعة الإسلامية العالمية ماليزيا  
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA  
بوتري برستي: أنبارا يغيا ملليسيا

Research, Innovation & Invention Exhibition 2010 (IRIIE 2010)

ENHANCING QUALITY RESEARCH &

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**P-187      Development of Material Selection Method for the Application of  
Children Bicycle Frame**

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A bicycle frame is a crucial part for cycling performance, efficiency, comfort, and injury prevention. This is especially true in the case of children cyclists that do not have the necessary cycling experience, balance and the fully developed musculoskeletal system of the adults. The selection of the correct materials for a particular product especially a children bicycle frame is a key step in the design and development process because it will carry the load of the rider during cycling. In the present paper few methods have been developed to select material of a bicycle frame for children and teenagers 7–14 years old. This paper will present the development of the material selection methodology based on Ashby's material selection chart for the application of bicycle frame purposes. Two quantitative methods are proposed such as cost per unit strength and digital logic model methods. Also mechanical properties, including tensile strength, yield strength, Young's modulus, toughness, density as well as cost were used as the key parameters in the material selection stage. Among the material selection methods the development of digital logic model is the best suited method which identified that the Kevlar fiber reinforced plastics (KFRP) as the most appropriate candidate material for the application of children bicycle frame.

**P-188      Reverse Engineering of Children Bicycle**

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Reverse engineering often involves taking something apart and analyzing its workings in detail to be used in maintenance or to try to make a new product or component that does the same thing without copying anything from the original. In order to understand the existing design, materials and manufacturing process of a bicycle frame and also for the future direction in new materials with new design, a comprehensive study on the reverse engineering is essential. Therefore, in this paper, a systematic study on a bicycle frame reverse engineering is performed. The bicycle components were destructed and investigated using the metallurgical microscope and hardness tester for microstructural and microhardness examination purposes respectively. The cost analysis of the new proposed bicycle frame is also given in this paper.

**P-191      A New Automated Compact Substation for Distribution  
System in Malaysia**

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This project has developed a new distribution automation system and remote metering system. It is a customized distribution automation system (DAS) for secure fault isolation at the low voltage (LV) downstream, 415/240V by using the Tenaga Nasional Berhad (TNB) distribution system. It is the first DAS research work done on customer side substation for operating and controlling between the consumer side system and the substation in an automated manner. Most of the work is focused on developing very secure fault isolation whereby the fault is detected, identified, isolated and cleared in few seconds. Supervisory Control and Data Acquisition (SCADA) techniques has been utilized to build Human Machine Interface (HMI) that provides a graphical operator interface functions to monitor and control the system. Microprocessor based Remote Monitoring Devices have been used for customized software to be downloaded to the hardware. Power Line Carrier (PLC) has been used as communication media between