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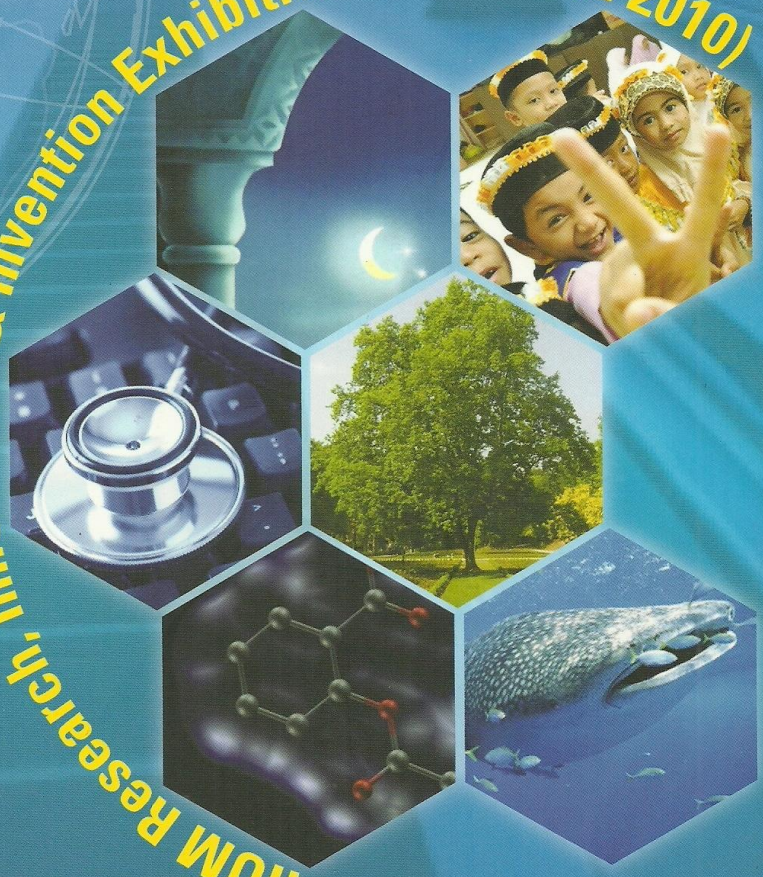

ENHANCING QUALITY RESEARCH & INNOVATION for SOCIETAL DEVELOPMENT

increasing effectiveness of silicon manufacturing process. This work aimed at machining silicon using small diameter (2 mm) diamond coated tools in ductile mode regime by employing high speed end-milling employing high rpm of the spindle (up to 50,000 rpm). A special fixture was designed and fabricated for holding the silicon workpiece during machining. Low values (micro-meter level) of feed and depth of cut employed during machining helped to ensure nano level surface finish that is able to avoid the need of further grinding and even polishing. This process also leads to much lower sub surface damages since machining was conducted in fully ductile mode causing minimum internal stresses as the feed and depth of cut values were kept very low. This new route of machining employing high speed end milling is expected to be more cost effective since the need for the costly and time consuming finishing operations like grinding and polishing could be avoided and the time for final etching could be substantially lowered.

P-131 Rapid Prediction of Residual Strength of sandwich structure subjected to impact loading.

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The prediction of residual strength of damage structure due to a certain loading becomes crucial for manufacturer especially in aerospace industry. A rapid decision whether a certain damage structure found visually from inspections can still fly without any changes or needs to be subjected to minor or major changes to have a permission to fly becomes a main issue.

Until today, the decision is based on the test results performed for a certain structure and material. This method is very expensive, especially if the whole structure or parts of aircraft need to be tested

The Finite element analysis method becomes one of the candidate tools to replace the tests. Unfortunately, the divergence of calculation and high number of elements and nodes should be employed to simulate the behavior which in turn leads to high cost in term of computation time.

This work proposes to simulate the behavior using “macrostructure level”. The honeycomb is modeled using array of nonlinear springs which the behavior of spring is obtained from a simple test on a block of honeycomb. With this approach, the behavior of impact and its residual strength can be predicted almost in real time. Also the prediction can be obtained from the damage area visually measured on-site and from the data of damage the residual strength can be predicted on-site.

P-136 Compaction of Fly Ash–Aluminum Alloy Composites and Evaluation of their Mechanical and Acoustic Properties

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The density and elastic moduli of green compacts can be determined by ultrasonic method with the help of pre-prepared diagrams. In this way, pressing conditions can be taken under control easily. In this study, fly ash particles were used as fillers in an aluminum alloy matrix material. The weight fractions of fly ash in the composites were in the range of 5–30%. The resulting composites were compacted at pressures ranging from 63 MPa to 316 MPa. It was observed that the green density increased with increasing compacting pressure and decreased with increasing weight percent of fly ash particles resulting in lightweight composites. The green compact composites were also tested using an ultrasonic nondestructive evaluation method. Results showed that ultrasonic velocities are a strong function of the density and the fly ash fraction in this material and could be potentially used to predict the density and the fly ash fraction as well as the elastic moduli of the metal matrix composite.