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functionality.

P-126 Unique Class Encryption (UCE) substitution boxes (S-Boxes) using mysterious Quranic objects for block ciphers in ICT Security

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Unforeseen attacks on ICT systems incurred billions of dollars of losses to public and private communities. The current parametric encryption algorithms suffer the unconventional and paranormal attacks. A search for a new paradigm against the unforeseen and paranormal attacks lead to an invention called Unique Class Encryption (UCE) that is based on the non-parametric and mysterious verses of the Al-Quran.Earlier, the Al-Muqatta'at based UCE was developed and tested in a Red-Hat cluster funded under IRPA and completed in 2006. The Al-Muqattaat UCE was patent filed in 2007. A block cipher is required as a medium to translate the non - parametric Al-Muqatta'at algorithm into a suite so that it can be an embedded system for FPGA chips. This would require the construction of substitution boxes (S-Boxes) with the other non-parametric objects from Al-Muawwidzatain and Ayatul Qursi verses. It is a completed Type A research endowment fund project in August 2009. The approach was to construct bigger S-Boxes that have no algebraic relations. The random bijective 8-bit S-Boxes that used the non-parametric and non-deterministic components of the Al-Qura'an would transform the objects into specific values for the S-Box construction. Thus the vital component of the non-parametric UCE block ciphers, that are the S-Boxes were developed. About 13.5 million of 8-Bit S-Boxes were generated. The non-linearity and differential uniformity tests by MIMOS Cyber-security Laboratory showed the standing of UCE S-Box to be equivalent to that of Khazad's block ciphers. Collaborative research with MIMOS Cyber-security Laboratory are using the strong UCE S-Boxes to develop hybrid round functions and key distribution algorithms to construct the UCE block cipher. This on-going phase is conducted under Type B research endowment fund. In an envisaged pre-commercialization phase, the UCE block cipher would be implemented in FPGA chips. The potential use for the UCE encryption chips will be as embedded cryptographic system in VPN routers, gateways, computing machines and security device firmware.

P-127 Development of an Intelligent Robotic Donation Box for IIUM Mosque

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The design and development of an intelligent robotic donation box is presented in this project. The mobile robotic system is equipped with the capability to collect donation from the people within the mosque during a specified period of time before the compulsory prayer commences. Also fitted with the ability to attract the attention of people by making audible sound, recognize person and wait for his/her donation as well as to avoid obstacles due to either a person praying, the wall or any other detected objects. The device covers a given number of rows before returning to place of storage.

P-128 A New Technique to Improve the Machinability of Hardened Steel AISI H13 in End Milling

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Hardened materials like AISI H13 steel are generally regarded as difficult to cut materials because of their high hardness due to high carbon content, which however allows them to be used extensively as the hot working tools like, dies and moulds. The challenges in machining this steel in hardened state led to many research works dedicated towards enhancing its machinability. In this work, preheating technique has been used to improve machinability of the material under different cutting conditions. An

experimental study has been performed to assess the effect of work-piece preheating using induction heating in enhancing machinability of AISI H13. The preheated machining of AISI H13 under different cutting conditions conducted with TiAlN coated carbide tool is evaluated in terms of tool wear, surface roughness and vibration. The results illustrated the advantages of preheated machining by a much extended tool life, better surface finish and stable cutting with much lower vibration/chatter amplitudes. The effects of preheating temperature on the chip morphology were also investigated and it is found that preheating resulted in the formation of relatively stable chips and reduction of chip serration frequency.

P-129 Enhancement of Machinability of Nickel Based Alloy - Inconel 718 by Induction Preheating in End Milling using Ceramic Inserts

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Unique combinations of high strength properties maintained at elevated temperature and high resistance to chemical degradation have made Nickel based alloy, Inconel 718 suitable for application as aerospace components. However, the same properties are responsible for very poor machinability of the material, as Inconel is one of the most difficult to cut materials. The main reason for poor machinability is generation of high heat during machining which lead to premature failure of the tool due to plastic deformation and diffusion. Uncoated and coated tools have been found to be not efficient in cutting this materials and the application of preheated resulted in not significant improvement in their machinability. PCD tools are not recommended for machining this material since it contains iron which acts as a catalyst to convert diamond into graphite at temperatures in excess of 700 0C. PCBN tools are very costly and also did not show very good performance in machining Inconel 718. Ceramic tools have proved to have performed well in machining the material. However, there was so far no work performed performance of ceramic tools in machining Inconel 718 using preheated technique. Since ceramic tools can perform under high temperatures, it was expected that preheated machining using ceramic tools would desired results. In this research work induction heating technique in combination of the application of ceramic tools was adopted as one of the machining techniques in order to improve the machinability of the material. The effect of preheated machining of Inconel 718 has been analyzed in terms of tool wear, surface roughness and chip formation. The advantages of preheated machining are demonstrated by appreciable increase in tool life, better surface roughness values and improved chip formation compared to room temperature machining.

P-130 Development of a Cost Effective Technique to Eliminate Conventional Finishing Operations Applying High Speed End Milling of Silicon

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Silicon has been widely used in different branches of industrial engineering. Most application of silicon is in computer parts or hardware especially for the production of integrated circuit (IC) chips. Machining of silicon is a big challenge and expensive affair because of it inherent brittleness which is a major limitation as the process of removing the material can generate subsurface damage. Silicon is conventionally finished using grinding followed by polishing and lapping to achieve required surface finish and surface integrity. Numerous research works attempted to conduct ductile mode grinding to avoid cracking and subsurface damages. However, it has been revealed that sub surface damages and micro cracks canâ€™t be avoided if grinding is performed. As a result, lengthy etching operations need to be performed to remove the surface defect crated by grinding. Hence, it is extremely important to develop alternative techniques to improve surface finish and avoid/minimize subsurface damages in order to lower the cycle time in machining and finishing of silicon chips. An attempt has been made in this work to investigate the effect of high speed end milling on surface finish and integrity of silicon to minimizing the amount of finishing requirement in machining of silicon, with the objective of reducing cost and