

**APPLICATION OF LAMB WAVES (ULTRASONIC
WAVES) IN WEAR DETECTION ON ALUMINIUM
PLATE**



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Tuan

TAJUK PROJEK: APPLICATION OF LAMB WAVES IN WEAR DETECTION ON ALUMINIUM PLATE

Dengan hormatnya perkara di atas adalah dirujuk.

Sukacita dimaklumkan bahawa Mesyuarat Jawatankuasa Penyelidikan ke-74 pada 30 Mac 2005 telah meneliti pindaan yang tuan kemukakan dan membuat keputusan :

- i. Bersetuju meluluskan cadangan penyelidikan yang telah dikemukakan oleh tuan, En Shahrul Azam Abdullah dan En Muhammad Hussain Ismail.
- ii. Tempoh projek penyelidikan ini ialah 12 bulan , iaitu bermula **15 April 2005 hingga 14 April 2006**.
- iii. Walaubagaimanapun, adalah dimaklumkan bahawa Jawatankuasa hanya dapat meluluskan kos sebanyak **RM 20,000.00** sahaja. Untuk makluman tuan keadaan kewangan adalah amat runcing kerana pihak kami tidak menerima sebarang peruntukan geran daripada pihak Kementerian Pengajian Tinggi sejak tahun 2003. Diharapkan perkara ini tidak mematahkan semangat tuan untuk menjalankan penyelidikan dan diharapkan kos tersebut dapat membantu pihak tuan memulakan projek. Tuan boleh memohon untuk mendapatkan peruntukan tambahan di masa hadapan sekiranya **peruntukan tersebut telah diterima oleh UiTM dari pihak Kementerian** atau memohon daripada pihak-pihak di luar universiti.
- iv. Tuan juga perlu mengemukakan semula keperluan kewangan J-Series mengikut **jumlah peruntukan yang telah diluluskan**. Pembiayaan pembentangan kertas kerja dan perjalanan ke luar negara dihadkan kepada RM 2,000.00 sahaja. Permohonan peralatan penyelidikan adalah dicadangkan dari Fakulti/ Cawangan masing-masing.
- v. Penggunaan geran yang diluluskan hanya akan diproses setelah perjanjian ditandatangani dan pindaan keperluan kewangan telah dibuat.
- vi. Tuan perlu membelanjakan **50%** daripada geran penyelidikan yang telah diluluskan bagi projek tuan dalam tempoh **6 bulan** pertama projek berjalan. Sehubungan itu , pihak IRDC akan memantau penggunaan geran penyelidikan tuan untuk memastikan **50%** daripada jumlah geran yang diluluskan telah dibelanjakan sehingga bulan **Oktober 2005**.
- vii. Semua pembelian peralatan yang kosnya melebihi RM500.00 satu item perlu menggunakan Pesanan Jabatan Universiti Teknologi MARA (LO). Pihak tuan juga dikehendaki mematuhi peraturan penerimaan peralatan. Panduan penerimaan peralatan baru dan pengurusannya , dilampirkan.

Date : 28 December 2006
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Assistance Vice Canselor (Research)
Institute of Research Development and Commercialization (IRDC)
UiTM Shah Alam
Selangor Darul Ehsan
(Attn: Coordinator of Science and Technology)

Sir,

SUBMISSION OF FINAL REPORT
"APPLICATION OF LAMB WAVES (ULTRASONIC WAVES) IN WEAR
DETECTION ON ALUMINIUM PLATE"

Referring to the above, enclosed are 3 (three) research final reports under the title of
"APPLICATION OF LAMB WAVES (ULTRASONIC WAVES) IN WEAR
DETECTION ON ALUMINIUM PLATE" for your favourable consideration and
action.

Thank you.

Yours faithfully,



NIK ROSLI ABDULLAH
Leader of Research Project
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ABSTRACT

Wear is a cause of failure in many engineering components and normally related to the surface roughness of the components surface. The wear rate is high when two rough surfaces are in relative motion compared to the motion involved by two smooth surfaces. Wear can normally be assessed by measuring the depth of wear scar or weighing the component loss. However this method cannot be used when the surface locate inside the machine or if occur on inner part of machine. This work focus on ultrasonic wave's application in order to detect surface roughness which is can relate to the wear phenomenon. Non-destructive Testing is defined as an inspection tool that used to detect internal defect, surface and discontinuities or flaws in materials without destroying their usefulness before it is used in a new design. In this work, there are two method used to detect a surface roughness at the different level of roughness on four specimens made by aluminium alloy. First measurement performs by using stylus profilometer then followed by ultrasonic waves propagation. Comparison between two them was made to draw the relationship of both methods. It is shows strong evidence that ultrasonic waves have a great potential in roughness/wear detection. The time travel from one point to another was recorded for all specimens then calculation of waves velocities show reduction when surface roughness increases. Here we have strong evidence to prove the rough surface absorb energy from waves after propagates through it.