

## Pengukur ketebalan bahan berbasis radiasi menggunakan pencacah geiger-muller = Thickness gauging radiation based using geiger muller counter

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### Abstrak

Telah dibuat suatu sistem pengukur ketebalan bahan dengan menggunakan radiasi radioaktif dicacah oleh Geiger-Muller. Sistem pengukur ini dikendalikan dengan mikrokontroller Atmel 89c52 untuk membaca interrupt dari LDR, menggerakkan motor dan menghitung cacahan dari Geiger-Muller yang dihubungkan ke PC melalui komunikasi serial. Penampil dan pemroses data pada PC dijalankan dengan software LabVIEW. Sumber radiasi yang digunakan adalah Cs-137 dan Th-204, dengan chi square test 2 diperoleh angka 4.19 dan 9.81, pada range 3 - 16 sehingga Geiger-Muller tersebut layak digunakan. Bahan yang diukur adalah kertas (70, 80, 100 gsm), art paper (120, 150 gsm) dan art carton (210, 230 260 gsm). Nilai koefisien absorpsi kertas, art paper dan art carton dari alat ini masing-masing adalah 0.11-0.19/lembar, 0.21-0.32/lembar dan 0.49-0.59/lembar. Didapatkan nilai tebal kertas 70 gsm ( $0.084 \pm 0.002$ ) mm, 80 gsm ( $0.084 \pm 0.002$ ) mm, 100 gsm ( $0.104 \pm 0.002$ ) mm, art paper 120 gsm ( $0.094 \pm 0.003$ ) mm, 150 gsm ( $0.131 \pm 0.002$ ) mm, art carton 210 gsm ( $0.206 \pm 0.004$ ) mm, 230 gsm ( $0.220 \pm 0.002$ ) mm dan 260 gsm ( $0.245 \pm 0.004$ ) mm. bila dibandingkan dengan ISO534:2005 didapatkan kesalahan kurang dari 14%.

.....It has been constructed a system of thickness gauging using radioactive radiation counted by Geiger-Muller Counter. The gauging system is controlled by Atmel 89c52 microcontoller to read interrupt from LDR, drive motor and calculate the counting of Geiger-Muller which connected to a PC via serial communication. Viewer and processing of PC data worked by LabVIEW software. Radiation source which used are Cs-137 and Th-204, results of the chi square test 2 obtained 4.19 and 9.81, in the range of 3-16 so that the systemt is feasible. The materials which measured in this experiment are paper (70, 80, 100 gsm), art paper (120, 150 gsm) and art carton (210, 230, 260 gsm). The absorbtion coefficient of the paper, art paper and art carton are 0.11-0.19/sheet, 0.21-0.32/sheet dan 0.49-0.59/sheet. The thickness of 70 gsm paper is ( $0.084 \pm 0.002$ ) mm, 80 gsm is ( $0.084 \pm 0.002$ ) mm, 100 gsm is ( $0.104 \pm 0.002$ ) mm, 120 gsm art paper is ( $0.094 \pm 0.003$ ) mm, 150 gsm is ( $0.131 \pm 0.002$ ) mm, 210 gsm art carton is ( $0.206 \pm 0.004$ ) mm, 230 gsm is ( $0.220 \pm 0.002$ ) mm and 260 gsm is ( $0.245 \pm 0.004$ ) mm. If comparred with ISO 534:2005 obtained the literature error less than 14%.