

ABSTRAK

ANALISIS PENGUUNAAN METODE *MINIMUM QUANTITY LUBRICATION* (MQL) PADA PROSES *DRILLING* DENGAN *CUTTING FLUID* BERBASIS MINYAK NABATI

Ade Aryaputra

(2025: xv + 58 Halaman, 32 Gambar, 26 Tabel, 10 Lampiran)

Minimum Quantity Lubrication (MQL) merupakan metode pelumasan dan pendinginan dalam proses permesinan. MQL bekerja dengan menyemprotkan fluida pemotongan (*cutting fluid*) dengan kuantitas cairan yang minim bersamaan tekanan udara pada area pemotongan, teknologi inilah yang membuat *cutting fluid* langsung menuju zona gesekan tertinggi. Penelitian ini dilakukan dengan menggunakan metode eksperimen yang menerapkan kombinasi antara metode MQL dan *cutting fluid* berbasis minyak nabati pada proses *drilling* aluminium 6061 berdasarkan hasil pengujian metode MQL mampu mengeluarkan kuantitas fluida jauh lebih sedikit yakni 25,5 ml/h pada 1 *mixing chamber* sedangkan metode *flood* mengeluarkan 6,264 L/h. Selain itu, metode MQL ini juga menghasilkan suhu yang lebih rendah dibandingkan metode *flood*. Metode MQL menghasilkan suhu 29,18 °C saat proses pemotongan sedangkan metode *flood* menghasilkan suhu 38,30°C. Untuk kekasaran permukaan lubang yang dihasilkan, metode MQL menghasilkan nilai kekasaran 1,74 µm dan metode *flood* menghasilkan nilai kekasaran permukaan 1,62 µm dimana nilai ini sesuai dengan nilai yang diharapkan yakni N7.

Kata Kunci : *Drilling, Flood, MQL, Fluida Pemotongan, Proses Pemesinan*

ABSTRACT

ANALYSIS OF THE USE OF THE MINIMUM QUANTITY LUBRICATION (MQL) METHOD IN THE DRILLING PROCESS WITH VEGETABLE OIL-BASED CUTTING FLUID

Ade Aryaputra

(2025: xv + 58 pp, 32 Figures, 26 Tables, 10 Attachments)

Minimum Quantity Lubrication (MQL) is a lubrication and cooling method in the machining process. MQL works by spraying cutting fluid with a minimum quantity of liquid along with air pressure in the cutting area, this technology makes the cutting fluid go directly to the highest friction zone. This research was conducted using an experimental method that applied a combination of the MQL method and vegetable oil-based cutting fluid in the 6061 aluminum drilling process based on the test results, the MQL method was able to release a much smaller quantity of fluid, namely 25.5 ml /h in 1 mixing chamber while the flood method released 6.264 L / h. In addition, the MQL method also produces lower temperatures than the flood method. In addition, the MQL method also produces lower temperatures than the flood method. The MQL method produces a temperature of 29.18 °C during the cutting process while the flood method produces a temperature of 38.30°C. For the surface roughness of the resulting hole, the MQL method produces a roughness value of 1.74 μm and the flood method produces a surface roughness value of 1.62 μm where this value is in accordance with the expected value of N7.

Keywords : Drilling, Flood, MQL, Cutting Fluid, Machining Processes