

# Pengaruh pelapisan diamond-like carbon pada permukaan cetakan microforming terhadap koefisien friksi dan laju keausan cetakan = Effect of diamond-like carbon coating on the mold surface microforming on friction coefficient and mold wear rate

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## Abstrak

Teknologi pada era industri 4.0 menuntut kebutuhan akan perangkat teknologi yang semakin canggih namun dengan berat yang semakin ringan dan ukuran yang lebih kecil. Untuk memenuhi kebutuhan tersebut, proses manufaktur berkembang kearah pembuatan komponen elektronik mikro yang diproduksi dengan teknik fabrikasi mikro (Microforming). Komponen dalam proses microforming yang paling berpengaruh yaitu cetakan (dies), dimana gesekan antarmuka antara permukaan cetakan dengan benda kerja dapat berpengaruh terhadap hasil produk akhir serta dapat memperpendek umur pakai cetakan. Untuk mengatasi masalah ini dapat diberikan pelapisan permukaan cetakan dengan diamond-like carbon (DLC). Studi literatur ini mempelajari pelapisan DLC pada permukaan cetakan microforming dengan membandingkan data penelitian terhadap koefisien friksi dan laju keausan. Hasil perbandingan pelapisan DLC dengan teknik physical vapour deposition (PVD) pada permukaan cetakan baja AISI D2 menghasilkan pengurangan nilai koefisien friksi hingga 50% dan penurunan laju keausan sebesar 2-6 kali lipat lebih kecil. Variasi penambahan gas Ne ke dalam gas Ar pada proses pelapisan DLC menghasilkan pengurangan koefisien friksi beserta laju keausan. Ketahanan aus lapisan DLC menunjukkan nilai koefisien friksi dan laju keausan terendah bila dibandingkan lapisan tahan aus lain.

.....Technology in the industrial era 4.0 demands the need for increasingly sophisticated technological devices but with lighter weight and smaller sizes. To meet these needs, the manufacturing process has been developing towards the manufacture of micro-electronic components which are manufactured using micro fabrication techniques (Microforming). The component in microforming process that has the most influence is the die, where the interface friction between the surface of the die and the workpiece can affect the final product and shorten the life cycle of the die. In this literature review, the DLC coating on the surface of the microforming die will be studied by comparing research data on the friction coefficient and wear rate. The comparison results of DLC coating with physical vapour deposition (PVD) techniques on the die surface, namely AISI D2 steel, have shown a reduction in the friction coefficient value of up to 50% and a decrease in wear rate of 2-6 times smaller. Then the variation with the addition of Ne gas into Ar gas in the DLC coating process obtained a reduction in the friction coefficient along with the wear rate. Finally, the wear resistance of the DLC coating is compared with other wear-resistant coatings, the lowest friction coefficient and wear rate were found in the DLC coating when compared to others.