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Investigation of Chip Formation Characteristics during Surface Finishing of HDPE Samples

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Abstract : Chip formation characteristics are investigated during surface finishing of high density polyethylene (HDPE) samples using a shaper machine. Both the cutting speed and depth of cut are varied continually to enable observations under various machining conditions. The generated chips are analyzed in terms of their shape, size, and deformation. Their physical appearances are also observed using digital camera and optical microscope. The investigation shows that continuous chips are obtained for all the cutting conditions. It is observed that cutting speed is more influential than depth of cut to cause dimensional changes of chips. Chips curl radius is also found to increase gradually with the increase of cutting speed. The length of continuous chips remains always smaller than the job length, and the corresponding discrepancies are found to be more prominent at lower cutting speed. Microstructures of the chips reveal that cracks are formed at higher cutting speeds and depth of cuts, which is not that significant at low depth of cut.

Keywords : HDPE, surface-finishing, chip formation, deformation, roughness
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