Experimental investigation of the factors influencing the polymer-polymer bond strength during two-component injection moulding

Two-component injection moulding is a commercially important manufacturing process and a key technology for combining different material properties in a single plastic product. It is also one of the most industrially adaptive process chains for manufacturing so-called moulded interconnect devices (MIDs). Many fascinating applications of two-component or multi-component polymer parts are restricted due to the weak interfacial adhesion of the polymers. A thorough understanding of the factors that influence the bond strength of polymers is necessary for multi-component polymer processing. This paper investigates the effects of the process conditions and geometrical factors on the bond strength of two-component polymer parts and identifies the factors which can effectively control the adhesion between two polymers. The effects of environmental conditions on the bond strength are also investigated. Investigation shows that melt and mould temperatures are vital process parameters that influence the bond strength. Besides this, surface roughness of the first-shot part and environmental factors like moisture have profound influence on the bonding of the two materials. The selection of materials and environmental conditions were done based on the suitability of MID production, but the results could be useful for two-component polymer processing for a wide range of industrial applications. The results and discussion presented in this paper are only valid for the two-component plastic parts moulded by over moulding in cavity-transfer process.

General information
Publication status: Published
Organisations: Manufacturing Engineering, Department of Mechanical Engineering, Sonion A/S
Contributors: Islam, A., Hansen, H. N., Bondo, M.
Pages: 101-111
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: International Journal of Advanced Manufacturing Technology
Volume: 50
Issue number: 1-4
ISSN (Print): 0268-3768
Ratings:
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.785 SNIP 1.454
Web of Science (2010): Impact factor 1.071
Web of Science (2010): Indexed yes
Original language: English
Keywords: Polymer, Process parameters, Two-component injection moulding, Bond strength
Electronic versions:
2k_IJAMT_AI_HNHA_MB.pdf
DOIs:
10.1007/s00170-009-2507-8
URLs:
http://www.springerlink.com/content/775661182j53kh5p/
Source: orbit
Source ID: 256964
Research output: Contribution to journal › Journal article – Annual report year: 2010 › Research › peer-review