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Title: Deep-drawing of thermoplastic metal-composite structures: Experimental investigations, statistical analyses and finite element modeling

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PII: S0924-0136(14)00312-4
DOI: http://dx.doi.org/doi:10.1016/j.jmatprotec.2014.08.012
Reference: PROTEC 14092

To appear in: *Journal of Materials Processing Technology*

Received date: 6-2-2014
Revised date: 31-7-2014
Accepted date: 18-8-2014

Please cite this article as: Rajabi, A., Kadkhodayan, M., Manoochehri, M., Farjadfar, R.,Deep-drawing of thermoplastic metal-composite structures: Experimental investigations, statistical analyses and finite element modeling, *Journal of Materials Processing Technology* (2014), http://dx.doi.org/10.1016/j.jmatprotec.2014.08.012

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Deep-drawing of thermoplastic metal-composite structures: Experimental investigations, statistical analyses and finite element modeling

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Abstract

In this paper, the influence of process parameters and type of core materials on deep-drawing of two thermoplastic metal-composites is investigated through the experimental tests, statistical analyses and FE simulation. Metal-composite is a general title which can involve fiber-metal laminates (FMLs) and metal-polymer laminates. The metal-composite laminates are produced by polypropylene (PP) and glass-fiber reinforced polypropylene (GFRP) as the cores and aluminum AA1200-O as the skin layers. Statistical analyses based on Taguchi method are used to reduce the number of experiments and to investigate the effect of process variables on the output results. The results show that the two variables of temperature and blank-holder force have the most influence on the output parameters. Furthermore, they demonstrate that a high interaction between the forming temperature and the blank-holder force is required to remove the wrinkling. The results of performed FE simulation predict the

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