Research on Constructional Shape of Bond at Connecting Galvanized Sheet of Metal

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A constructional shape of an adhesive bond deals with a mutual position of bonded parts in such way to gain a given contact area. The constructional shape of the adhesive bond finds a practical application at connecting of plain areas that means sheets of metal above all. The adhesive bond strength at connecting the galvanized sheet of metal was significantly lower than at connecting a constructional carbon steel. Results of specimens of wavy-lap bonds showed higher values of the adhesive bond strength comparing with specimens of single-lap bonds. The wavy-lap constructional adjustment proved to be positive at connecting the galvanized sheet of metal. The increase of the adhesive bond strength ranged in the interval 27 to 560 %. The difference in using specimens A (single-lap bond) and B (wavy-lap bond) is obvious from the statistical comparison. It is visible from performed experiment that using the specimen B (wavy-lap bond) led to increasing of strength values of the adhesive bond.

Keywords: Adhesive bond, deformation of adherent, two-component epoxy adhesives, testing

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References

[1] ÁVILA, A. F., BUENO, P. (2003). Stress analysis on a wavy-lap bonded joint for composites. In: *International Journal of Adhesion & Adhesives*, Vol. 24, pp. 407–414.
[2] BANDEKAR, J., FENTON, J., GOLDEN, M., MEYERS, G., ROBINSON, A., YAN, B., HENG, C. (2009): Adhesive bondability of advanced high strength steels with galvannealed zinc. In: *Materials Science and Technology Conference and Exhibition 2009*, Vol. 2, pp. 722-749.
[3] MESSLER, R., W. (2004). Joining of materials and structures from pragmatic process to enabling technology. Burlington: Elsevier, 816 pp.
[4] MÜLLER, M., HERÁK, D. (2010). Dimensioning of the bonded lap joint. In: *Research in Agricultural Engineering*, Vol. 2, pp. 59-68.
[5] ADAMS, R. D., COMYN, J., WAKE, W. C. (1997). Structural adhesive joints in engineering. 2nd ed. Chapman & Hall, London. 360 pp.
[6] HABENICHT, G. (2002). Kleben: Gundlagen, Technologien, Anwendung. Berlin: Springer. 921 pp.
[7] GRANT, L. D. R., ADAMS, R.D, DA SILVA, L.F.M (2009). Experimental and numerical analysis of single-lap joints for the automotive industry. In: *International Journal of Adhesion & Adhesives*, Vol. 4, pp. 405–413.
[8] ÁVILA, A. F., BUENO, P. O. (2004). An experimental and numerical study on adhesive joints for composites. In: *Composite structures*, Vol. 64, pp. 531 – 537.
[9] CAMPILHO, R. D. S. G., DOMINGUES, J. J. M. S. (2009): Numerical prediction on the tensile residual strength of repaired CFRP under different geometric changes. In: *International Journal of Adhesion & Adhesives*, Vol. 29, pp. 195 – 205.
[10] FESSEL, G., BROUGHTON, J. G., FELLOW, N. A., DURODOLA, J. F., HUTCHINSON, A. R. (2007). Evaluation of different lap-shear joint geometries for automotive applications. In: *International Journal of Adhesion & Adhesives*, Vol. 7, pp. 574–583.
[11] MÜLLER, M. (2013). Research of renovation possibility of machine tools damage by adhesive bonding technology. In: *Manufacturing Technology*, Vol. 4, pp. 504-509.
[12] NOVÁK, M. (2011). Surface duality hardened steels after grinding. In: *Manufacturing technology*, Vol. 11, pp 55–59.
[13] HOLEŠOVSKÝ, F., NÁPRSTKOVÁ, N., NOVÁK, M. (2012). GICS for grinding process optimization. In: *Manufacturing technology*, Vol. 12, pp. 22-26.
[14] JÓZWIK, J., KURIC, I., SÁGA, M., LONKOWIC, P. (2014). Diagnostics of CNC machine tools in manufacturing process with laser interferometer technology. In: *Manufacturing technology*, Vol. 14, pp. 23-30.
[15] NAKAZAWA, M. (1994): Mechanism of Adhesion of Epoxy Resin to Steel Surfaře. *Nippon steel technical report*, pp. 16-22.
[16] YOU MIN, ZHI LI, XIAO-LING ZHENG, SHAN YU, GANG-YAN LI, DE-XIN SUN, (2009): A numerical and experimental study of preformed angle in the lap zone on adhesively bonded steel single lap joint. *International Journal of Adhesion & Adhesives*, Vol. 29, pp. 280 – 285.

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