## **Evaluation of Adhesive Bond Strength Depending on Degradation Type and Time**

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Owing to the evolution an adhesive bonding technology can be a complement of the classical methods as well as their compensation in the area of the bonding materials. Although the adhesive bonding technology has many advantages there are also some limits that contain an adhesive degradation which leads to the lowering of a strength function. In this study specimens were prepared with methyl-methacrylate adhesive (MMA) (Novatit - adhesive) and steel sheets, and the effect of degradation conditions at the room temperature on the adhesive bond strength was studied. Part of the specimens was exposed to a dehydration after the degradation time. The results showed that the degradation conditions and also the dehydration have considerable effect on the ultimate strength as well as on the durability of the adhesive bond.

**Keywords:** Adhesive, Methyl-methacrylate, Ultimate strength

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## References

- [1] ABDEL WAHAB, M., CROCOMBE, A. D., BEEVERS, A., EBTEHAJ, K. (2002). Coupled stress-diffusion analysis for durability study in adhesively bonded joints. In: *International Journal of Adhesion & Adhesives*, Vol. 22, No. 1, pp. 61 73.
- [2] COURT, R., SUTCLIFFE, M., TAVAKOLI, S. (2001). Ageing of adhesively bonded joints fracture and failure analysis using video imaging techniques. In: *International Journal of Adhesion & Adhesives*, Vol. 21, No. 6, pp. 455 463.
- [3] DOYLE, G., PETHRICK, R. A. (2009). Environmental effects on the ageing of epoxy adhesive joints. In: *International Journal of Adhesion & Adhesives*, Vol. 29, No. 1, pp. 77 90.
- [4] HOLESOVSKY, F., NAPRSTKOVA, N., NOVAK, M. (2012). GICS for grinding process optimization, In: *Manufacturing technology*, Vol. 12, No. 1, pp. 22 26.
- [5] KINLOCH, A. J., OSIYEMI, S. (1993). Predicting the fatigue life of adhesively-bonded joints. In: *Journal of adhesion*. Vol. 43, No. 12, pp. 79 90.
- [6] MESSLER, R. W. (2004). *Joining of materials and structures from pragmatic process to enabling technology.* 816 p. Elsevier, Burlington.
- [7] MULLER, M., CHOTEBORSKY, R., HRABE, P. (2009). Degradation processes influencing bonded joints. In: *Research in Agricultural Engineering*, Vol. 55, No. 1, pp. 29 34.
- [8] MULLER, M., HERAK, D. (2013). Application possibilities of adhesive bonds Europe, Indonesia. In: *Scientia Agriculturae Bohemica*, Vol. 44, pp. 167 171.
- [9] MULLER, M., NAPRSTKOVA, N. (2010). Possibilities and limits of adhesive layer thickness optical evaluation. In: *Manufacturing technology*, Vol. 10, No. 10, pp. 45 59.
- [10] MULLER, M., VALASEK, P. (2013). Comparison of variables influence on adhesive bonds strength calculations. In: *Manufacturing technology*, Vol. 13, No. 2, pp. 205 210.
- [11] MULLER, M., VALASEK, P. (2012). Degradation medium of agrokomplex adhesive bonded joints interaction. In: *Research in Agricultural Engineering*, Vol. 58, No. 3, pp. 83 91.
- [12] MULLER, M. (2013). Research of liquid contaminants influence on adhesive bond strength applied in agricultural machine construction. In: *Agronomy Research*, Vol. 11, No. 1, pp. 147 154.
- [13] MULLER, M. (2011). Proces stárnutí a trvanlivosti garantované výrobcem na hodnocení lepených spojů. In: *Strojírenská technologie*, Vol. 16, No. 2, pp. 23 28.
- [14] NESLUSAN, M., ROSIPAL, M., KOLARIK, K., OCHODEK, V. (2012). Application of barkhausen noise for analysis of surface integrity after hard turning. In: *Manufacturing technology*, Vol. 12, No. 11, pp. 60 65.

- [15] NOVAK, M. (2011). Surface quality of hardened steels after grinding. In: *Manufacturing technology*, Vol. 11, No. 11, pp. 55 59.
- [16] NOVAK, M. (2012). Surfaces with high precision of roughness after grinding. In: *Manufacturing technology*, Vol. 12, No. 12, pp. 66 70.
- [17] NOVAK, M., KASUGA, H., OHMORI, H. (2013). Differences at the surface roughness by the ELID and grinding technology. In: *Manufacturing technology*, Vol. 13, No. 2, pp. 210 215.

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