Influence of pressure and temperature on the strength properties of a laminate produced by the RTM method

Krzysztof Piernik*

PhD-student: Faculty of Mechatronics and Mechanical Engineering, Kielce University of Technology, al. 1000-lecia P.P. 7; 25-345, Kielce; PL, piernikkrzysztof@gmail.com

The production of a high-quality polymer composite using the RTM method requires the proper selection of two independent technological parameters of temperature and pressure. Temperature is used to control chemical reactions inside the mold. The pressure is adjusted so that the flow of resin in the mold is continuous. Synchronizing these two parameters with each other and measuring the time they take place is called the „curing cycle". The paper discussed the influence of pressure on the content of voids (micro-voids) inside laminates made under various pressure values. A Glass mat with a [0°/90°] angle and basis weight was used for the production of the laminate $450g/cm^2$. Non-flammable resin of the company was used as the matrix Bueffa Firestop@ 8170-W1. Then the composite was subjected to a static ten sile test with two different sample sizes (scale effect). In order to estimate the influence of micro voids and microcracks caused by technological processes on the strength of the material.

Keywords: RTM, scale effect, polyester resin, curing cycle

References

[1] Chatys R., Stefański A., Piernik K., Stefański K.: *Estimation of Strength Parameters of Aviation Products Made of Polymer Composites Based on Markov Chain Theory*. Prace Instytutu Lotnictwa, No.2(274), 2017 pp.19-30.

[2] Mal, O., Couniot, A., and Dupret, F., *Non-isothermal simulation of resin transfer molding process*, Composites Part A, 1998,29A, 189-198.

[3] Chatys R.,Piernik K, Influence of scale effect and time on strength proporties of polimer composite made by vacuum metod, Composites Theory and Practice 2018, 2, 103-109.

[4] F. Kuwahara, A. Nakayama., A numerical study of interfacial convective heat transfer coefficient in two-energy equation model for convection in porous media, International Journal of Heat and Mass Transfer 2001, 44,1153-1159.