

AN INFLUENCE OF FIBER ORIENTATION AND LOAD DIRECTION ON BEHAVIOUR OF THIN COMPOSITE SAMPLES

Weronika Taras¹, Pawel Pyrzanowski¹, Jacek Gadomski¹, Zbigniew Kowalewski², Tomasz Libura²

¹ Warsaw University of Technology, Institute of Aeronautics and Applied Mechanics, Nowowiejska str. 24, 00-665, Warsaw, Poland

² Institute of Fundamental Technological Research, Polish Academy of Sciences, Pawinskiego str. 5B, 02-106 Warszawa, Poland

A strength test was carried out to compress a laminate with glass fibers hardened with an epoxy resin. Two types of laminate were used for the tests. One marked with the symbol "+" consisting of five layers oriented [0/90] and the other marked with the symbol "x" also with five layers oriented [0/90, ±45, 0/90, ±45, 0/90].

The tests were carried out on a special device that allows testing the compressive strength of thin samples. Until now, such tests have been impossible due to the buckling of the examined element.

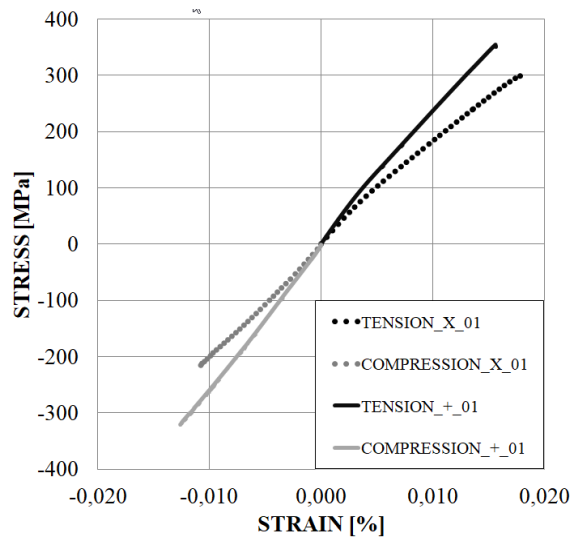


Fig. 1. Stress – strain diagram



Fig. 3. Microscopic image of the structure of the sample „+” with the highest compressive strength



Fig. 2. The shape of the sample „+” subjected to the compression test

Dimensions of the tested samples were as following: thickness: 1,4 mm, width: 18 mm, length: 140 mm. The tensile samples were controlled by displacement at a speed of 0,002 mm/sec, while the compressive samples were controlled at a speed of 0,003 mm/sec.

Tab. 1. Results of experiment

	for samples “x”:	for samples “+”:
maximum tensile stress [MPa]	298,6	354,5
maximum compressive stress [MPa]	215,1	321,1

On the basis of the graph and the values read, it can be seen that the sample marked with the symbol "+" is characterized by a much higher compressive strength.