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ENDURANCE TESTS ON SPECIMENS FROM COMPOZITE MATERIALS SANDWICH TYPE

R. Purcarea[1], **V.Gheorghe**[1], **M.V. Munteanu**[1]
[1] Universitatea Transilvania din Brasov, ROMANIA, r.purcarea@unitbv.ro, ghesile@yahoo.com

Abstract: *Fatigue test is an important component in the life prediction of mechanical components within a complex system(vehicles, machine tols)in various operating conditions. The stand presented in the paper can otain different results for various materials: composites, steel.*
Keywords: *endurance, composite material, specimens, RT 800.*

1. INTRODUCTION

Car bodies are constructed from a variety of materials, ferrous and non-ferrous metal and non-metallic. More recently, plastics (including composites) are increasingly present in a body part. The main advantage of composite materials is the high ratio between strength and weight density. For this reason composite materials are not only used to achieve body parts with decorative role, but a solution increasingly adopted in implementing parts of the body resistance of structures. Special interest should be given, among other things, determine the damage that can occur under load bearing capacity of their effect on the structure and behavior analysis of composite materials hardship (variations in temperature and humidity, vibration, chemical action etc.).

2. TECHNICAL REQUIREMENTS

To perform endurance tests on specimens at the request of symmetric alternating bending, was made one plate of composite "sandwich" (RT-800). From this plate were made a total of 16 specimens. The specimens have the following dimensions:

- length: 100 mm ;
- width: 10 mm;
- thickness: 4,5 mm.

Samples were numbered and marked for identification with numbers from 1 to 16. Some of the specimens are shown in Figure 1.

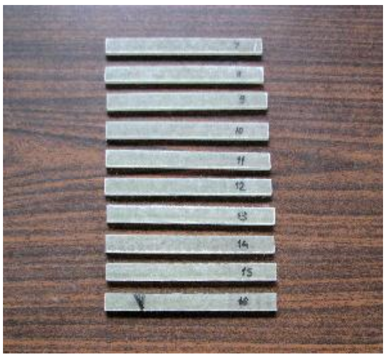

Figure 1. Some of specimens

Figure 2. Specimen on bending stress

Bending breaking attempt was made for nine specimens. Installing of the nine samples on stand was done as in figure 2. On pusher is mounted a force transducer to measure pressing force of the pusher on the specimen. The lift cylinder is mounted a transducer that measures the movement of the cylinder stroke. Signals from the two transducers are amplified and transmitted to a recorder.
The sample was made at a press speed of 0.1 mm /s. The behavior of specimens during the bending test is reflected by force-break diagram made with recorder. In Figure 3 is shows the diagram of bending test for specimen number 12. He was retained as the value of the deformation of the specimen arrow; the first recorded value occurrence falls upon application of force, even if that force has increased in some cases.

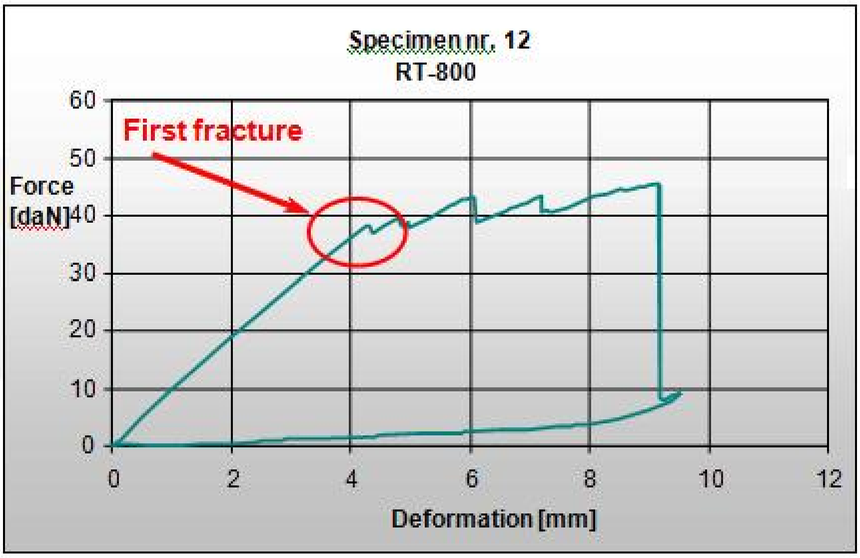

Figure 3. Diagram of bending for specimen 12

The diagram of all specimens is shown in figure 4.

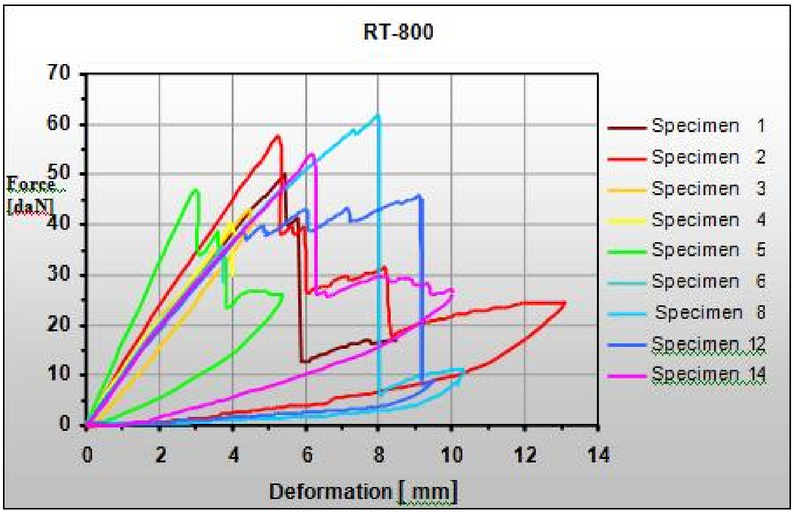

Figure 4. The diagram of bending test

Values recorded during the bending test for the specimens tested are shown in Table 1.

Table 1

	Down force [daN]	Deformation [mm]
Specimen nr.1	50.00	5.40
Specimen nr.2	57.00	5.30
Specimen nr.3	43.00	4.50

Specimen nr.4	40.50	4.00
Specimen nr.5	47.00	5.40
Specimen nr.6	35.50	3.75
Specimen nr.8	61.50	7.85
Specimen nr.12	38.50	4.30
Specimen nr.14	53.30	6.25

Figure 5 presents graphically the variation of breaking force for specimens tested, and plotted in Figure 6 is the variation of deformation size of specimens. Analyzing the results it is observed that the lower deformation of the 3.75 mm.

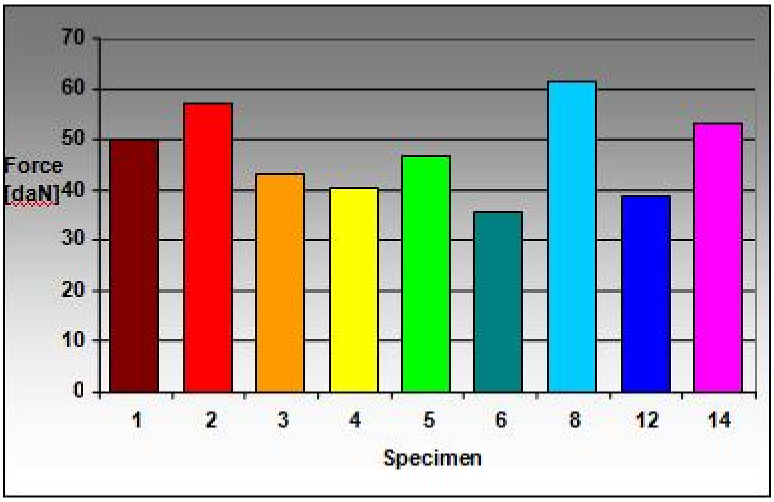

Figure 5. Variation of breaking force

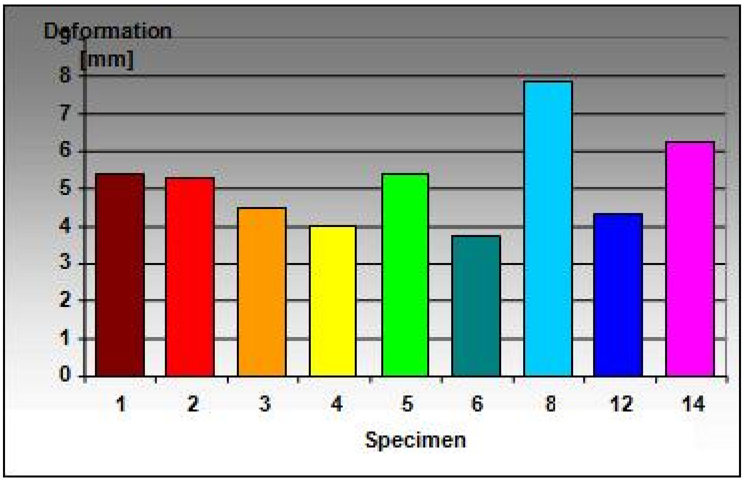

Figure 6. Variation of breaking deformation

To achieve endurance at the request of symmetric alternating bending is necessary, for specimens made from these materials undergo symmetric alternating bending cycles. Will be using a device built for this purpose, and mounted on a stand.

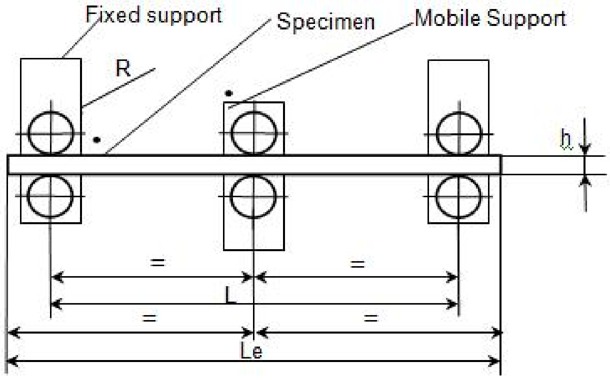

Figure 7. The strain device of specimen

Force will act perpendicular to the surface specimen loading this one with a bending moment. In figure 7 is shown the Fixing specimen into the device. Load force will act midway between the two supports (L).
Into device the specimen will be strain of a symmetrical alternating force (F) that will deform the specimen with the deformation (f), as shown in figure 8.

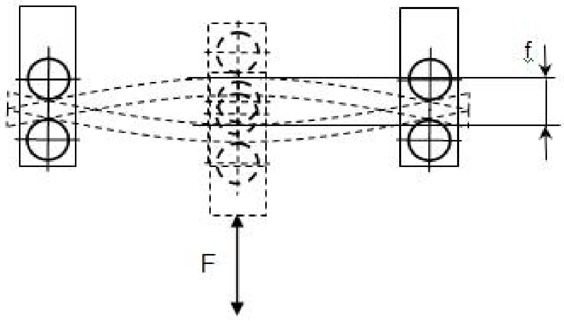

Figure 8 The strain of specimen

Specimens with numbers 6, 7 and 11 were subjected to alternating strain for an arrow symmetric deformation of ± 3.5 mm. During this time they recorded the number of cycles performed and the amount of force application. Records are presented graphically in figure 9.
Specimens with numbers 9, 10 and 15 were subjected to alternating strain for an arrow symmetric deformation of ± 2 mm. Records are presented graphically in figure 10.

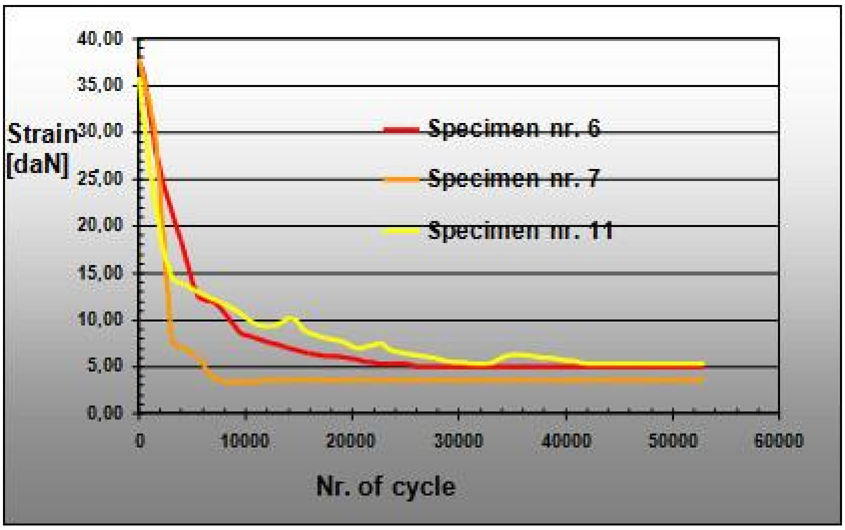

Figure 9. Alternating strain for an arrow symmetric deformation of ± 3.5 mm.

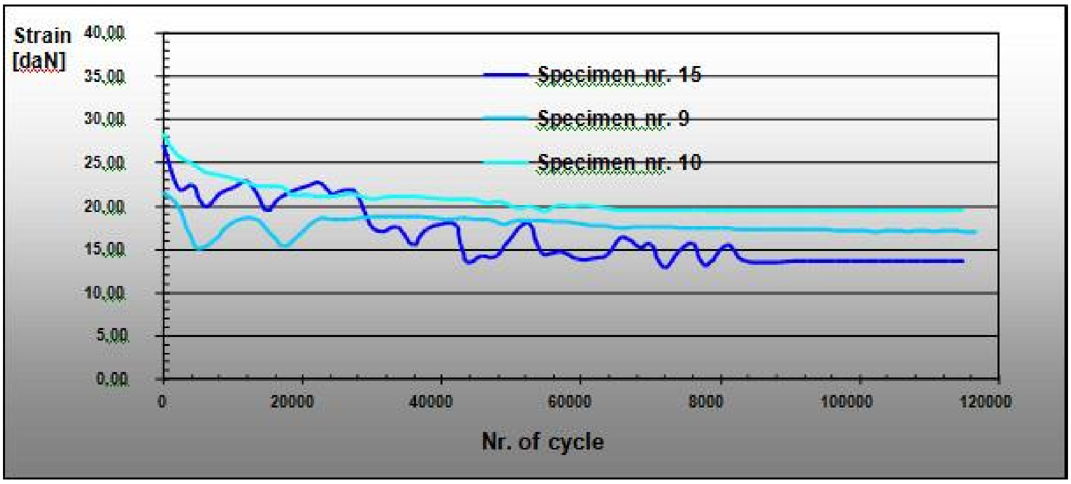

Figure 10. Alternating strain for an arrow symmetric deformation ±2 mm

3. CONCLUSION

None of the specimens did not break during these strain on endurance. Of all specimens subjected to deformation of ± 3.5 mm the layer of resin has destroyed entire, the specimen remaining only because its component glass fiber. Specimens subjected to deformation of ± 3.5 mm deteriorated faster and more pronounced than those subjected to deformations of ± 2 mm. Although not exceeded arrow breaking in either cases required by ± 3.5 mm specimens have quickly lost rigidity.

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