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METALLOGRAPHIC AND MICROSCOPIC ANALYSIS OF FIBERGLASS COMPOSITE MATERIAL, AFTER TENSILE TEST

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***Abstract**: This metallographic analysis technology can get information about manufacturing multilayer structure type, warp and weft. Microscope meets the needs to reduce the time for evaluation and quality improvement were seen in the image entirely in real time just by turning the adjustment while song notes studied.*
***Keyword:** fiberglass, 2D and 3D view, rupture in material*

1. INTRODUCTION

Metallographic analysis is examining the overall naked eye, a magnifying glass or by stereomicroscope at low magnification (below 100x) of blanks, parts, tools or samples specially prepared for this purpose (breaks, sections). Through this analysis you can get information on manufacturing technology as well as details on the operating conditions (breaking the static or fatigue, etc. Through this analysis you can get information on manufacturing technology as well as details on the operating conditions (breaking the static or fatigue, etc. **Microscopic analysis** can be both an interim control method and final. Its importance is even greater as this method is simple and requires no special equipment and can be controlled a large number of parts. Application can be made: breaking the surface or form (solidification, condensation, etc.).
Different measurements can be made in 3D: volume measurement, measurement profile section, measuring the distance between two parallel planes, measuring plane angles.

2. MATERIAL STRUCTURE ANALYSIS

2.1. Metallographic analysis

To view the structure we made an metallographic analysis and we could see layers, product homogeneity, and resin.It should be emphasized that the internal structure of typical grain requires no resemblance to the real structure that can be isolated in a section of material. The notion of granule feature is a hypothetical construction, conveniently placed to separate the effects of orientation, the influence of composition and geometry of reinforcement (as reflected by the specification of behavior typical grain).
Macroscopic analysis was performed in this work, through a final control method. The study was conducted on specially prepared surfaces (ground and attacked with a reagent). By analyzing macroscopic defects can be identified and determined which were formed at different stages of manufacturing technology.
It generally means multilayer composite as a constructive element made of two layers showing minimum for a given fixed direction, different values of the elastic properties (modulus of elasticity longitudinal, transverse, transverse contraction coefficients). It deals specifically with multilayer composites whose individual layers are unidirectional armed, all the fibers are linear and parallel to each other.

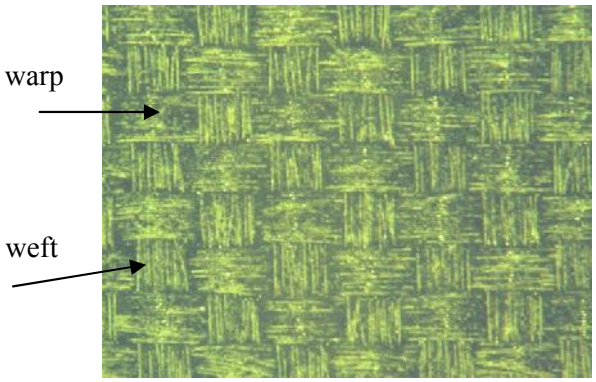

Figure 1 Dull face of compozite material MAT-Roving

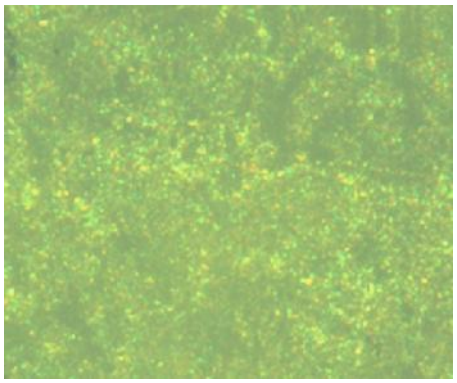

Figure 2 Bright face of compozite material MAT-Roving

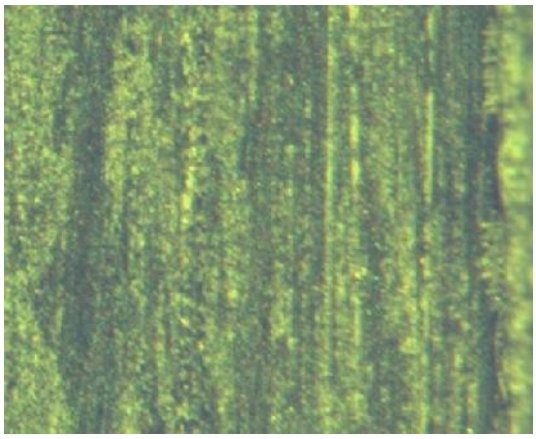

Figure 3 Longitudinal view

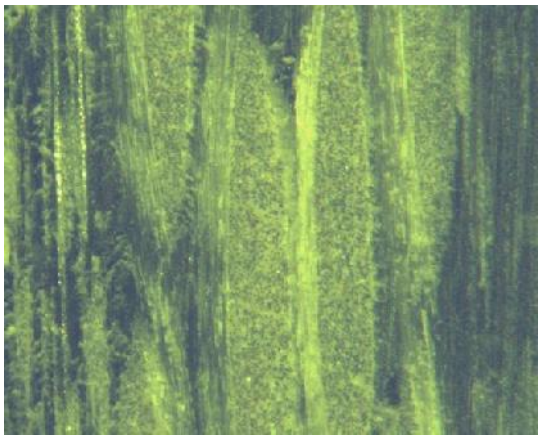

Figure 4 Transversal view

Appropriate fiber reinforced composite tubes required by internal or external pressure. If there are preferential directions of fiber orientation when there are preferential directions of elastic properties. If fiber arrangement is symmetrical about two axes perpendicular to each other then the special case of anisotropy is orthogonal or orthotropic. Symmetry axes are in this case orthotropic axes.

2.2. Microscopic analysis

To study changes in the composite material were used two powerful devices: camera and microscope VHX. After tensile and bending test the specimens have been studied in the breaking area.

Figure 5 Microscop VHX

VHX 500 integrates all steps from zoom to measure 3D profiles with the ability to zoom the object between 500 and 2000 times.
After tensile test , we studied the specimens with the camcorder which was increased by 5 times in areas where breaking and microscope VHX were increased by 500 times.

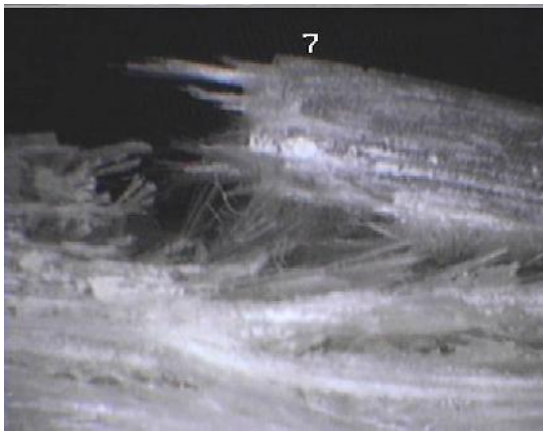

Figure 6 Specimen 8 MAT-Roving increase 5 times with camcorder

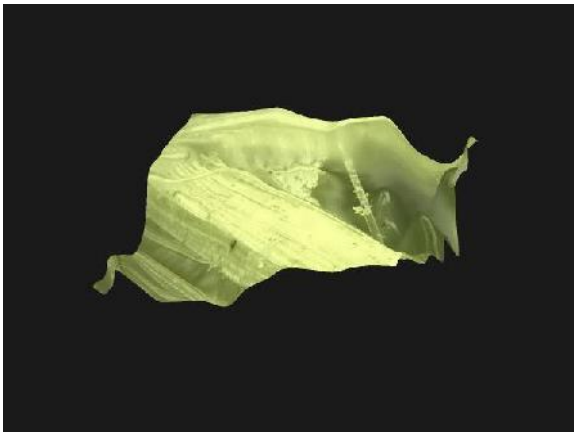

Figure 7 Specimen8 MAT-Roving increased 500 times with the microscop

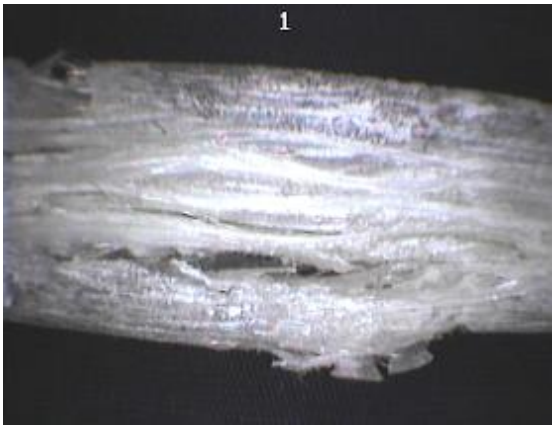

Figure 8 Specimen2 MAT-Roving increase 5 times with camcorder

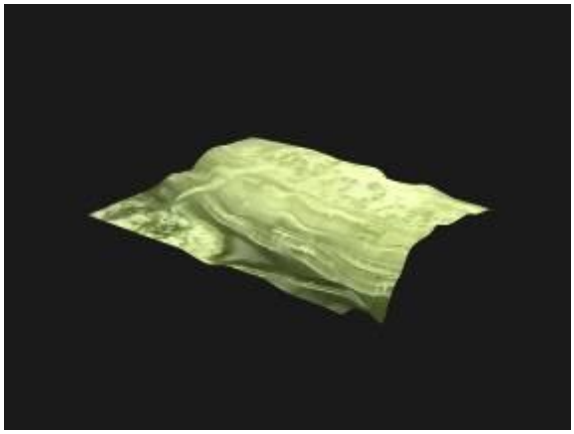

Figure 9 Specimen 2 MAT-Roving increased 500 times with the microscop

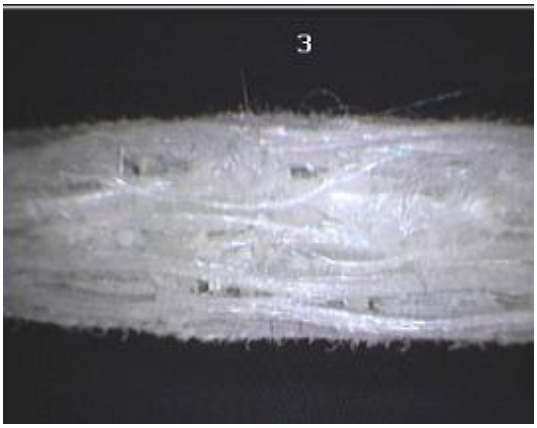

Figure 10 Specimen b3 Roving increase 5 times with camcorder

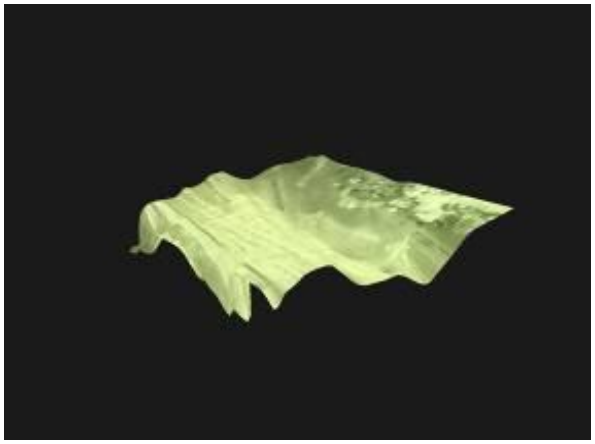

Figure 11 Specimen b3 Roving increased 500 times with the microscop

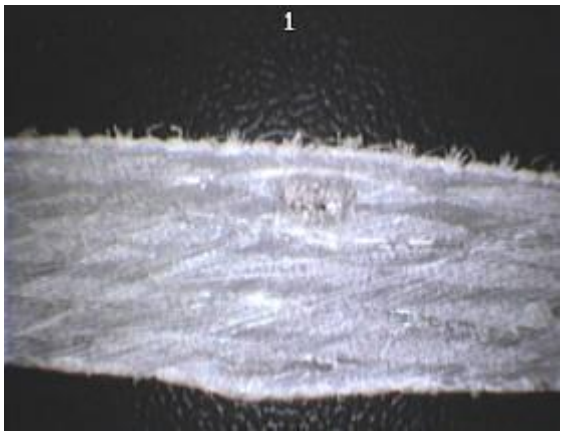

Figure 12 Specimen u3 Roving increase 5 times with camcorder

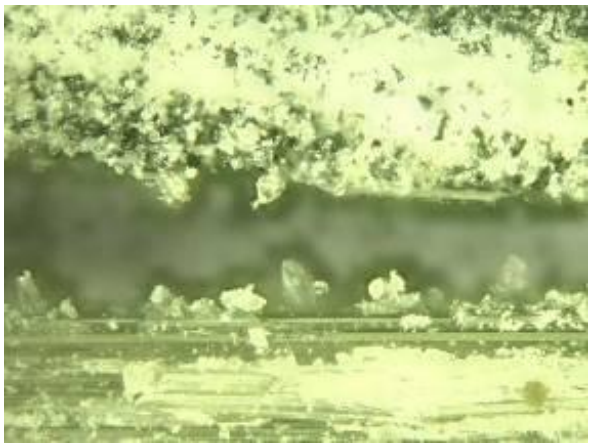

Figure 13 Specimen u3 Roving increased 500 times with the microscop, 2D

3. CONCLUSION

Conducting research on macroscopic composite samples revealed stratified and inhomogeneous structure of the material. The analysis of micrographs for specimens studied was observed distributions and glass fiber orientation of the material MAT and those of roving, distributions of fillings and holes, uneven, material damage, vacuoles and existing inclusions in the matrix resin.

Extreme complexity of products, continuous emergence of new scientific models and theories that changed the approach to technological act itself makes anything requiring a high concentration of material and conceptual forces.

View in detail was done with a powerful microscope that can increase 500 times the area studied up to 2000 times, and the images were as clear and even in the depth of the material. Results were obtained with a microscope both 2D and 3D, noting also how to change the whole structure of these materials.

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