USE OF POLYMER COMPOSITE MATERIALS IN THE BUILDING INDUSTRY

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INTRODUCTION

An every probleme in world life is "*construction materials*". The origin of main materials used by people in different ages and with the development of specific technologies of processing, were determined the name of civilizations itself, starting with stone, bronze, iron, steel.

The last century experience shows that the new construction materials are concepted for responding to the specific requirements imposed by the new necesities of the civilisation and culture human developement. On the other hand, for compare the different materials between them intervenes all of factors which determine its operation value. In this context, composites materials enjoy by the future expectation just by the possibility of expert to confer them new and various properties by association of synthesis components with complementary specifications.

Composite materials require a great and tight involvement of fundamental and technical sciences.

1. CONCEPTION ELEMENTS CONCERNING POLYMERIC COMPOSITE MATERIALS

The polymeric composites can be included in "the unconventional materials" capable to confer building elements and structures new functional and architectural aptitudes.

The conception of "composite" synthesizes the new idea in the construction material engineering domain, which characterises the contemporary development degree of science and technics, of culture evolution, of civilization and humanity aspiration for a better quality of spiritual and material life.

The essential constituents from structure of composites are physical identifiable, with interface delimination which generally, determines those properties, fig. 1.

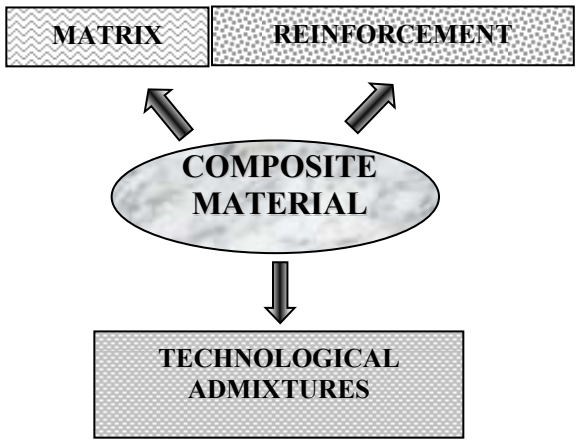


Figure 1. The structure of reinforced composite materials.

The structure of any composite involves [1]:

- **the matrix**, constituted by the one or more constituents which can be a synthetic polymer or other nature, being agent part, forming the composite and protecting the reinforcing fibres;
- **the reinforcing fibres**, made by one or more constituents insoluble in matrix, based on technical fibres which confer to composite the mechanic strengths and desired stiffness;
- **the technological admixture**, like the polymerization accelerators, the catalysts, varied inert fillings.

The distribution of tensiles in composite mass presumes the existence of transfer possibility of them among components by the "fibre–matrix interface", zone which can not be well-defined because the technical fibres are superficial treated with an agent at which sticks the matrix. Thus, the connection region fibre–resine can be treated like a third composite phase, this receiving the influences from exterior and exploitation factors, fig. 2.

The quality of composite performance and the decrease of rate of defacement of material realise by an initial proper adherence and than by the avoidance of interface zone destroying.

The domain of composites is very large and comprises a great diversity of groups, distinguished like structure, nature, performances

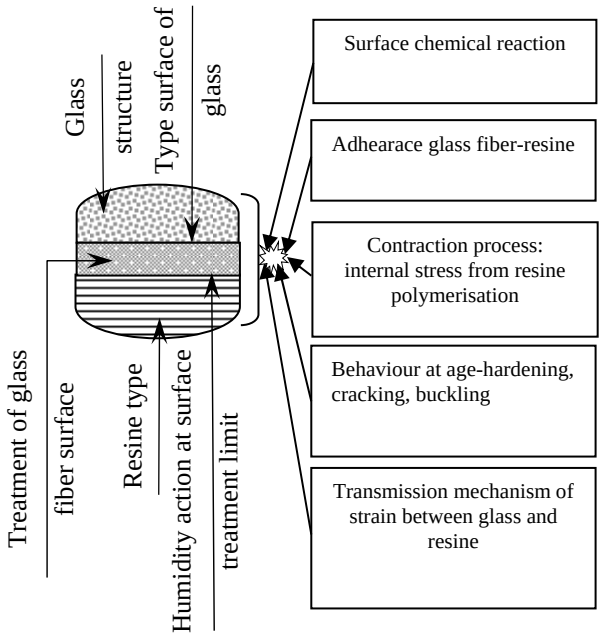


Figure 2. Influence factors over glass fiber – resine binding.

and possibilities of technic utilization, so that a classification with strict deliminations is difficult. The utmost peculiarity of new composite material family consists in the fact that their properties are apriori prescribed, relizing on mechanical, thermic, chemical, electrical stresses which these follows to be subdued.

The main interest which thermosetting polymer composites represent results by the fact that takeing over action:

- nature of essential constituent – matrix and reinforcing fibres;
- ratio between components;
- reinforcing fibres orientation after directions of stresses

on obtain the characteristics aimed by design.

3. COMPOSITE MATERIALS – THE XXITH CENTURY MATERIALS

The extension and diversification of utilization field transformed the polymer composite materials by simple substitute of overstressed traditional materials – wood, glass, iron – in structural materials. There is maintaing that today, any field of life appeals to the composite materials, so it's remarking following aspects, fig. 3:

- the highest production of composite materials is in U.S.A, followed by Japan and Germany;
- the highest consumption per year and man to this type of material is possessed by Germany, than U.S.A. and France;
- the highest share of composites utilization in building is in Italy, on the second place being Japan and than France.

The application of the polymer composite materials in the building field direct to a multitude advantages, so that:

- the energy consumption for obtaining these composite materials is considerable less than iron, aluminium, fig. 4.a;
- the reduced weight comparative with traditional structural materials, fig. 4.b, involves a reduce inertia which appears in the earthquarke time;
- the tensile strength of composites undergos major influences by reinforced material, fig. 4.c;
- this material sensibility is given by it elasticity modulus, low enough comparatively other materials, fig. 4.d;
- the maximum admitted temperature for the thermal stress, fig. 4.e, can be ameliorated by admixture of chlorine or bromide raw material in polymer resine;
- the recognized behaviour at atmospheric and chemical agents enables the using of polymer composites like building material for chemical industry or other industries with high degree of corrosion.

4. CONCLUSIONS

The brief presentation of some phisico-chamical properties of technic fibres reinforce of polymer composite materials, by comparison with other traditional materials for building using, locates the new family materials beside of its. These are now strong reason to declare that we are on the threshold of a new civilization, those of composite materials.

This material has the best phisico-technic properties which are determinated by scientific research of specialists from varied domains: chemistry, physics, mathematics, strength of materials, and engineering of building.

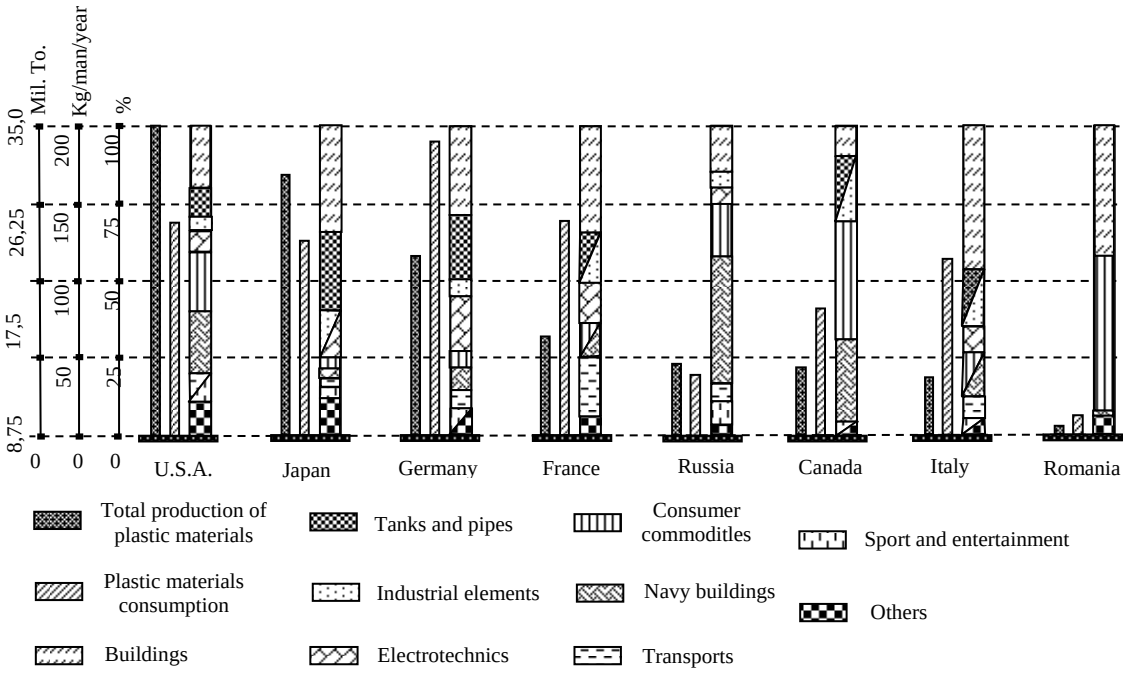
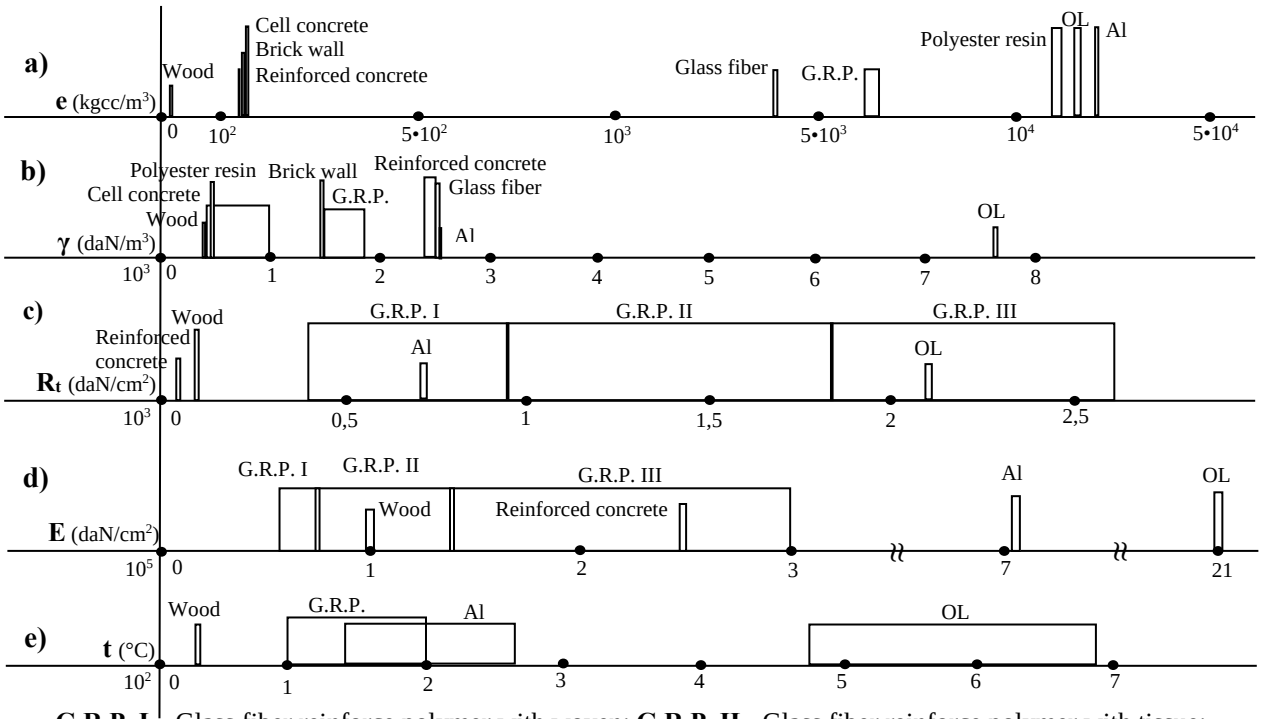


Figure 3. Plastic material production, consumption per man, per year and the weight of there use in different domains and countries.



G.R.P. I – Glass fiber reinforce polymer with woven; **G.R.P. II** - Glass fiber reinforce polymer with tissue; **G.R.P. III**- Glass fiber reinforce polymer with continuous fibers.

Figure 4. Place of prime materials and composite materials in comparison with traditional materials, function of some phisical and mecanical characteristics.

References

1. Decher E. *Elemente şi structuri din materiale compozite pentru acoperişurile construcţiilor inginereşti, teză de doctorat, Iaşi, 1998.*

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