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Managerial Decision on Purchasing of Products of Composites Materials

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ABSTRACT *Managers are facing many problems when it comes to decide on the purchase of new products including technologies. To these they are sometimes restraint due to the lack of knowledge of the parameters and the advantages they have with the new technologies.*

This work presents the comparative studies about electromagnetic features of the products of the composites materials compared with the metal.

INTRODUCTION

As is well known, the decision is a "variant selected from several possible to achieve a purpose or objective" (Nicolescu, O., cood., 2011, p. 181). Also, the decision is essentially a deliberate act, authority, binding upon organizational structures and persons in authority, in order to achieve common goals stated.

In terms of theory decision , this approach all actions and awareness dedicated to solve imperative problems on three levels (Panzaru, S., 2013, pp.75-87):

1) organizational (refers to preparation and analysis, identifying and developing alternative and rational actions, , and choosing the optimal solution);
2) Informational (collection, storage, processing and evaluation of data and ideas of value);
3) methodological (homogeneous activities, logical procedures, operations algorithmic, heuristic and logistics).

Starting from these premises, managers of firms acquiring transceiver systems are still distrustful of devices using antennas made of materials other than metal. Therefore, we conducted a comparative analysis of the electromagnetic parameters of the antennas made of composite materials and metal.

Research results are intended to ensure that facilities managers who have acquired their composition composites are inferior in terms of technical parameters than classic metal. Furthermore, composites are lighter, more reliable and cheaper.

SHORT ANALYSIS OF LITERATURE

Antennas theory was an interesting scientific field for the last 40-50 years. Over the years, antennas theory have developed considerably (Siebert, W. M., 1956, vol. 2, no. 3, pp. 204–221).

The parabolic dish antennas is the most frequently form. A dish antenna consists of one circular parabolic reflector and a point source situated in the focal point of this reflector (Eskeilinen, P., 2004, p.103).

One of the goals of structural materials technology is to develop new materials, combining properties such as high mechanical resistance and rigidity (Folgueras LC and Rezende MC., 2013). The combination of structural composite materials with RAMs allows the production of functional materials, which can be also used in microwave applications (Folgueras L.C., Alves, M.A. and Rezende, M.C., 2012).

As a general definition, it would be suitable for composite materials to use the term „synergy", which refers to the result produced by the combination and dosage unit suitable characteristics of components. Thus, these components will „cooperate" some deficiencies qualities being filled by others, giving the whole property that no component can't have (Pânzaru, S., 2008, p.5).

In layered materials, each layer behaves in a particular way, absorbing or reflecting the incident wave. This phenomenon has been studied using computer simulations involving complex algorithms (Tsang, L, Kong, J.A. and Ding, K.H., 2000, p. 67).

The application of paint to a substrate can change the surface impedance the antennas, in such a way that the painted substrate attenuates the reflection of microwaves. The absorbing properties of a painted substrate are related to the proper impedance the antennas between the painted surface and air (Thostenson, E.T. and Chou, T-W., 1999).

Composite materials are part of "new materials" and are specifically designed to respond to particular requirements in terms of (Pânzaru, S., 2010, p. 71):

- mechanical strength and rigidity;
- resistance to corrosion;
- resistant to chemical agents;
- low weight;
- dimensional stability;
- resistance to varying loads, shock and wear;
- insulating properties and aesthetics.

In this context, the manager decision to purchase the product of composite material must be well-founded, to comply with all specific stages of the management process, because the business will be in benefit the company he leads (Dragomir (Ştefănescu), C., 2008, pp.19-24).

PURPOSE OF THE STUDY

The purpose of the study was to compare the electromag-

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netic parameters of antennas made of composite materials with antennas made of metal.

OBJECTIVES OF THE STUDY

The main objectives of the study is as follows:

- To observe the antenna behavior of composite materials in electromagnetic field;
- the existence of side lobes for anntenas made of composit materials
- to verify the emission stability and the reception of electromagnetic signals in the composite of parabolic antennas for different angles in the horizontal and in the vertical plane, as compared to a metalic antenna.

METHODOLOGY

To perform the experiments we used a microwave generator operating at 9.7 GHz and has a maximum power of 100 mW. The electromagnetic detector has a special design and can appreciate the value of the field point by point, based on the detected current value is read on electronic ammeter.

The antenna is made of laminated composite material with embedded wire mesh with mesh size less than λ / 10.

Parabolic antenna as a paraboloid of revolution, has a sharp directivity diagram in the shape of a cigar. It also has secondary lobes, but insignificant value. [Figure 1].

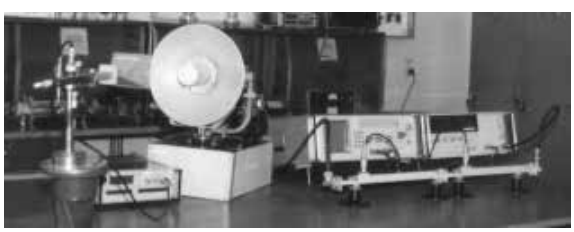

Figure 1: Arrangement of the apparatus for carrying out the experimental research

The directivity of the diagram form and opening it depends on the ratio λ/D, the focal length, the shape and size of the reflector, the directive properties of the radiator.

The sequence of the operations that were made to measure the performance of parabolic composite antenna are presented below:

l. connecting the microwave generator, setting the current to a value below 40 mA;
2. operating the mechanisms antenna so that it is brought to the α = 0° in the horizontal plane (azimuth) and β = 0° in the vertical plane (elevation angle);
3. measuring the distance between the dish and the detector field and note;
4. rotating the antenna at α = - 20° to α = 20° in azimuth and note the current value detected for each situation;
5. bringing the dish at 0 ° azimuth and repeat operations in Section 4, but this time vertically. Record the readings of the measuring equipment.

Based on the obtained values, we conducted a comparison between indication apparatus, the antenna case and the metal antenna made of composite materials [Figure 2 and Figure 3].

Values obtained from experiments performed are almost equal between the two antennas compared to the angles 0 ± 20^0.

Lateral lobes are very small, their presence is due to the edge of the antennas.

Note that the price of making composite antenna is much lower than that of aluminum antenna, approaching 1/3 ratio in favor.

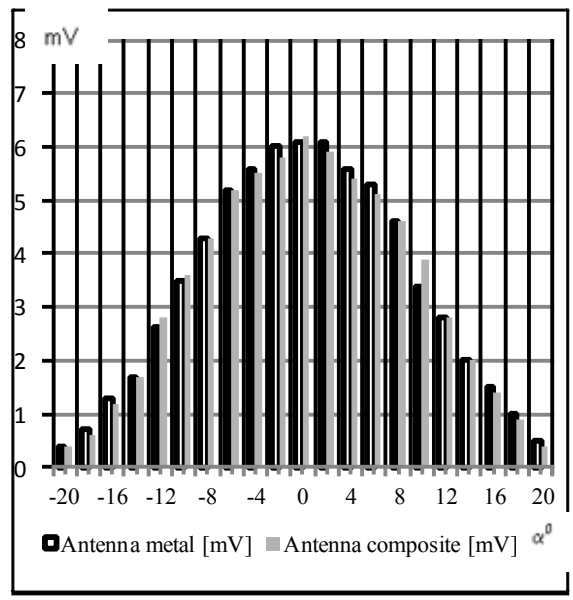

Figure 2: Digital multimeter values indicated by horizontal angle of antennas α = 0^0

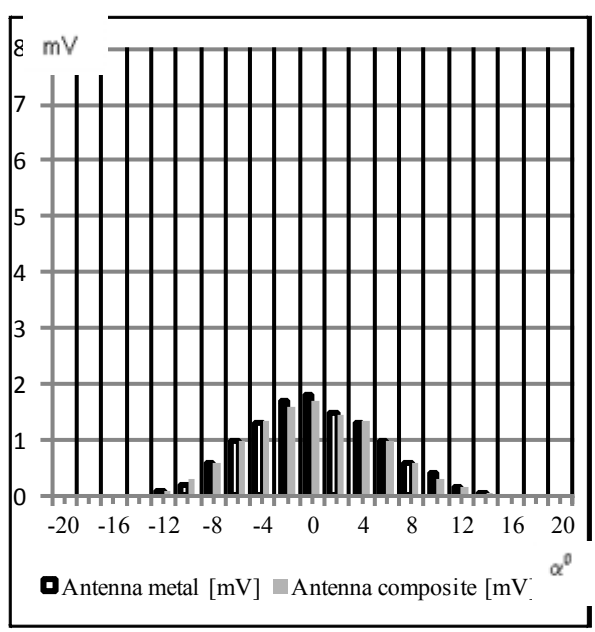

Figure 3: Values indicated by the digital multimeter horizontal angle of antennas α = ±20^0

The testing of the antenna made of composites can be done and in other ways, especially if it is larger (mechanical response to various requests, the working frequency, the existence of secondary lobes and their influence over the main lobe of the directivity characteristic et .a.).

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CONCLUSIONS

The results of the comparative analysis presented above, show us that the managers can have confidence in buying the equipment that uses horns made of composite material, and they can take in consideration advantages, such as:

- electromagnetic performance parameters; differ in terms of electromagnetic parabolic antennas are minimal in the case of composite-plated aluminum foil and the wire mesh reinforced, as compared with those made of metal, as can be seen from the diagrams obtained from measurements;
- antennas made of composite materials having the same directivity characteristic as the metal, can be replaced with suscces with those made by conventional methods;
- the installation and the removal of the composite antenna are similar to the small size of the metal, but simpler in the case of large antennas, due to the fastening system more simplified than in those made of metal; the same does not influence electromagnetic parameters of antennas;
- resistance to the elements;
- increased elasticity and shock resistance;
- price less cost by about 1/3;
- does not corrode and expansion ratio / contrast the best etc.

Therefore, I recommend the managers to buy the devices of emission - reception with antennas of composite materials.

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