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THE USING OF NANOCOMPOSITE HEATING SYSTEM FOR AVIATION DESIGNING

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Abstract: *The publication shows the preliminary possibility of nanocomposite heating system using for aviation designing. Carbon nanotubes are the quintessence of nanotechnology advances mainly due to their specific thermal, physical and mechanical properties. They are used to create totally new materials and occur as strengthening phase, for example, to medicine or build the wings and fuselages of aircraft as well as to their self-healing.*

Key words: *nanocomposite heating system, safety & security system, aviation design.*

1. INTRODUCTION

Materials for the construction of an airframe, aircraft engine containing carbon nanotubes with the use of the right proportion in combination with other structural materials (polymers, sintered metal) give more flexibility [2]. The main fields of nanocomposite heating system applicable to medicine, rehabilitation, paramedical rescue services, aviation construction, building industry, means of motor, air and railway conveyance, household equipment, agriculture and special applications etc. [4].

2. THE PRINCIPLE OF NANOCOMPOSITE HEATING SYSTEM OPERATION

The heating technology elaborated in the nanocomposite heating system laboratories

allows attaining properties and qualities of heating systems, hitherto unattainable. Traditional paths (cylinders) or electrically conducting resistance wires have been replaced with uniform heating composite containing modified carbon nanomaterials (figure.1) [3]. The result of our efforts is heating mats and coatings distinguished from:

- an uniform temperature distribution all over the surface being heated,
- the short reaction times in order to attain the temperature desired,
- the safe supply voltages under 24V for surface temperatures 0 - 70°C,
- an adjustment of the technology to the expected rigidity or elastic properties of materials [5].

The nanocomposite heating system is based upon carbon nanomaterials modified in our labs and used for manufacturing polymer nanocomposites to produce heating effects.

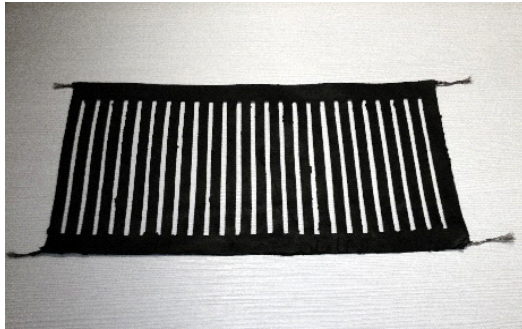


Figure 1. Traditional heating system vs. Nanocomposite Heating System

Such nanocomposites are distinguished with increased electrical resistance. They can be laid on many materials, e.g. polymer products and natural products.

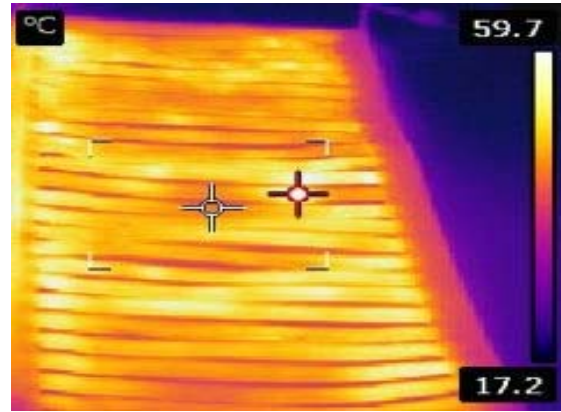


Figure 2. Thermal camera picture of nanocomposite heating mat (the surface temperature 60°C, current 24V)

By applying various types of polymers as carriers, it is possible to lend elasticity or rigidity to the heating coatings being laid. Simple current control systems: voltage controller to hold no more than 24V, temperature sensor, thermostat and electronic program selector can secure an accurate control and selection of temperature ranges from 0 to 60°C (figure 2).

The use of heating mats system and coatings will mean energy saving due to a uniform temperature distribution all over the heating surface (figure 3). No energy overuse is needed to heat up 'voids', which happens while using conventional technologies with resistance wire windings. Because the heat radiation is emitted from the entire working surface, the heat comfort is attained earlier and an item of consumer goods subject is heated faster and uniformly. For each user, such a functionality will also mean money saving.



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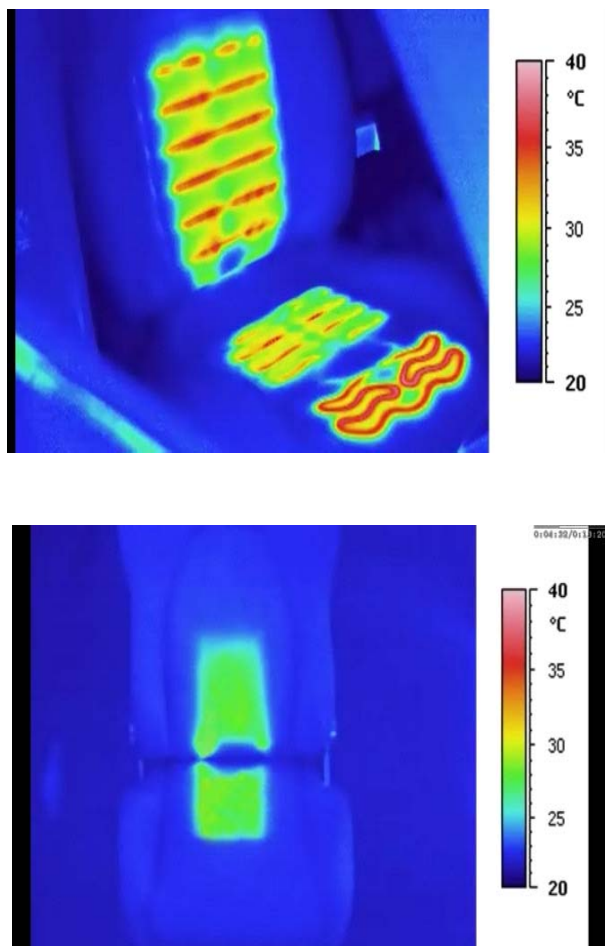


Figure 3. The Classical Seat Heating System vs. Nanocomposite Heating System (the thermovision camera pictures)

2. CONCLUSION & ACKNOWLEDGMENT

The introduction of Nanocomposite Heating System as new technology does not affect the previous functional quality of products and sub-assemblies. To end of them with heating properties means gaining access to new fields of application, previously either unattainable or which demanded the purchasing and fitting extra heating devices.

What the more this system gives high efficiency and reliability during the working life because the functional heating elements this of new system is longer than in the case of classical heating with systems based upon leads and resistance wires.

The heating mass of paint does not contain any paths or electrical resistance circuits; hence, there is no risk of their burning or breaking. The entire heating surface/mat will keep on working to heat until torn apart.

An innovative and specialized product with new qualities will allow having the offer targeted at a wider field of application. Safe and low supply voltages of heating mats and coatings will make the user more aware of their safe and trouble-free operation. There is no risk when the product is used in consumer goods within the children's reach - even if destroyed or flooded.

Special thanks must go to Professor J. Lewitowicz and Professor W. Gąsowski my mentors of engineering aviation, who were source of endless encouragement and motivation, patient in the extreme during my long hours at the computer, but with a keen eye and perceptive mind.

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