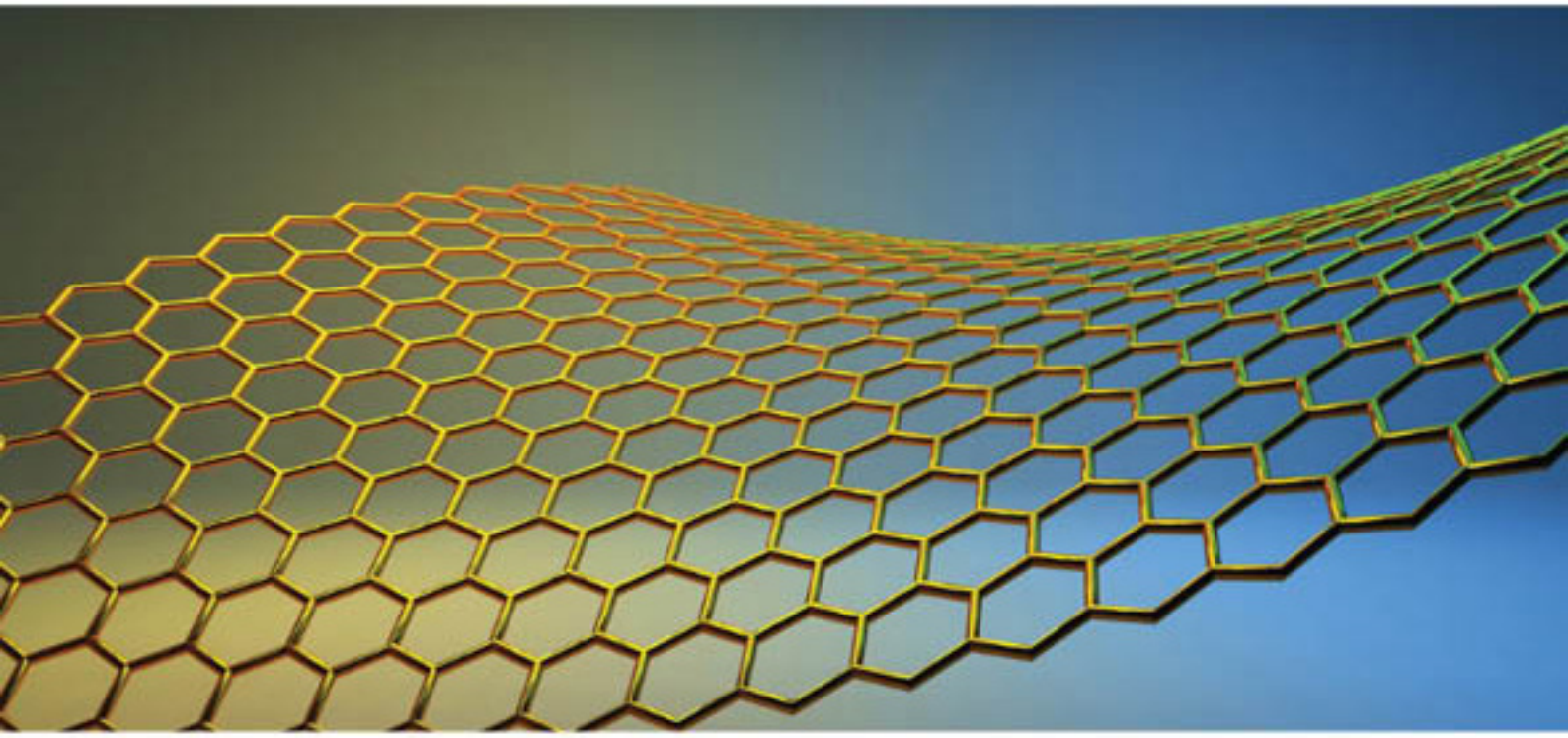
E-Newsletter nº3

Focus: composite materials and lightweight materials on aircrafts



SKILLMAN

Sector Skills Alliance
for Advanced Manufacturing
in the Transport Sector

skillman.eu

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SKILLMAN @ EfVET International Conference

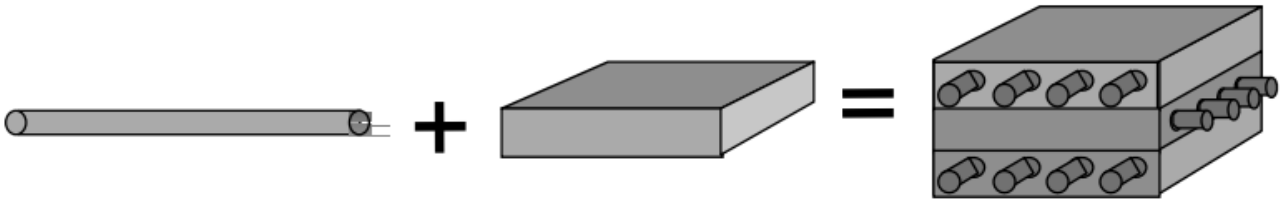
SKILLMAN has been presented in the 24th Annual EfVET International Conference in Cyprus

'What makes Vocational Education and Training an attractive pathway to success?' This was the title of the conference held in Cyprus beteewn the 21st and the 24th of October 2015.

The event aimed at exploring the opportunities provided by Vocational Education and Training. For this reason key players of that sector were called to share good practices and case studies. In this framework Skillman was presented to the audience by Mr. Stefano Tirati (CSCS) within the framework of the workshops and round tables sessions: Presentation SKILLMAN The presentation, besides introducing the Skillman project and its main areas of activity, addressed the difficulties experimented by the business sector to fill vacancies due to the changing competences and specializations required by the emerging technologies. In addition Conference looked at the importance of high quality career advice and guidance; the value of robust quality assurance transparency and transferability and the benefits of working toward learning outcomes. For further information, please, visit these links:

24th Annual EfVET International Conference

Conference Program



Fiber/Filament Reinforcement	Matrix	Composite
• High strength • High stiffness • Low density	• Good shear properties • Low density	• High strength • High stiffness • Good shear properties • Low density

Composite material is a material that consists of strong carry-load materials which are embedded in a somewhat weaker material

Materials make up every aspect of our world and have been critical throughout history in advancing both technological and cultural development, from the tools of the Bronze Age to the silicon driving the Information Age. The ability to effectively develop and deploy breakthrough materials technologies has always been inextricably tied to national prosperity and influence on the world stage. At no time has this been more evident than with the current imperative to secure a sustainable energy future.

Energy availability and the impact of energy consumption on the environment will be the delineating factor of major economic and security issues for decades to come. The effectiveness and practicality of many critical energy solutions will depend on advancements in materials and their manufacturing processes.

Achieving a markedly higher standard of fuel economy at an affordable cost and reduced environmental impact is a pivotal challenge for both the personal and mass transportation industries in the Clean Energy Age. Success will depend on the effective deployment of advanced materials innovations in nearly every system of the cars, trucks, airplanes, and other modes of transportation that have come to define modern commerce and quality of life.

Composite material is a material that consists of strong carry-load materials which are embedded in a somewhat weaker material. The stronger material is commonly referred to as reinforcement and the weaker material is commonly referred to as the matrix. The reinforcement provides the strength and rigidity that is needed and which helps to support the structural load.

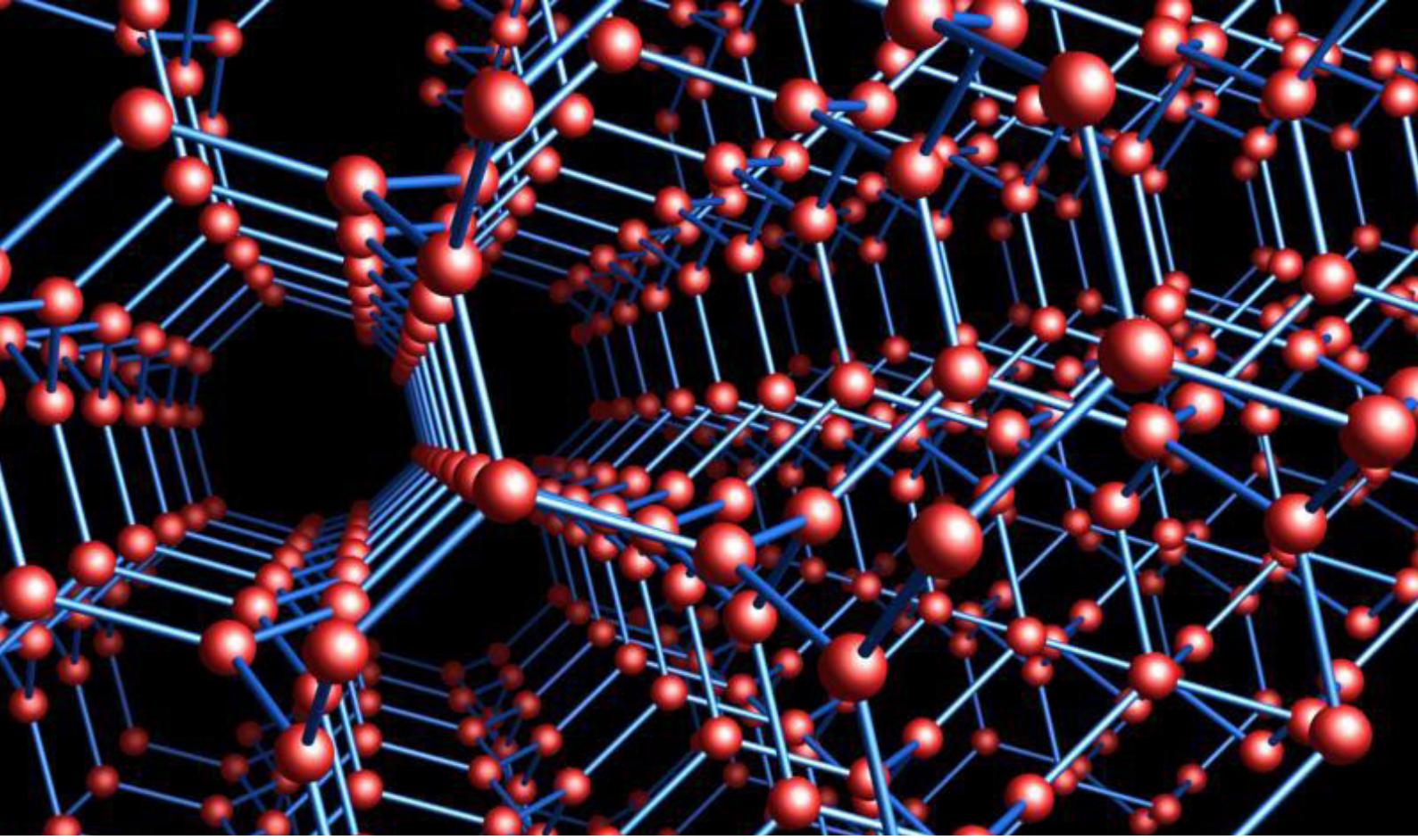
The matrix or the binder helps to maintain the position and orientation of the reinforcement and is somewhat more brittle.

The matrix is the continuous phase of the composite. Its principal role is to give the shape to the structure. Therefore, matrix materials that can be easily shaped and then hold that shape are especially useful.

The matrix is the component of the composite that first encounters whatever forces might be imposed.

The principal role of the reinforcement is to provide strength, stiffness and other mechanical properties to the composite.

Structural properties, such as stiffness, dimensional stability, and strength of a composite laminate, depend on the stacking sequence of the plies. The stacking sequence describes the distribution of ply orientations through the laminate thickness. As the number of plies with chosen orientations increases, more stacking sequences are possible.



Graphene: the most promising of carbon-based nanostructured materials

EU 2020 agenda states that EU is the home to world leading manufacturing industries, game changing innovative technologies and an entrepreneurial infrastructure that can enable the transition to a resource efficient, sustainable, society. Unfortunately raw materials, crucial for these core industrial activities, are mostly imported from other countries.

The challenge to increase the supply of materials from all types of sources requires a range of technologies, infrastructures, trade measures and policies that can dynamically adjust to different resource types, availability and product compositions.

Luckily, in the last years researches in the field of nanostructured materials have taken many steps. Graphene is the most recent and most promising of carbon-based nanostructured materials. It is formed by a sheet of carbon atoms, one atom thick, arranged in a honeycomb lattice.

Thanks to its peculiar structure, graphene has many extraordinary properties: it is the strongest material ever tested, it conducts heat and electricity efficiently and it has high charge mobility, excellent mechanical properties and good chemical tunability.

Graphene has been widely used as a nano-additive in polymer composites to enhance mechanical properties, electrical conductivity, resistance to temperature or solvents. It is a promising candidate to create high-performance composite materials for metal replacement, as for example in the aeronautic and aerospace sector, improving fuel efficiency, range and reducing weight.

Due to its electrical conductivity, it could even be used to coat aircraft surface material to prevent electrical damage resulting from lightning strikes. These characteristics can also help in the development of high strength requirement applications such as body armour for military personnel and vehicles.

In addition outside of its much vaunted manufacturing potential, graphene could be used within the aerospace industry to de-ice airs. In this case nanoplatelets of graphene can be mixed into a polymer resin; the grapheneresin applied to the aircraft body and its components form a tight jacket around it. An electrical current can then be passed through this conductive jacket - either across the entire body of the aircraft or to specific components, such as the wings - providing heat, which would in turn melt the ice. This method provides no detrimental effect on aerodynamics and little weight, while the high conductivity of the resin also requires little electricity to be effective.

Graphene was discovered in Europe, and several European groups are at the forefront of graphene research, among them the University of Manchester. Worldwide production is already on the tens of kilograms scale. Graphene-based products have been already commercialized by Austrian, Italian and Spanish companies. However, a strong activity on industrial production and application is ongoing in Asia and USA, who have the lead on graphenegraphene-related patenting activities. To keep Europe at the center of this technologically relevant sector a strong international activity and a good network of infrastructures will be needed, relying on industrial involvement, top-level research and training of researchers on processing and application of graphene.

The Flagship Project GRAPHENE is collecting the most advanced European research about this topic bringing together academic and industrial researchers to take graphene from the realm of academic laboratories into European society in the space of 10 years, thus generating economic growth, new jobs and new opportunities.

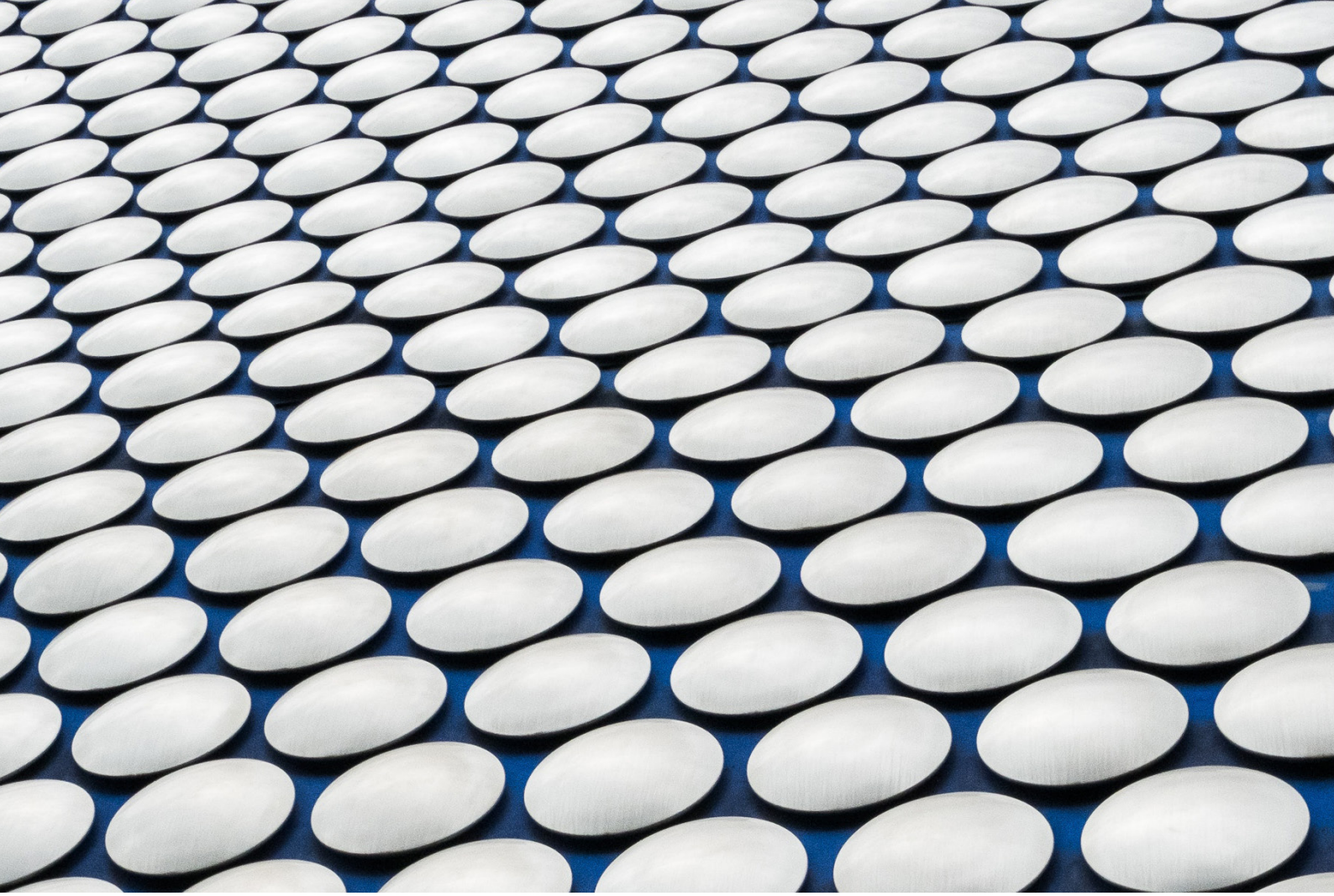
Skillman supports the KIC EIT RawMaterials

Skillman supports from December 2015 the KIC EIT RawMaterials (EIT RM), an EIT Knowledge and Innovation Community (KIC), funded in 2014 by the European Institute of Innovation and Technology (EIT).

This KIC will integrate multiple disciplines, diversity and complementarity along the three sides of the knowledge triangle (business, education and research) and across the whole raw materials value chain.

EIT Raw Materials will generate significant impact on European competitiveness and employment. This will be realized through the introduction of innovative and sustainable products, processes and services and well-educated people that will deliver increased economic, environmental and social sustainability to European society.

Synergies are envisaged in relation with the implementation of vocational educational activities, for what is called within the KIC, “T-Shape Professionals”.



Main Applications of composite materials in the industry

Composite materials contain construction, marine goods, aerospace, transportation, sporting goods, and further newly infrastructure, with construction and transportation being the biggest. Generally, more costly but high act continuous carbon-fiber composites are used somewhere light weight along with high stiffness and strength are required, and in fewer demanding applications where weight is not as critical then considerable lower cost fiber-glass composites are used.

Main Applications of composites materials in industry

1. Aerospace Applications

Aircraft applications are the maximum significant uses of composites. Unlike other vehicles, commercial aircraft, essential to lay greater stress on safety and weight. They are realized by using materials through great specific properties. A modern civil aircraft designed as to encounter the several criteria of power and safety. As a result of forward-thinking technology that has gone beyond the design and application the glass and carbon reinforced hybrid composites are the best preferred materials.

2. Wind Power Generation

The applications of composite materials are used in wind power generation because the wind power engineering is a significance region of energy generation because of its resource saving and ecologically safe. The power monetary value mainly is determined substantially by simple power element blades. At present-day hybrid fibers (carbon, glass) are largely used for fabrication of the blades.

3. Automobile/Transportation Sector

In spite of the potential benefits and many advantages of lighter weight and high durability resulting from corrosion resistance, advanced composites are not used widely in automotive applications. There must be some step's should be taken on a global level to make advanced composites material attractive for some wide-spread use in trucks, cars etc. and all other automobile applications. The main cause which is a barrier for composite material is its high cost of raw and fabricated material, since the existing material used is of law cost.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