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**Группа: 17 СЗС -1Д**

**Наименование дисциплины: Английский язык**

**Тема: Композитные материалы**

The combinations of two or more different materials are called composite materials. They usually have unique mechanical and physical properties because they combine the best properties of different materials. For example, a**fibre-glass reinforced** plastic combines the high strength of thin glass**fibres** with the ductility and chemi­cal resistance of plastic. Nowadays composites are being used for structures such as bridges, boat-building etc.

Composite materials usually consist of synthetic fi­bres within a matrix, a material that surrounds and is tightly bound to the fibres. The most widely used type of composite material is**polymer matrix composites**(PMCs). PMCs consist of fibres made of a ceramic mate­rial such as carbon or glass embedded in a plastic matrix. Usually the fibres make up about 60 per cent by volume. Composites with metal matrices or ceramic matrices are called**metal matrix composites** (MMCs) and**ceramic matrix composites** (CMCs), respectively.

Continuous-fibre composites are generally required for structural applications. The**specific strength**(strength-to-density ratio) and**specific stiffness** (elastic modulus-to-density ratio) of continuous carbon fibre PMCs, for example, can be better than metal alloys have. Composites can also have other attractive properties, such as high thermal or electrical conductivity and a low coefficient of thermal**expansion.**

Although composite materials have certain advan­tages over conventional materials, composites also have some disadvantages. For example, PMCs and other com­posite materials tend to be highly**anisotropic**— that is, their strength, stiffness, and other engineering proper­ties are different depending on the orientation of the com­posite material. For example, if a PMC is fabricated so that all the fibres are lined up parallel to one another, then the PMC will be very stiff in the direction parallel to the fibres, but not stiff in the perpendicular direction. The designer who uses composite materials in structures subjected to multidirectional forces, must take these anisotropic properties into account. Also, forming strong connections between separate composite material com­ponents is difficult.

The advanced composites have high manufacturing costs. Fabricating composite materials is a complex proc­ess. However, new manufacturing techniques are devel­oped. It will become possible to produce composite mate­rials at higher volumes and at a lower cost than is now possible, accelerating the wider exploitation of these materials.

**Vocabulary:**

**fibreglass**— стекловолокно

**fibre** — волокно, нить

**reinforced** — упрочненный

**expansion** — расширение

**matrix** — матрица

**ceramic** — керамический

**specific strength** — удельная прочность

**specific stiffness** — удельная жесткость

**anisotropic** — анизотропный

**General understanding:**

1. What is called «composite materials»?

2. What are the best properties of fibre-glass?

3. What do composite material usually consist of?

4. What is used as matrix in composites?

5. What is used as filler or fibers in composites?

6. How are the composite materials with ceramic and metal matrices called?

7. What are the advantages of composites?

8. What are the disadvantages of composites?

9. Why anisotropic properties of composites should be taken into account?

**Diesel**

In 1890s, Rudolf Diesel, a German engineer, invented the engine that bears his name. As distinguished from gasoline engines, diesels have no ignition system fed with electricity. The fuel is ignited simply by contact with very hot air in the cylinder.

The operation performed is like this: when taken into the cylinder the air is highly compressed, the temperature rises so the heated fuel mixture burns. The higher is the pressure, the higher is the temperature. Besides, the compressed mixture produced more power.

Diesel engines power many of the trucks, coaches, tractors, tanks, generators of electricity and other devices. They are usually used in cases when engine’s weight is not a prime factor. Their advantage is that they are simple in design and use much heavier liquid fuels than gasoline engines. The cost of a heavier fuel is much less than that of a light one. Besides, the fuel consumption of a diesel is much less then that of gasoline engines.

Although applied for many purposes diesel engines have certain disadvantages. Their weight is more than that of gasoline engines of the same power and they occupy more space. The disadvantages of diesels as passenger-car engines are slow performance, noise and smoke.

All the companies investigating diesels are trying to reduce noise and smoke, but the problems are not entirely solved. Diesel engines clatter when started on a cold weather. And the warm-up period for all diesels seems too long to drivers accustomed to gasoline models.

Who invented diesel engines?

Do diesel engines have ignition system fed with electricity?

How is the fuel ignited in the diesel engine?

What do diesel engines power?

What is the advantage of diesel engines?

What are disadvantages of diesels as passenger-car engines?

What are companies trying to reduce?

**Контрольные задания**

**Exercise 5.5. Find equivalents in the text:**

1. композитные материалы

2. уникальные механические качества

3. полимерные матричные композиты

4. составлять 60% объема

5. углепластик

6. привлекательные качества

7. структура, подвергающаяся воздействию разнонаправленных сил

**Exercise 5.6. Translate into Russian:**

1. PMC is fabricated so that all the fibres are lined up parallel to one another.

2. Forming strong connections between separate com­posite material components is difficult.

3. Fabricating composite materials is a complex process.

4. Composite materials have certain advantages over conventional materials

5. Nowadays, composites are being used for structures such as bridges, boat-building etc.

6. Continuous-fibre composites are generally required for structural applications.

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