Composite materials

Composite materials also called **composition materials** or shortened to **composites** are materials made from two or more constituent materials with significantly different physical or chemical properties, that when combined, produce a material with characteristics different from the individual components. The individual components remain separate and distinct withinthe finished structure. The new material may be preferred for many reasons: common examples include materials which are stronger, lighter or less expensive when compared to traditional materials.

Typical engineered composite materials include:

- Composite building materials such as cements, concrete Reinforced plastics such as fiber-reinforced polymer
- Metal Composites
- Ceramic Composites (composite ceramic and metal matrices

Composite materials are generally used for buildings, bridges and structures such as boat hulls, swimming pool panels, race car bodies, shower stalls, bathtubs, storage tanks, imitation granite and cultured marble sinks and counter tops. The most advanced examples perform routinely onspacecraft in demanding environments.

Types of Composites

- Composite materials are usually classified by the type of reinforcement they use. This reinforcement is embedded into a matrix that holds it together. The reinforcement is usedto strengthen the composite. For example, in a mud brick, the matrix is the mud and the reinforcement is the straw. Common composite types include random-fiber or short-fiberreinforcement, continuous-fiber or long-fiber reinforcement, particulate reinforcement, flake reinforcement, and filler reinforcement.

Mud Building Bricks

- Mud building bricks are examples of a composite material invented by ancient humans. Abrick formed only with mud is sturdy and resistant to compression, but it has little flexibility, and it can break if bent. Straw has excellent tensile strength, meaning that it resists stretching. By combining both straw with mud, ancient humans were able to createcomposite bricks that could remain flexible while supporting weight and resisting compression.

Concrete and Reinforced Concrete

- Concrete is a composite material made of cement, sand, stones and water. A chemical reaction that occurs when you combine these materials makes concrete stronger than anyone of its components. Concrete is commonly used in building and road construction. When you add reinforced steel rods to the concrete, you create another composite with greater strength and flexibility called reinforced concrete.

Fiberglass

- Fiberglass is made of tiny glass shards held together by resin and other components. In the automotive industry, fiberglass is important for making body kits. The body shell fora car is made up of different layers of fiberglass, such as a gel-coat layer, tissue layer, matting and cloth. The final product is a complete, waterproof, lightweight and strong body kit. Fiberglass can also be a less expensive alternative to other materials.

Natural Composites

- Composites can be easily found in nature. Wood is an example of a composite because cellulose fibers are held together by a substance called lignin. These fibers can be foundin cotton and thread, but it's the bonding *power of lignin in wood that makes it much tougher. Certain types of large rocks can also be regarded as natural composites when they are composed of a variety of smaller rocks and minerals*

Applications of laminar composites

Laminates - Laminates are layers of materials joined by an organic adhesive.

- *Cladding - A laminar composite produced when a corrosion-resistant or high-hardnesslayer of a laminar composite formed onto a less expensive or higher-strength backing.*
- *Bimetallic - A laminar composite material produced by joining two strips of metal withdifferent thermal expansion coefficients, making the material sensitive to temperature changes.*

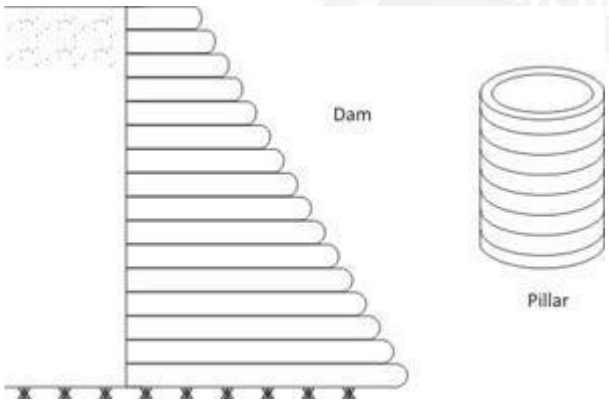
Fibre textiles

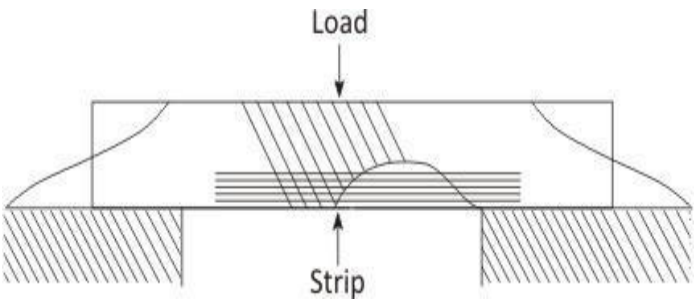
Textile Fibers Are Special Many fibrous materials are not suitable to make into fabrics, e.g., corn silk or wood slivers. Textile fibers must have certain properties: flexible, thin (but not too thin), long (enough), cohesive, and strong(enough).Textile fibers must be flexible. Wood fibers (unlessprocessed, as into pulp) do not bend easily—you can-not make fabrics from slivers!Textile fibers are also very thin—long in relation to diameter. To be mechanically spun into yarn—drawn out and twisted—staple fibers must have sufficient length, strength, and cohe- siveness (fiber-to-fiber friction). Many seed fibers are too short, weak, and slippery to spin into yarn; kapok, for instance, can be used only for stuffing. Of course, for a fiber to be used a great deal, there must be a reasonable supply and price

Reinforced Earth

The Primary purpose of reinforcing a soil mass is to improve its stability, increasing itsbearing capacity and reduce Settlements and Lateral deformations.

Reinforcing materials: stainless steel, aluminum, fiberglass to nylon, polyster,polyamides, and other synthetics in the form of strips.
Geosynthetics, geotextiles, geogrids and geocomposits.





Basic Functions

- Drainage
- Filtration
- Separation
- Reinforcement

Drainage:

Collecting and redirecting seepage water within a soil mass or adjacent to retaining wallsculverts and tunnel linings .

Ex - Non-woven fabrics or composits have sufficient inflow capacity to fulfill this function.

Geotextiles acts as a filter if it allows seepage from a water bearing layer while preventing mostsoil particles from being carried away by the water flow.

Separation

It is achieved if the fabric prevents mixing of adjacent dissimilar soils which may occur during construction or may be caused by repeated external loading of a soil layer system Mostfabrics can act as separators provided they have adequate strength.

Reinforcement

Means the inclusion of the fabric to provide tensile strength, redistribution of stresses and / orconfinement, thereby increasing the stability of a soil mass, reducing earth pressures, or decreasing deformation or susceptibility to cracking.

Fabrics are used to provide containment if they are used to form soil or concrete filled bags, tubes, or mattresses. Fabrics are used to act as a tensioned membrane if it supports loadsacross a gap or plastic zone of soft soil Fabrics may be required to provide cushioning againstlocalized stresses which may cause puncturing or abrasion

If placed on the surface of a slope the geotextile may prevent erosion and dispersion of soil dueto wind, surface runoff or wave action.