

## 5.4 FERROCEMENT

Ferrocement (or Ferro-concrete) is defined as a composite construction material, consisting of cement mortar applied to both sides of a thin wire mesh.

### Materials for Ferrocement

#### 1. Cement and Fine aggregate (Mortar Mix)

- Mortar mix 1:2
- Water/Cement ratio – 0.3 to 0.5

#### 2. Skeletal Steel

- Forms the skeleton of the structure
- 3 to 8 mm steel rods are used
- Used in the form of tied reinforcement or welded wire fabric
- Used to impart structural strength in case of boats, barges etc
- Reinforcement should be free from dust, rust and other impurities

#### 3. Reinforcing Mesh

- Consists of galvanized steel wires of diameter 0.5 to 1.5 mm, spaced at 6 to 20mm c/c.
- Available as woven/interlocking mesh and welded mesh
- Welded wire mesh has hexagonal or rectangular openings
- Expanded-metal lath is also used
- Made from carbon, glass etc.

#### 4. Water

#### 5. Admixture

#### 6. Coating

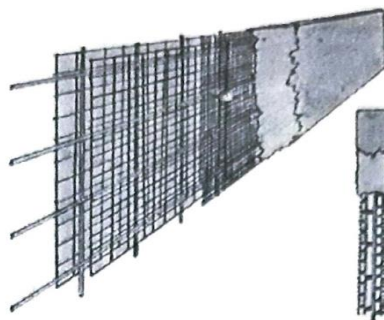
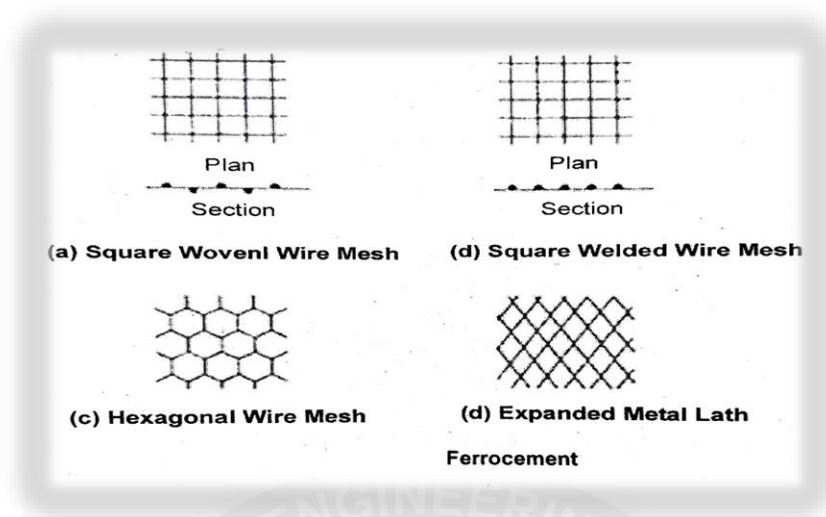


Fig. 5.4. FerroCement



### Process of Ferrocement Construction

- ✓ Fabricating the skeletal framing system
- ✓ Applying rods and meshes
- ✓ Plastering
- ✓ Curing

### Properties of Ferrocement

- Highly versatile form of reinforced concrete
- It's a type of thin reinforced concrete construction, in which large amount of small diameter wire meshes uniformly throughout the cross section.
- Wire mesh may be metal or suitable material.
- Instead of concrete, Portland cement mortar is used.
- Strength depends on two factors, quality of cement mortar and quantity of reinforcing materials used.

### Advantages of Ferrocement

- ❖ Easily available materials.
- ❖ Fabricated into any desired shape.
- ❖ High strength
- ❖ More durability and are cheaper than steel and wood
- ❖ Heavy machineries or techniques required.

- ❖ High corrosion resistance
- ❖ Low labour skill required.
- ❖ Ease of construction, low weight and long lifetime (Low strength to weight ratio)
- ❖ Low construction material cost.
- ❖ Low maintenance cost.
- ❖ Better resistance against earthquake.
- ❖ Execution time at work site is less.
- ❖ Good fatigue behavior
- ❖ Ability to undergo large deflection
- ❖ Improved impact resistance and toughness
- ❖ High fire resistance
- ❖ High Impermeability

### **Disadvantages of Ferrocement**

- Structures can be punctured by collision with pointed objects.
- Corrosion of the reinforcing materials due to the incomplete coverage of metal by mortar.
- It is difficult to fasten to Ferrocement with bolts, screws, welding and nail etc.
- Large no. of labors required.
- Cost of semi-skilled and unskilled labors is high.
- Tying rods and mesh together is especially tedious and time consuming.
- Excessive shrinkage due to higher cement content.
- Needs constant curing for a period of 7 days to avoid any shrinkage cracks
- Low shear strength
- Susceptibility to stress rupture failure

### **Applications of Ferrocement in Construction**

- ✓ Building and structural applications
  - Housing Applications (used as planks for shelves)
  - Residential and Public Buildings
  - Water supply and Sanitary Installations (sewage manhole covers etc.)

- Industrial structures.
- Electrical installations (Boxes for water and Electrical meters)
- Low cost housing
- ✓ Other structures
  - Boats, Fishing Vessels,
  - Barges, Cargo tugs,
  - Catamarans, Yachts and Flotation buoys etc.
- ✓ Marine applications
- ✓ Agricultural applications
- ✓ Rural energy applications
- ✓ Anticorrosive membrane treatment.
- ✓ Transportation structures.
- ✓ Miscellaneous applications
  - Pipes
  - Swimming pools
  - Curved benches for parks etc.

