

NEED FOR STRENGTHENING:

1. Load increases due to higher live loads, increased wheel loads, installations of heavy machinery or vibrations
2. Damage to structural parts due to aging of construction materials or fire damage, corrosion of the steel reinforcement, and impact of vehicles
3. Improvements insatiably for use due to limitation of deflections, reduction of stress in steel reinforcement and reduction of crack widths
4. Special Modification of structural system due to the elimination of walls/columns and openings cut through slabs.
5. Errors in planning or construction due to insufficient design dimensions and insufficient reinforcing steel.

Deflection due to Strengthening of slabs:

The strengthening of slab is taken up only after the strengthening of beams is completed. A reinforced structural concrete topping over the existing slab can be used which provides a composite construction of old and new slabs, with additional depths to slab and beam.

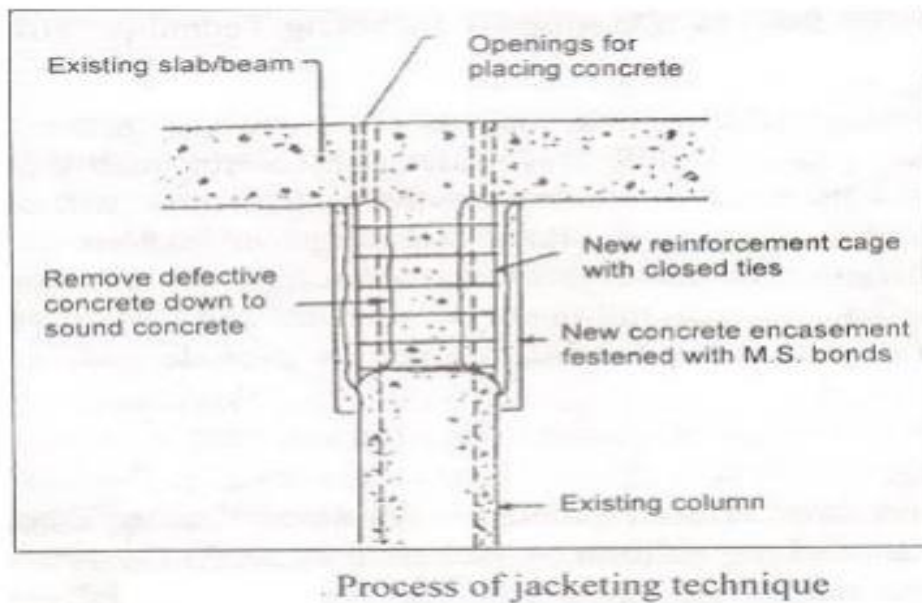
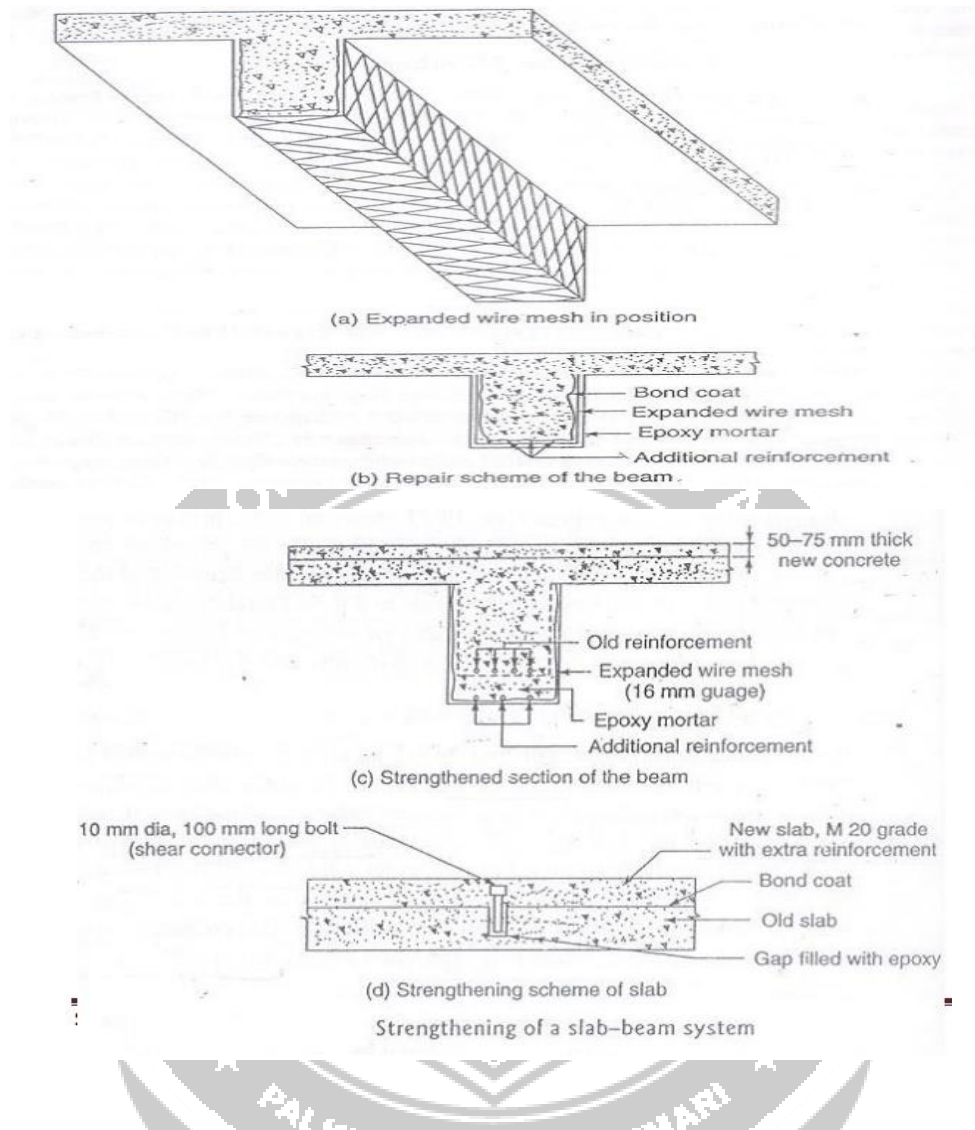
To ensure a good bond between new and old concretes, mechanical anchorage consisting of steel bolts inserted in holes drilled into the slab at suitable intervals may be provided.

The spaces surrounding the holes are filled with **epoxy grout**. A shear connector is embedded for half of its length in old concrete and the remaining half which is projected will subsequently be embedded in new concrete.

Before applying topping the surface of old floor slab should be thoroughly scrubbed and cleaned. Additional reinforcement may be required over the supports, because the old reinforcement at supports acquires a position which is near to the neutral axis of composite section.

After the preparation of old concrete surface, epoxy bond coat is applied on it and while this coat is 25 to 50mm thick M20 grade concrete topping is laid. The thickness of topping is governed by the strength and thickness of old floor slab.

However application of topping increases the dead weight on the slab. With suitable treatment the top layer of topping may be utilized as floor finish etc, After curing the beam and slab for 14 to 21 days props can be removed.



Deflection due to Strengthening of columns

Jacketing is the process of fastening a durable material over concrete and filling the gap with a grout that provides needed performance characteristics.

The column jacket can also be used for increasing the shear strength of column slab connections. When the jacket is provided around the periphery of the column, it is termed a **collar**. In most of the applications, the main function of the collar is to transfer vertical load to the column. Circular reinforcement can be used for load transfer.

The practice of transferring load through dowel bars embedded into columns or shear keys has a disadvantage in that they require drilling of holes for dowels or cutting shear keys which are costly and time consuming, and can damage the existing column. Reinforcement encircling the column can be used to transfer the load through shear friction.

The expansion of collar as it slides along the roughened surface causes the tensioning of circular reinforcement resulting in radial compression, which provide normal force needed for load transfer.

The shear transfer strength is provided by both frictional resistance to sliding and dowel action of reinforcement crossing the crack.

The collar is subjected to shear and bending along the collar circumference as well as direct bearing stress under concentrated load. In addition shear transfer reinforcement, the collar should be provided with reinforcement for shear and moment within collar. Column collars can be provided below the slab to act as column capital to improve punching shear strength of the slab column connection.

