



# IN-SITU PRESTRESSING IN HIGH RISE STRUCTURES

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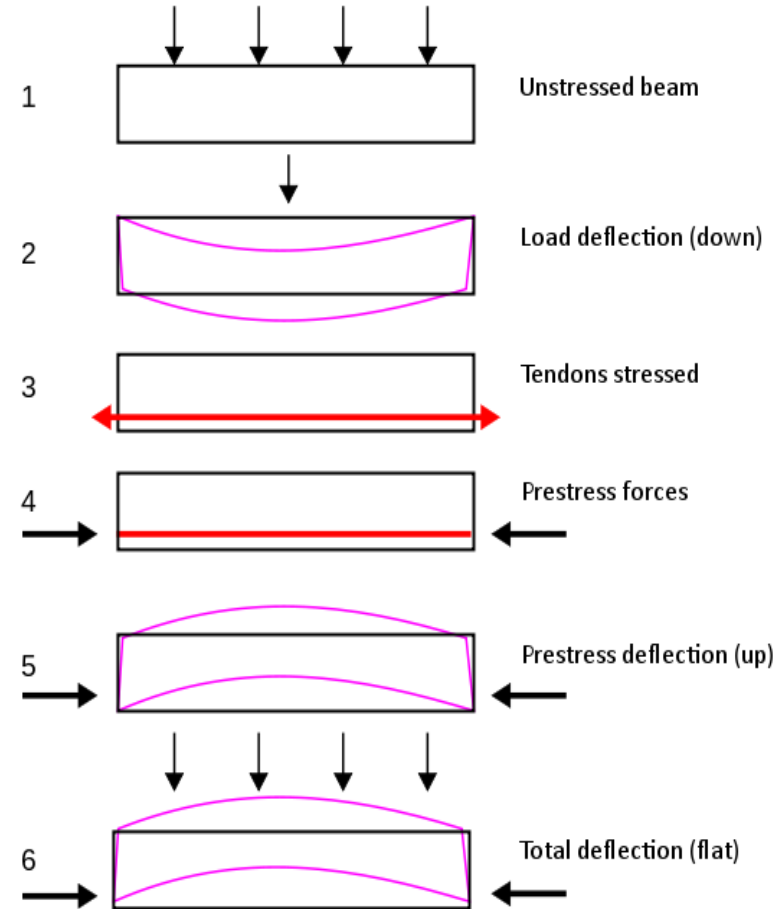
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# PRE-STRESSED CONCRETE

Pre-stressed concrete is a method for overcoming concrete's natural weakness in tension. It can be used to produce beams, floors or bridges with a longer span than is practical with ordinary reinforced concrete. Pre-stressing tendons (generally of high tensile steel cable or rods) are used to provide a clamping load which produces a compressive stress that offsets the tensile stress that the concrete compression member would otherwise experience due to a bending load. Traditional reinforced concrete is based on the use of steel reinforcement bars, inside poured concrete. The basic purpose of pre-stressing is to improve the performance of concrete members and this is achieved by inducing in the beam initial deformation and stresses which tend to counteract those produced by the service loads.



Pre-stressing involves inducing compressive stresses in the zone, which will tend to become tensile under external loads. This compressive stress neutralizes the tensile stress so that no resultant tension exists, (or only very small values, within the tensile strength of the concrete). Cracking is therefore eliminated under working load and all of the concrete may be assumed effective in carrying load. Therefore lighter sections may be used to carry a given bending moment, and pre-stressed concrete may be used for longer span than reinforced concrete.



# ADVANTAGES OF PRE-STRESSING IN HIGH RISE BUILDING



- ❖ Maximum utilization of provided section of the member.
- ❖ Provision of slender member for long span beams as compared to RCC.
- ❖ Use of high strength materials contribute to the durability of the structure.
- ❖ Pre-stresses concrete has considerable resilience and impact resistance.
- ❖ Proves to be economical only in long span beam-column frames compared to other materials.
- ❖ The intermediate distance between the columns can be increased by using pre-stressed concrete as compared to reinforced cement concrete.
- ❖ Architectural design provisions and specifications can be achieved using pre-stressed concrete.
- ❖ Dead weight of concrete is reduced to a higher rate using pre-stressed concrete

# METHODS AND SYSTEM OF PRE-STRESSING

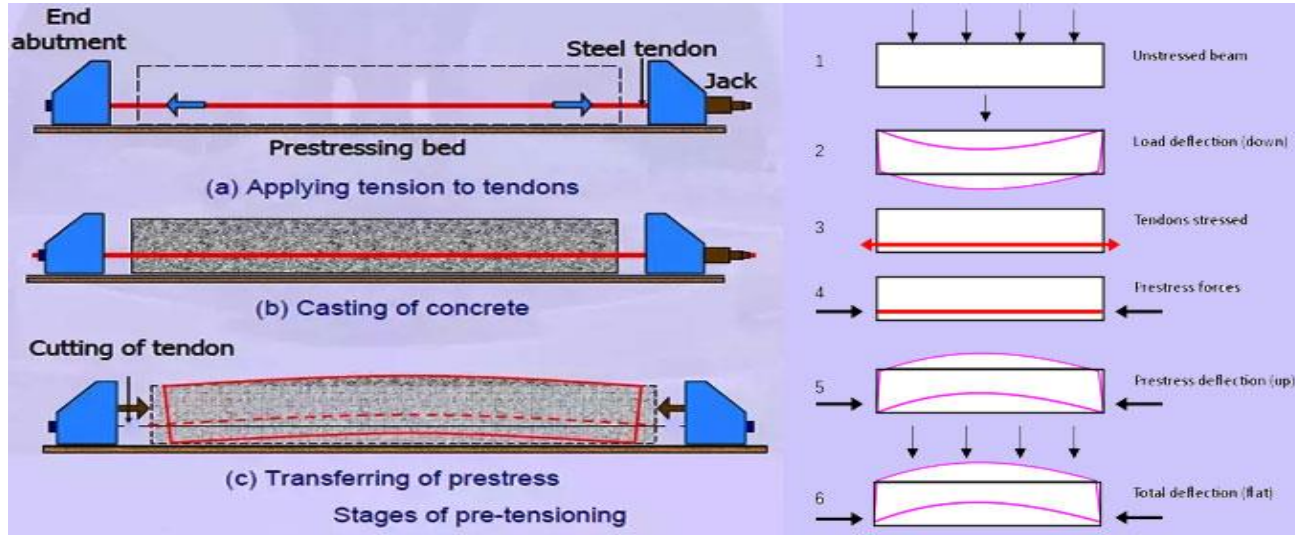
**Pre-cast Pre-tensioned**

**Pre-cast Post-tensioned**



Pre-tensioning is a method of pre-stressing in which the steel tendons are tensioned before the casting of the member. In this method the tendons are tensioned using hydraulic jacks, which bear on strong abutments between which the moulds are placed. After the concrete attains full strength the tendons are released and the stress is transferred to the concrete by bond action.

## PRE-TENSIONING





# Procedure of precast pre-tensioned concreting

Tendons and reinforcement are positioned in the beam mould.

01



Stage 1



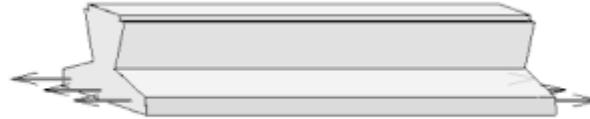
Stage 2

02

Tendons are stressed to about 70% of their ultimate strength.

03

Concrete is cast into the beam mould and allowed to cure to the required initial strength.



Stage 3

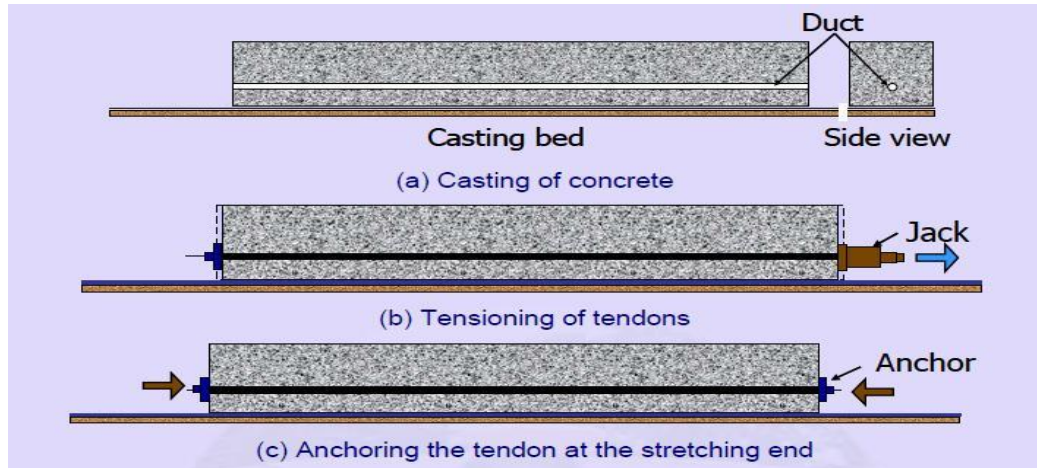
04

When the concrete has cured the stressing force is released and the tendons anchor themselves in the concrete.



Stage 4

Post-tensioning is a method of pre-stressing in which the steel tendons are tensioned after the casting of the member. In this method ducts or sheaths are placed in the required profile in the mould and the tendons are passed through the ducts. After the concrete had attained sufficient strength the tendons are tensioned using hydraulic jacks which bear on the member itself. The stress is transferred to the concrete by bearing action of tendons which are anchored using suitable anchorages. Finally the ducts are grouted and the anchor plates concealed by cement mortar.



## POST-TENSIONING

# Procedure of precast post-tensioned concreting

Cable ducts and reinforcement are positioned in the beam mould. The ducts are usually raised towards the neutral axis at the ends to reduce the eccentricity of the stressing force.

01



Stage 1



Stage 2

02

Concrete is cast into the beam mould and allowed to cure to the required initial strength.

03



Stage 3

Tendons are threaded through the cable ducts and tensioned to about 70% of their ultimate strength

04

Wedges are inserted into the end anchorages and the tensioning force on the tendons is released. Grout is then pumped into the ducts to protect the tendons.



Stage 4

# Equipment used for Prestressing



PULLING PLATE



# QUESTIONS!

**Q1**

Any two Advantages of Prestressing.

**Q2**

Give Procedure for Post-Tensioning.

**Q3**

What are the Equipments used for Prestressing.



**THANK YOU!**