
Postgraduate Certificate in Structural Steel Design

Design of Steel Plate and Box Girders

****AASHTO****: American Association of State Highway and Transportation Officials, a organization that develops standards and guidelines for transportation infrastructure in the United States, including the design of steel plate and box girders.

****Box girder****: A type of bridge girder that consists of a hollow box-shaped cross-section, made of steel plates. It is often used in long-span bridges due to its high strength-to-weight ratio and resistance to torsional forces.

****Camber****: The intentional curvature provided to a steel plate or box girder during construction to counteract the effects of dead load deflection and ensure that the structure is in a level position when it is in service.

****Compression flange****: The top or bottom horizontal flange of a steel plate or box girder that is designed to resist compressive forces.

****Connections****: The components and details used to connect steel plate and box girders to each other and to other structural elements, such as bearings, supports, and diaphragms.

****Corrosion****: The gradual destruction of steel by chemical or electrochemical processes, which can weaken the material and reduce its load-carrying capacity.

****Diaphragm****: A horizontal or vertical steel plate that is used to transfer lateral forces between steel plate and box girders and to provide stability and rigidity to the structure.

****Fatigue****: The process of progressive damage and failure of a material under cyclic loading, which can lead to cracking and fracture of steel plate and box girders.

****Flange****: A horizontal or vertical plate that forms part of the cross-section of a steel plate or box girder and provides additional strength and stiffness to the structure.

****Haunch****: The portion of a steel plate or box girder that is located between the web and the flange and is designed to resist shear and bending forces.

****Hanger****: A steel member that is used to support the weight of a steel plate or box girder and transfer it to the substructure.

****Haunch depth****: The vertical distance between the bottom of the haunch and the bottom of the web of a steel plate or box girder.

****Live load****: The temporary or moving loads that are placed on a bridge, such as vehicles, pedestrians, and wind.

****Moment of inertia****: A measure of the resistance of a cross-section to bending, which is calculated as the sum of the products of the areas of each element and the square of its distance from the neutral axis.

****Neutral axis****: The axis of a cross-section that passes through the centroid of the area and is neither in compression nor in tension under bending.

****Painting****: The application of protective coatings to steel plate and box girders to prevent corrosion and maintain their structural integrity.

****Plate girder****: A type of bridge girder that consists of a series of vertical and horizontal steel plates that are connected to each other to form a stiff and strong structural element.

****Shear lag****: The phenomenon where the distribution of stress in a steel plate or box girder is not uniform and the stress is concentrated near the loaded area, leading to a reduction in the load-carrying capacity of the structure.

****Shear stud****: A threaded steel rod that is welded to the top or bottom flange of a steel plate or box girder and is used to transfer shear forces between the girder and the concrete deck of a bridge.

****Stiffeners****: The vertical or horizontal plates that are used to reinforce and strengthen the webs and flanges of a steel plate or box girder, and to prevent local buckling and deformation.

****Strain hardening****: The process of increasing the strength and hardness of a material by subjecting it to plastic deformation, which can improve the fatigue resistance of steel plate and box girders.

****Tension flange****: The top or bottom horizontal flange of a steel plate or box girder that is designed to resist tensile forces.

****Transverse stiffener****: A vertical plate that is used to reinforce and strengthen the web of a steel plate or box girder and to prevent buckling and deformation under transverse loads.

****Ultimate load****: The maximum load that a steel plate or box girder can carry before it fails or collapses.

****Web****: The vertical plate that forms the central part of the cross-section of a steel plate or box girder and is designed to resist shear forces.

****Web crippling****: The local buckling and failure of the web of a steel plate or box girder under concentrated loads, which can reduce the load-carrying capacity of the structure.

****Web post****: A vertical plate that is used to connect the web and the flange of a steel plate or box girder and to prevent web crippling and deformation under transverse loads.

****Web stiffener****: A horizontal plate that is used to reinforce and strengthen the web of a steel plate or box girder and to prevent buckling and deformation under longitudinal loads.

****Web thickness****: The vertical distance between the top and bottom surfaces of the web of a steel plate or box girder, which affects the strength and stiffness of the structure.

****Web yielding****: The local buckling and deformation of the web of a steel plate or box girder under high loads, which can reduce the load-carrying capacity of the structure.

****Weld****: The fusion of two or more pieces of steel by melting and joining them together, which can improve the strength and durability of steel plate and box girders.

****Weld access hole****: A small hole that is provided in the web of a steel plate or box girder to allow access for welding the flange and the web together, which can improve the strength and durability of the structure.

****Weld toe****: The sharp corner at the intersection of the web and the flange of a steel plate or box girder, which is a critical location for fatigue cracking and failure.

****Yield strength****: The stress at which a material begins to yield or deform plastically under load, which is an important property for the design and analysis of steel plate and box girders.