# Fabrication of Steel Trusses and related BIS Guidelines

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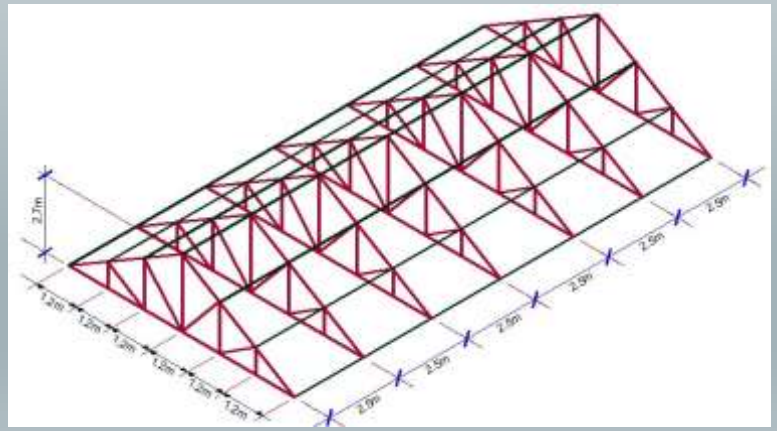
# An Overview

Steel trusses are a type of structural frame that is commonly used in construction projects to support roofs, floors, and bridges. They consist of a series of interconnected triangular elements, which work together to create a strong and stable structure. Steel trusses are made from high-quality steel, which gives them the strength and durability necessary to support heavy loads and withstand environmental stresses.



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01. **Design**

Design to meet the specific needs of the project

02. **Material Selection**

The appropriate type and grade of steel are selected

03. **Cutting**

The steel components are cut and shaped into the required sizes and shapes

04. **Welding**

The individual pieces are then welded together

05. **Assembly**

The welded truss components are then assembled on-site

06. **Finishing**

The finished truss is inspected to ensure that it meets the required specifications.

## Designing

The first step in the fabrication process is to create a design for the steel trusses using computer-aided design (CAD) software. The design must take into account the required strength, span, and load-bearing capacity of the trusses, as well as any environmental factors that may affect the trusses' performance.

## Material Selection

Once the design is complete, the appropriate type and grade of steel must be selected. This decision will be based on a range of factors, including the required strength, the intended use of the trusses, and the expected environmental conditions.

# Cutting Process

Cutting is a crucial step in the fabrication of steel trusses, as it determines the accuracy of the final product. The cutting process involves transforming steel into the required shape and size for the truss components. Here are the common methods of cutting steel trusses:

## Sawing

Sawing is a traditional method of cutting steel trusses. A metal saw with a high-speed blade is used to cut through the steel, producing accurate and smooth cuts. However, sawing can be a slow process and may not be suitable for thicker or more complex steel components.

## Plasma Cutting

Plasma cutting is a newer method of cutting steel trusses that uses a high-temperature plasma arc to melt through the steel. The molten metal is then blown away, leaving a clean and precise cut. Plasma cutting is a fast and accurate method of cutting steel trusses, and is suitable for both thick and thin steel components.

# Laser Cutting

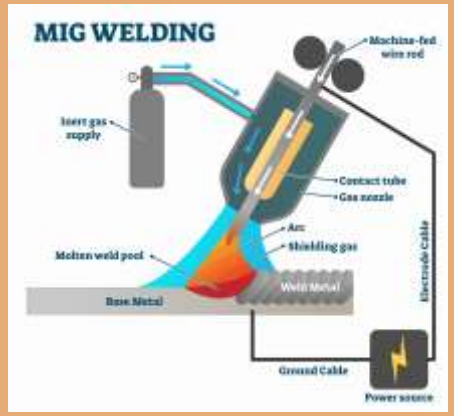
Laser cutting is a highly accurate method of cutting steel trusses that uses a high-powered laser beam to melt through the steel. The laser beam is guided by a computer program, producing precise and clean cuts. Laser cutting is suitable for both thick and thin steel components and is often used for complex shapes and designs.

# Welding

Welding is a critical step in the fabrication of steel trusses, as it involves joining individual steel components together to create a structurally sound truss. Here are the common welding methods used in the fabrication of steel trusses:

## MIG Welding

MIG (Metal Inert Gas) welding is a common method of welding steel trusses. It involves using a welding gun that feeds a wire electrode through the gun and into the weld joint. The wire electrode melts and fuses with the steel components, creating a strong and durable bond. MIG welding is fast, efficient, and suitable for both thick and thin steel components.



# Welding

## Stick Welding

Stick welding, also known as Shielded Metal Arc Welding (SMAW), is a traditional method of welding steel trusses. It involves using a welding electrode that is coated in flux. The electrode is then melted and fused with the steel components, creating a strong and durable bond. Stick welding is suitable for thick steel components and is often used in outdoor or remote locations.

# Assembly

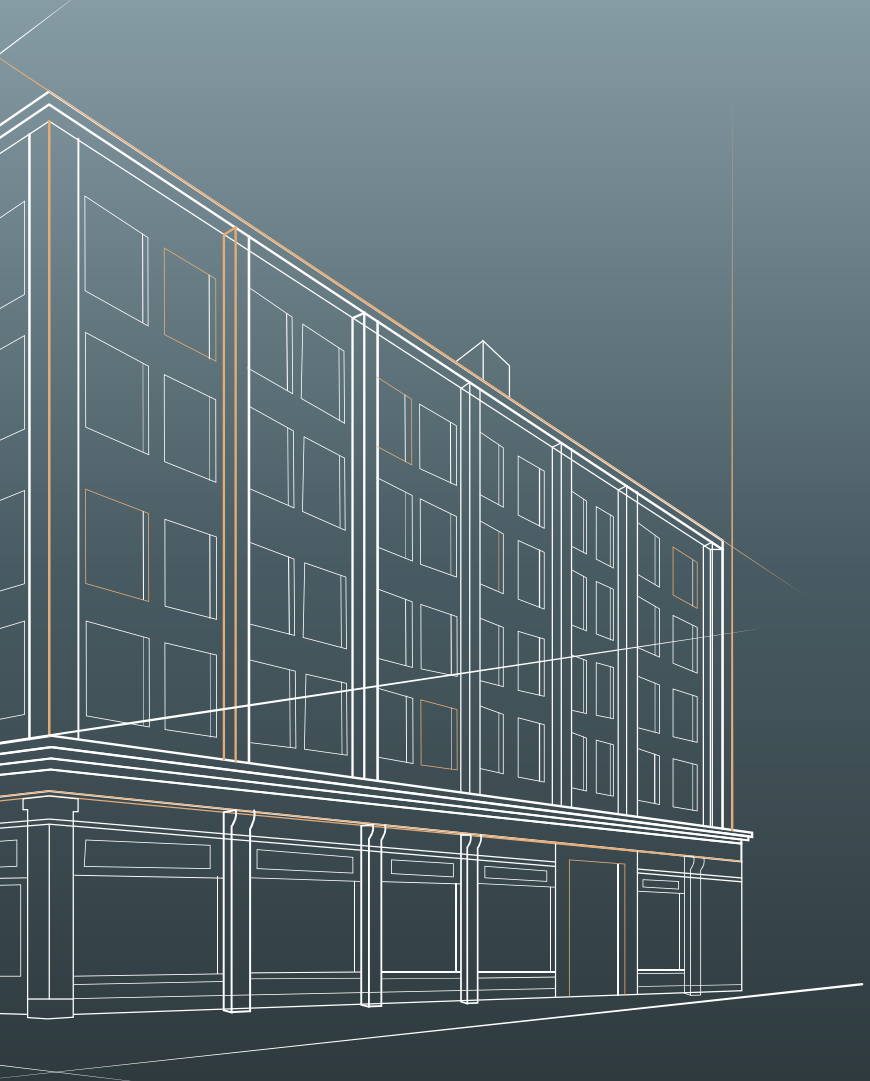
Assembly is a critical step in the fabrication of steel trusses, as it involves joining the individual steel truss components together to create the final truss structure.

The assembly process can vary depending on the complexity of the steel truss design and the chosen fabrication method. Proper assembly techniques are essential to ensure that the final steel truss is structurally sound and able to meet the intended load requirements.


# Finishing

It helps to protect the truss from corrosion and other environmental factors. Here are some common methods of finishing steel trusses:

- **Painting**: Painting is a common method of finishing steel trusses. It involves applying a layer of paint to the truss to protect it from moisture and corrosion.
- **Powder Coating**: Powder coating is another method of finishing steel trusses. It involves applying a layer of dry powder to the truss, which is then heated to create a smooth, durable finish.
- **Galvanizing**: Galvanizing is a process of coating steel with a layer of zinc to protect it from corrosion. It involves dipping the steel truss into a bath of molten zinc to create a durable, corrosion-resistant coating.



# BIS Guidelines for Fabrication of Steel Trusses

# ➢ Straightening

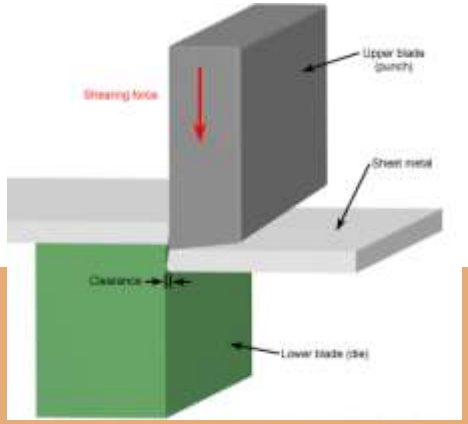
**Material shall be straightened or formed to the specified configuration by methods that will not reduce the properties of the material below the values used in design. Local application of pressure at room temperature or other thermal means may be used for straightening.**

## ➢ Clearances

- In bearing type of connections, the holes may be made not more than 1.5 mm greater than the diameter of the bolts.
- In case of bolts diameter less than 25 mm and not more than 2mm.
- The hole diameter in base plates shall not be exceed the anchor bolt diameter by more than 6mm.
- In friction type of connection clearance may be maintained.

# CUTTING

- It can be effected by sawing, shearing, cropping, matching or thermal cutting process.
- Shearing, cropping and gas cutting shall be clean, reasonably square, and free from distortion.
- Planning or finishing of sheared or gas-cut edges of plates or shapes shall not be required, unless specially noted on drawing or included in stipulated edge preparations for welding or in following sections.
- Corners shall be free from notches and shall have largest practical radii with a minimum radius of 15 mm.

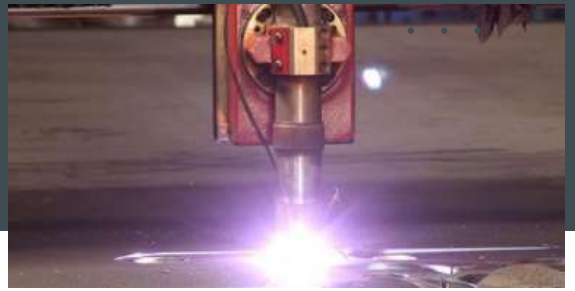



# SHEARING

Shearing of items over 16mm thick to be galvanized and subject to tensile force or bending moment shall be not carried out, unless the item is stress relieved subsequently.

# THERMAL CUTTING

Gas cutting of high tensile steel by mechanically controlled torch may be permitted, special care is taken to leave sufficient metal to be removed by matching. Except where the material is subsequently joined by welding, no load shall be transmitted through a gas cut surface.



# HOLING

- The holes are punched 3mm less in diameter than the required size and reamed after assembly to the full diameter.

- The thickness of material punched shall be not grater than 16mm. For dynamically loaded structures, punching shall be avoided.

# ADVANTAGES OF STEEL TRUSSES

- It is easy and quick to erect as compared to timber framing.
- It has high strength.
- Properties of steel- it does not require drying out or maintenance.
- Steel roof truss can be lighter than wooden rafter framing.
- Moisture resistance- this prevents the appearance of mould or fungi and high resistance to adverse weather conditions.
- At production stage, steel elements are covered with special additional protective and anti- corrosive coatings.

# ➢ DISADVANTAGES OF STEEL TRUSSES

- Corrosion proofing must be carried out. If the protective coating is scratched , it will become susceptible to corrosion.
- Regular inspections are required.
- Due to low weight , heavy roofing such as cement tiles, cannot be laid on it.
- Steel trusses cost more than their wooden counterparts.
- As individual finished elements are large, transporting them to the construction site can be challenging.

# Questions

Q. Name different methods of cutting of steel trusses.

Q. How does stick welding differ from MIG welding ?

Q. Give any 2 advantages and disadvantages of steel truss?

Q.  What are guidelines for fabrication of steel trusses?