

SITE VISIT REPORT ON STEEL SECTIONS AND PLATE GIRDER

Title: - Visit to understand Steel Structure Sections and Plate Girder.

Date of Visit: - 17/10/2024

Address of Site: - Kimaya Steel, Manori, Dhakambe-Ashewadi link Road, Dindori Road, Nashik, 422004.

Guided by: - Mr. Sagar Sonar (Production Engineer), Mr. Omkar Dabale (Quality Engineer),
Mr. Amol Kulkarni (HR Manager)

No. of students visited: - 27

Name of visit coordinator: - Ms. Madhuri. Z. Khairnar & Ms. Vaishali Z. Khairnar



Photo 1: Group photo along with team Kimaya Steel

❖ **INTRODUCTION:**

The Department of Civil Engineering of Sanghavi College of Engineering, Nashik organized one day visit to Kimaya steel, Dindori road, Nashik on 17th Oct. 2024 for the third year student of Civil Engineering (BE) program.

The visit was organized with the prior permission of honorable Director of SCOE Dr. P. A. Zavar, Principal Dr. B. S. Shirole and HOD of Civil Department Mr. T. H. Boraste. Students of B.E Civil takes hard efforts and initiative under the guidance of Ms. Madhuri Khairnar and Ms. Vaishali Khairnar, which makes this visit a grand success.

❖ **OBJECTIVE OF VISIT:**

1. This course is designed to provide understanding of IS code provisions, fundamentals of structural steel design and its applications for design of various components.
2. Students should be able to understand components of steel structures and its arrangements.
3. Student should be able to design beams, columns, column footings, roof trusses, gantry girder and plate girders.

❖ **INTRODUCTION ABOUT KIMAYA STEEL**

Kimaya Steel is a leading steel fabrication company specializing in designing and manufacturing steel structures for various industries. Kimaya Steel was established in the year 2014 at Nashik, Maharashtra. It is a Partnership based firm, engaged as the foremost manufacturer of Roof Sheds, Industrial Storage, Pre-Engineered Structures. These products are high in demand due to their premium quality, seamless finish, different patterns and affordable prices. Furthermore, they ensure to timely deliver these products to their clients, through this they have gained a huge clients base in the market. By providing quality product and having experienced knowledge of the market, they have been able to attain huge client base.

Factors responsible for their enormous success are as follows:

1. In-depth industry knowledge
2. Timely completion of orders
3. Transparent business dealings
4. Qualified and trained team of professionals Market leading prices.



Photo 2: Team Kimaya Steel giving information to students about Company & Manufacturing Process

❖ STEEL STRUCTURES

Steel structure is a metal structure which is made of structural steel components connect with each other to carry loads and provide full rigidity. Because of the high strength grade of steel, this structure is reliable and requires fewer raw materials than other types of structure like concrete structure and timber structure.

In modern construction, steel structures are used for almost every type of structure including heavy industrial building, high-rise building, equipment support system, infrastructure, bridge, tower, airport terminal, heavy industrial plant, pipe rack, etc.

It is steel construction material which fabricated with a specific shape and chemical composition to suit a project's applicable specifications.

Depending on each project's applicable specifications, the steel sections might have various shapes, sizes and gauges made by hot or cold rolling, others are made by welding together flat or bent plates. Common shapes include the I- beam, HSS, Channels, Angles and Plate.

❖ **Advantages of using steel structure:**

1. **Cost saving:**

Steel structure is the cost leader for most projects in materials and design. It is inexpensive to manufacture and erection, requires less maintenance than other traditional building methods.

2. **Creativity**

Steel has a natural beauty that most architects can't wait to take advantage of. Steel allows for long column-free spans and you can have a lot of natural light if you want it in any shape of structures.

3. **Control and Management**

Steel structures are fabricated at factory and rapidly erected at construction site by skilled personnel that make safe construction process. Industry surveys consistently demonstrate that steel structures are the optimal solution in management.

4. **Durability**

It can withstand extreme forces or harsh weather conditions, such as strong winds, earthquakes, hurricanes and heavy snow. They are also unreceptive to rust and, unlike wood frames, they are not affected by termites, bugs, mildew, mold and fungi.



Photo 3: Students are learning the basics of Steel Structures

❖ CNC plasma machine

A CNC plasma machine uses a plasma cutter to cut thin to thick metals along a multi-axis grid. The CNC method provides an advantage over handheld plasma cutting tools due to the cut being programmed and controlled by a computer instead of human motion. CNC plasma is where high speed and precision meet low cost – among a vast array of additional benefits.

The CNC plasma machine's versatility is one of its key advantages, as it is an effective way to cut both thin and thick materials. It is commonly used to cut a wide range of metals, including:

- Steel
- Stainless steel
- Aluminium
- Copper
- Brass



Photo 4: Students are taking information about Plasma cutting machine and learning the use of plasma cutting machine.

❖ Submerged-arc welding (SAW)

Submerged-arc welding (SAW) is a common arc welding process that involves the formation of an arc between a continuously fed electrode and the work piece. A blanket of powdered flux generates a protective gas shield and a slag (and may also be used to add alloying elements to the weld pool) which protects the weld zone.

Welding is checked by the welding gauge. Then provided the hole by machine for bolted connection. They provide alternate welding, because they don't bend easily, and their life increases.



Photo 5: submerged arc welding machine (SAW)

❖ **H Beam Welding Machine**

PEB H Beam Fabrication machine is used to convert or fabricate H Beams from individual Plates. As the whole welding is done in H – configuration. It is so called H Beam Fabrication Line.

H Beams can be fabricated from pre-cut lengthy plates called Flange Plates & Web Plates. These Flange & Web plates required are pre-cut from standard available steel plates of industrial stock sizes by either shearing or Plasma / Oxy Fuel Cutting process.

The Pre Cut Flange & Web Plates are loaded on to the inlet conveyor for further Beam Fabrication processes. The plates are fed to the “H Beam Tack welding station” for doing single point entry level tacking between the 2 Flanges & the Web to form an H configuration.



Photo 6: Process of Submerged-arc welding (SAW)



Photo 7: Students Learned welding on H Beam Welding Machine

❖ **Blast cleaning**

Blast cleaning is the most comprehensive method for the removal of mill-scale and rust on steel Surfaces. The method involves the use of high-velocity abrasive particles from a jet stream of Compressed air or centrifugal impellers to ‘blast’ clean the steel surface.



Photo 8: Students are learning the use of blast cleaning

❖ **Painting**

Painting is a protective layer of base metal, which is also a cost-effective method to keep metal from rusting and corrosion. It can prolong the service life of the base metal.

A SITE VISIT REPORT ON STEEL STRUCTURE SECTIONS AND PLATE

On the other hand, the steel will look great if it is painted with colorful coatings.

1. Things to Do Before Painting Metal Surfaces

- a) Clean the Metal Surface. Prior to painting, metal surfaces must be free from any dirt, grease, old paint, and rust.
- b) Eliminate Loose or Peeling Paint.
- c) Get Rid of Rust Deposits.
- d) Apply the Right Primer.

2. First apply the primer, after 4 to 5 hours apply paint. Primers serve as the foundation for the chosen coating system, and in the case of metals deliver corrosion protection for the asset. They help the final coating adhere to the surface, increase paint durability and can hide or fill in some surface defects.

Before beginning to apply the primer and final coat on the structural steel, the first thing that you need to do is to clean the steel sections. Dirt, dust, debris, liquids, and other substances can cause damage to the steel surface, which can compromise different sections of painted steel if not cleaned properly. Using cleaning solutions like soap and degreasers would be able to remove any substance present on steel. For the best effect, using hand tools can help make the process more efficient, and ensure that the surface would be kept dry after cleaning.

It is best to thoroughly clean all parts of the steel section that will be painted to prevent any substances affecting the primer and paint during the process. Once it has been cleaned, the next step is to apply the primer to begin the painting process.



Photo 9: Student are learning the final coat of painting



Photo 10: Students are learning the purpose and method of painting

❖ **PLATE GIRDER**

A plate girder is a built up I-beam section, used to carry heavy loads which cannot be carried economically by rolled I-sections. It is made by riveting or welding the steel plates in I-beam shape.

- Components of Plate Girder

The components of typical plate girder are as follows:

1. Web
2. Flanges
3. Stiffeners

1. Web

The deep central vertical plate is called as a web in plate girder. It separates the two flange plates by a required distance. Web is responsible to resist shear developed in the plate girder.

2. Flanges

Flanges or flange plates are horizontal elements of plate girder which are provided at the top and bottom and they are separated by the web. The main purpose of flange plates is to resist the bending moment acting on the girder.

The top flange resists the bending moment by developing compression and the bottom flange resists the tensile force. They should be provided with a required width and thickness to offer good resistance against bending moment.

3. Stiffeners

Stiffeners are classified into two types:

1. Vertical Stiffeners
2. Horizontal Stiffeners

Vertical Stiffeners

Vertical stiffeners are provided at right angles to the flanges and they are also called as transverse stiffeners. These are again classified into two types namely end stiffeners and intermediate stiffeners based on their position in the plate girder.

End stiffeners are provided at both the ends of the girder. They receive the load from the beam and transfer it to the support. In plate girder, some part of the end portion of the web is subjected to compressive loads. Due to these loads, the web of the section may get crushed. Here, the end stiffeners play an important role by keeping the web safe from crushing. End stiffeners are also called as bearing stiffeners.

Intermediate stiffeners are required when there are concentrated loads acting on the plate girder. When the thickness of the web is very less (less than $1/85$ th of the depth of the web), then the web may buckle due to shear. In that scenario, intermediate stiffeners are provided in order to improve the buckling strength of the web.

Horizontal Stiffeners

Horizontal stiffeners are provided in parallel to the flange plates. They are also called as longitudinal stiffeners. These stiffeners will improve the buckling strength of the web portion. Horizontal stiffeners are either continuous or discontinuous.

Continuous horizontal stiffeners connect all the traverse stiffeners and also take load coming from the flange and web portions. Discontinuous horizontal stiffeners are provided between the traverse stiffeners without touching them. They do not take any

load coming from the flange or web portion, they just provide buckling resistance to the web.



Photo 11: Plate Girder

❖ Gantry Girder

The gantry girders are girders that hold the loads that are carried through the moving wheels of the crane. The crane girder length from column to column does not own any lateral support at the moderate points except when a walkway is made at the top of the girder. In a manufacturing plant, it is essential to keep an overhead traveling crane to transfer heavy parts of machines from one end to another end.



Photo: Gantry girder

❖ **CONCLUSION**

The visit to Kimaya Steel was a valuable educational experience for the students, bridging the gap between theoretical knowledge and practical application in the field of civil engineering. The insights gained from industry experts will undoubtedly enhance their understanding of steel as a fundamental material in construction.

Prof. M. Z. Khairnar

Visit Co-ordinator

Prof. T. H. Boraste

HOD

Prof. Dr. B.S. Shirole

Principal