INSTITUTE OF TECHNOLOGY

A TECHNICAL REPORT ON THE STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

UDERTAKEN AT: YOLAS CONSULTANT.

5, OGBEHA ROAD, GRA. ILORIN, KWARA STATE.

BY

TAJUDEEN SAHEED OPEYEMI

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DEPARTMENT OF CIVIL ENGINEERIING,

INSTITUTE OF TECHNOLOGY,

KWARA STATE POLYTECHNIC, ILORIN

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ACKNOWLEDGEMENT

My sincere thanks to the King of all kings, the sustainer of my being and the reason I am all that I am, to the king of the angel armies. I am exceedingly grateful to be able to participate in this SIWES program.

To my number one fan that always got my back, Mummy, thanks for all you do. You are just the BEST. Cheers to more wins and milestones together, the sky is just the starting point!

To my ever supportive brother, thanks for always been there for me. I am blessed to have you sir.

To Engineer Ade, thank you, sir for taking me as your brother and making sure I get the best of all you can offer. I promise to make you proud.

To Samson, TAYE, Joshua,SEUN, Gbolahan and Ayo. Thanks for all the time we had together. We will all meet at the top.

To all Tajudeen family, thanks for praying and looking out for me and helping in every way you can. I am glad to be part of this great family, thanks for always checking up on me. Together we can.

To Civil Engineering sets 2023/2024, thanks for information right on time and cooperating as group. I see potential in this set and can't wait to see professional Engineers amidst us.

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CHAPTER ONE

1.1 INTRODUCTION TO SIWES

The Student Industrial Work Experience Scheme (SIWES) is a skill training program design to expose and prepare students of Universities, Polytechnics, Colleges of Technology, and Colleges Agriculture and or Colleges of Education for the Industrial work experience, they likely to meet after graduation. The scheme also affords students the opportunity of familiarizing and exposing themselves to the needed experience in handling equipment and machinery that are usually not available in their institute. Before the establishment of the scheme, there was a growing concern among industrialists that graduate of tertiary institution lack adequate practical background (studies) preparatory for employment in industries. Thus, the employers were of the opinion that the theoretical education going on in institutions of higher learning was not responsive to their needs. It is against this background that the rationale for initiating and designing the scheme by the fund during its formative years-1973/74 was introduced to acquaint students with the skills of handling employer's equipment and machinery. The ITF solely funded the scheme during its formative years. But as the financial involvement becomes unbearable to fund, it withdrew from the scheme. The federal government handed over the scheme in 1979 to both the National Universities Commission (NUC) and the National Board for Technical Education (NBTE). Later, the Federal Government in November 1984 reverted the management and implementation of the SIWES programme to ITF and it was effectively taken over by industrial training fund in July 1985 with the funding being solely borne by the Federal Government.

SIWES is a tripartite programme involving the students, the Polytechnic and the industry (employer of labour). The programme is funded by the Federal Government of Nigeria and jointly coordinated by Industrial Training Fund (ITF) and National Board for technical Education (NBTE).

1.2 AIMS AND OBJECTIVES

Specifically, the objectives of the Students Industrial Work Experience Scheme (SIWES) are to:

- Provide an avenue for students in institutions of higher learning to acquire industrial skills and experience in their course of study, which is restricted to Engineering and Technology including Environmental studies and other courses that may be approved. Courses like, NCE (Technical), NCE Agriculture, NCE Business, NCE (Fine and Applied Arts) and NCE (Home Economies) in colleges of Education are also included.
- Prepare students for Industrial Work Experience they are to undergo after graduation
- Make transition from school to world of work easier and enhance students contacts for later job placement
- To Enlist and strengthen employer's involvement in the entire education process and prepare students for employment in Industry and commerce
- To satisfy accreditation requirement set by the NBTE.
- To provide student opportunity to see the real World of theirs

CHAPTER TWO

1.1 BRIEF HISTORY OF YOLAS CONSULTANT

YOLAS CONSULTANT was established in July 2015 as general construction company with an aim to serve the nation professionally. We provide full contracting and construction services in Building / Civil Construction.

Electrical, Mechanical and infrastructural services. Their project services inclusive of consulting services. These services include: On-time delivery, Quality service, Professional and ethical conduct, Personal commitment and dedication.

CHAPTER THREE

3.1 INTRODUCTION TO ARCHITECTURAL DRAWING

An architectural drawing is a sketch, plan, diagram, or schematic that communicates detailed information about a building. Architects and designers create these types of technical drawings during the planning stages of a construction project.

Architecture drawings are important for several reasons:

- They help owners and project planners understand how a building will look and function when it's finished.
- They give necessary information and instructions so the construction crew can build the structure.
- And finally, an architect's drawings provide a detailed record of the inner workings of a building, which is necessary for future maintenance.

Throughout the project, you'll need to create different types of architectural drawings

Types of Architecture Drawings:

The road to a completed project starts with a detailed set of architecture plan drawings. Here are 11 common types of drawings you might need.

1. Site plan drawings

The site plan provides an aerial view of the building and its surrounding property. Sometimes it'll even show neighboring buildings or infrastructure like roads.

Site plans are important for showing exactly how the structure is positioned concerning the property boundaries. Also, the site plan drawings can give detailed info and dimensions for landscaping features, driveways, patios, and other outdoor design elements.

With modern home design software like Cedreo, you can even create 3D site plans that show the landscaping design along with a 3D floor plan drawing of the home's interior.

3D architecture drawings like that make a nice addition to your project proposals!

2. Floor plan drawings

Floor plan drawings show a structure's internal layout. Floor plan layouts also come in a wide variety of types depending on how they'll be used.

For example, some floor plan drawings are made to feature specific design elements like electrical or plumbing systems.

The most common building floor plans for residential construction projects are drawings that show detailed measurements between walls, doors, and windows. Most will also show the surface area calculations for each room. These types of architectural drawings are essential for creating estimates and building a home according to the architect's specifications.

In the past, floor plans used to be limited to simple, black and white 2D layouts. But drawings like that are hard for a lot of clients to understand.

Now with programs like Cedreo, you can create 3D floor plans complete with furnishings, flooring, painting, and decorations. These are good for helping clients understand and get excited about the project.

3D floor plan designed with Cedreo

3. Cross-sectional drawings

Cross-section drawings are 2-dimensional drawings that show a combination of visible and hidden elements in a building. Imagine that you've sliced part of the building in half along a vertical plane and are looking at the inside. That's a cross-section or sectional drawing.

Cross-section architecture drawings are useful for showing how certain parts of a building are put together. They can show things like:

- How walls should be built
- How windows fit into a wall section
- Structural transitions from one floor to the next

4. Elevation drawings

An architecture elevation drawing is created from a vertical plane looking straight at the building. The most common elevation drawings are ones that show the exterior of the building from the front, back, and sides.

Architects can also create elevations similar to cross-sectional drawings that show an interior view from a vertical plane. These help show a 2D view of cabinets, doors, and windows.

5. Finishing drawings

These architecture drawings show detailed views of the finishes. With them, architects can communicate detailed information regarding the type of floor coverings, moldings, textures, and colors.

6. Landscape drawings

   Landscape drawings are really common to see in residential construction projects. They're similar to the site plan mentioned earlier but show more detail related to the hardscapes and greenery.

   It's important to have some 2D landscape drawings for showing the overall layout and measurements. But 3D drawings are also really helpful for understanding how the greenery looks in real life.

   And with a program like Cedreo, you can even create 3D renderings that show how a landscape design looks at sunset with the exterior lighting turned on!

7. Detail drawings

   Detail architecture drawings are usually a combination of small cross-section drawings and up-close views of a small part of the building.

They're really important for showing how various elements come together in critical parts of the building.

8. Asbuilt drawings

   As-built drawings (or just "as-builts" for short) are revised drawings that show any differences between the original plans and how the building was constructed.

9. Excavation drawings

   Excavation drawings provide detailed information regarding trenches, pits, shafts, tunnels, and other types of soil removal. In these drawings, architects can also show important details about the excavation process.

10. Location drawings

    Location drawings are a general category of drawings that can include a combination of floor plans, elevations, and cross-sections. Sometimes called "general arrangement drawings" these architectural plans show the general location of different construction elements.

11. Design drawings

    Design drawings show the aesthetics and overall flow of a space. In the past, architects and designers would create sketches that showed 3D views of the finished project. Nowadays, architects use 3D design and rendering software like Cedreo to do that for them.

Steps in the Architectural Drawing Process

Whether you want to design a skyscraper or a residential home, you'll need to use the same basic drawing process. Here are the main steps that follow architectural drawing standards.

Site plans

The first step is to start with the site plan. An accurate site plan with the property's boundaries, topography, and existing features helps you determine the size and shape of the building you can put on that property.

Floor plans

The floor plan layout stage is one of the most important steps. Everything else — lighting, plumbing, HVAC, etc. — is based largely on the floor plan.

As you create the floor plan and finalize the overall dimensions of the building, you'll need to create a combination of 2D and 3D drawings.

2D

The 2D plans are the cornerstone of your architectural drawings. It's important to create 2D plans with measurement markups, symbols for doors and windows, and even furniture diagrams.

However, if you're presenting a project proposal to a client for approval, you're going to need to do more than just 2D plans.

3D

3D architectural drawings make your project proposals stand out. Plus, they're one of the best ways to effectively communicate your ideas to your clients.

You can outsource your 3D work, but it's a lot less hassle to use a program like Cedreo that lets you simultaneously create 2D and 3D plans.

Once your clients approve the final project, you can move on to the more detailed drawings that you need for construction.

Sections

Now it's time to create some section drawings. For residential construction projects using standard building methods, you probably won't need a lot of section drawings. That's because the tradesmen already know how the different building elements fit together.

Elevations

The final step is creating the exterior building elevations. These drawings will show important details about the building's facade — exterior surface materials, window and door finishings, measurements, etc.

3.2 SITE VISITATION

A site visit is a physical inspection of a construction site. It's an opportunity for the project team behind the build to see the work in progress and to identify any potential problems.

They can be conducted by the project manager, the engineer, the architect or any other member of the project team.

There are many benefits to conducting site visits. They can help to:

- Ensure that the project is on schedule and within budget.
- Identify and address any potential problems.
- Communicate with the client and the contractor.
- Gain a better understanding of the project.
- Build relationships with the client and the contractor.

How to plan and coordinate a site visit

Planning and coordinating a site visit can be a bit of work, but it's important to do it properly in order to get the most out of the visit. Here are a few tips:

- Set a clear purpose for the visit. What do you hope to accomplish by going to the site?
- Identify who needs to attend. This will depend on the purpose of the visit, but make sure those going are doing so for a reason.
- Make sure to schedule the visit for a time when the site is accessible and the work is in progress.

3.3 INTRODUCTION TO FEATURES ON ARCHITECTURAL DRAWING

Architectural drawings typically contain the following:

Foundations

A foundation plan drawn using quality architecture supplies provides an overview of the project with essential structural information, such as:

- The type and width of the foundation wall
- The size of the footings

- Details about point loads
- Construction techniques

Floor Plans

An architect draws these plans as a horizontal cross-section, showing the rooms, doors and windows. They contain a great deal of essential information. Indicate the size of each room, the location of appliances, plumbing fixtures, fireplaces and more. Include particulars about things like the framing components, materials, fixtures and cabinets. A floor plan will also specify information about garages, decks and other exterior features and demonstrate how the building meets fire code.

Windows and Doors

Sometimes, an architect may create framing sheets for walls, windows, doors and floors separately. This information could be in the form of a drawing or a document.

Elevations

This plan provides a visual aid with information about ceiling heights, exterior finishes and the roof slope. It has scaled views of the building's outside, displays overhangs and the necessary techniques and materials to finish the exterior. An elevations plan details how it complies with codes and lists the roof slope ratio.

Roof Framing

These plans enable the builder to see details about the elements used to frame the roof, including each structural member's size and location. Also included are connectors, venting, overhangs and the rafter's size and spacing.

Section Views

This plan type contains precise information about the design and construction features, such as floors, walls and heights, including large and small cross-section views to show various vital components. It is critical to include all particulars and structural details with any necessary notes.

Construction Details

Include a drawing plan for any additional architectural details, if needed. You can include assembly information about junctions and connections and highlight areas that require different materials or need attention. These detailed drawings can also show building code requirements and other crucial information. Some architectural plans need less of these added specifics than others, but it is often best to offer as many details as possible.

3.4 SECTIONAL VIEW OF DRAWINGS

A section is a scaled drawing of a building which has been cut or sliced along a plane which is identified in the floor and roof plans. This plane is called a section plane which is represented by a section line.

They give us more detail about the drawing as they show the relationship between various parts of a building. They reveal how foundations, walls, floors, staircases and roofs are all connected to one another.

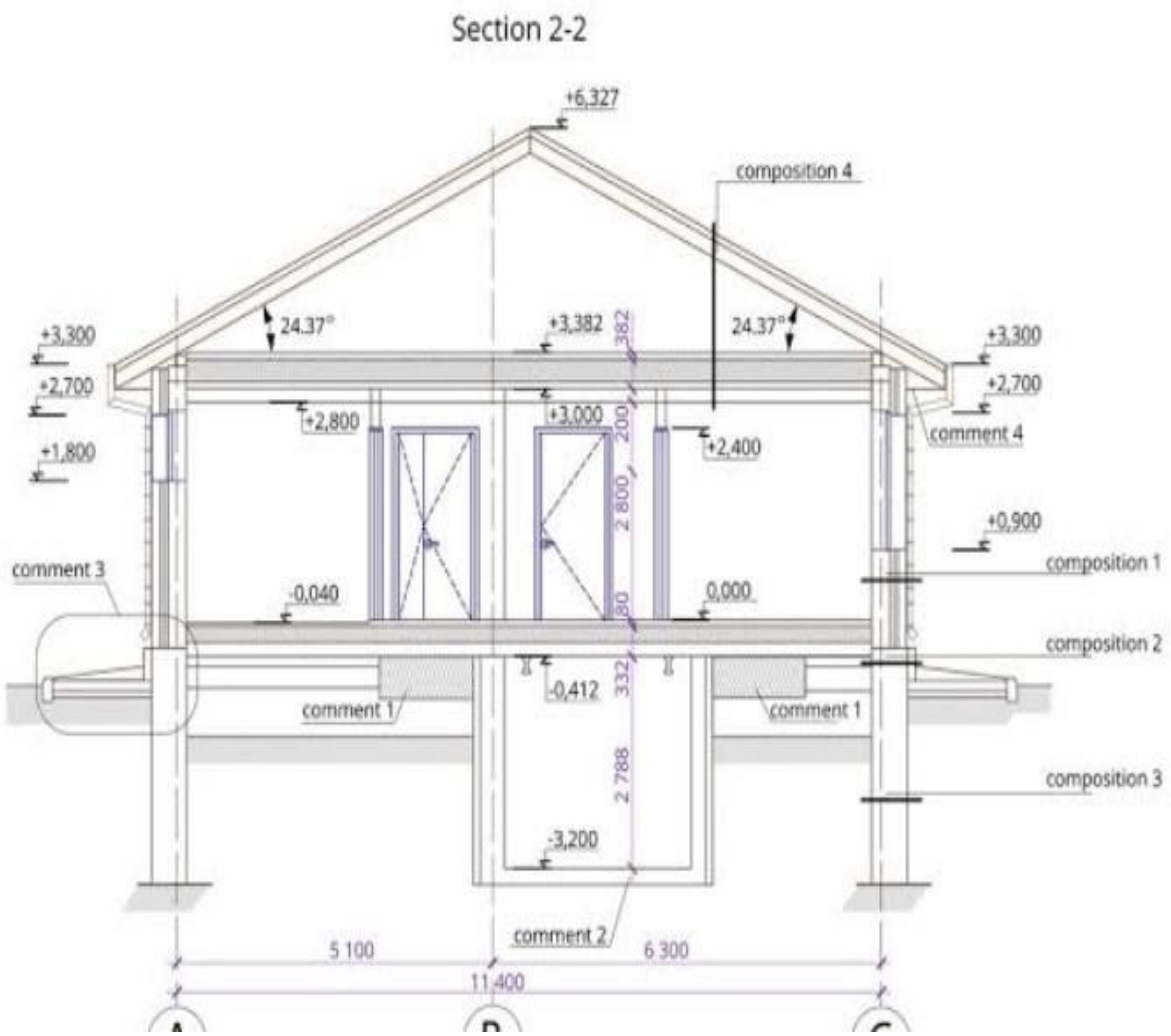
Selecting the position of section plane is crucial as they reveal important details for construction purposes. Ensure you choose points that give the most information

about your design, for example, showing sections through stairs, openings, floor areas with different levels, spaces with different level and ceiling heights, roofs etc.

If we have floor and roof plans for our designs, we can select the section plane for the design. A minimum of two section drawings are required for designs; one along the horizontal axis and the other along the vertical axis of a plan.

Before proceeding to generate a section, we first have to identify the various elements of our building. For the purpose of this post, I will stick with the common types of elements and materials used in small constructions in our environment.

For the foundation, we will use a raft foundation. The floors will be concrete floors of 150mm thickness. The walls will be concrete masonry blocks of 230mm thickness (9-inch blocks). Structural beams and columns will be of reinforced concrete. The roof will be made up of timber trusses and long span aluminum roofing sheet. The roof will have a slope of 15-degrees.



3.1 INTRODUCTION TO AUTOCAD

Designing is the process of converting an idea into an object, product or a system. This process is iterative. CAD (Computer Aided Design) is a tool that can be used for design and drafting activities. Since it uses the computing power of a processor, CAD drawings are faster, better and more accurate than their manually drafted counterparts.

AutoCAD is sophisticated CAD software that is synonymous with engineering drafting. The concept of AutoCAD evolved way back in the 1980's, when engineers and architects were seeking to harness the power of newly introduced personal computers to reduce the drafting time. People began experimenting with internal graphic controllers which allowed them to draw engineering / architectural drawings at the front end which were efficiently replicated at the back end of the computer. AutoCAD was formally launched in December 1982 by Autodesk, a leader in 3D design, engineering and entertainment software. Simply put, AutoCAD enables engineers, designers and architects to produce 2D and 3D models using computers. AutoCAD started as a design tool for engineers and architects, but is now used by other professionals as well. Autodesk, the company behind AutoCAD, has developed custom versions that can be used by design engineers, civil engineers, electrical and electronics engineers and mechanical engineers. AutoCAD thus covers a vast canvas - from engineering to industrial sector, there is an AutoCAD package for everyone. In that sense, AutoCAD is a horizontal product. It is used by product development teams, manufacturing facilities, media and entertainment industries, engineers, architects; educators and students; entrepreneurs, non-profits, medical professionals, and including beginners. AutoCAD is thus useful for any domain that requires 2D and 3D designs.

List of Important AutoCAD Tools:

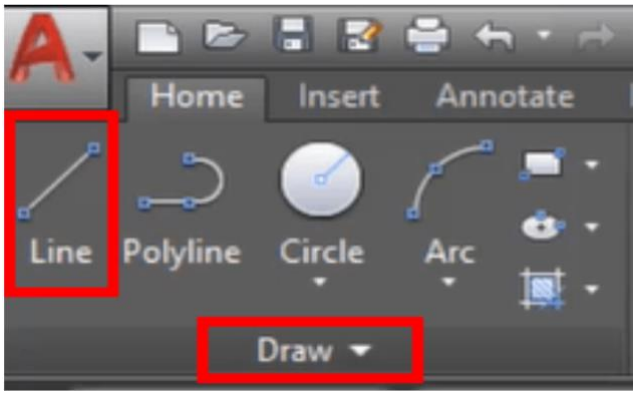
1. Line
2. Circle
3. Rectangle
4. Polyline
5. Copy

1. Line

A line tool lets you create a straight path between two points in a CAD drawing.

How to open it?

Click the Line tool in the Draw panel.



Line

Command Prompt: Type “LINE” or “L” in the command prompt and press Enter.

Line 2Note: Similarly, you can type the command for other tools in the command prompt.

How to Use it?

- Pick a starting point: Click your mouse to tell AutoCAD where to begin the line.
- Choose the ending point: AutoCAD will then ask you to pick a second point, indicating where the line should end. Click again to set this point.
- Finish the command: You can end the LINE command by hitting Enter, Escape (ESC), or the Spacebar.

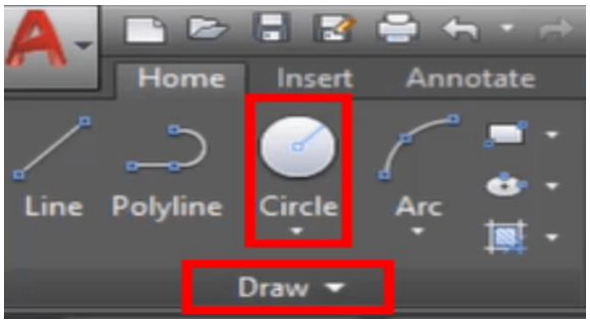
When to Use it?

- Creating walls and partitions in architectural drawings.
- Drawing electrical wiring diagrams with straight wire segments.
- Sketching basic geometric shapes (square, rectangle, triangle, etc.).

Output:

2. Circle

The circle tool generates a round shape with a constant radius in CAD designs.



How to open it?

- Look for an icon that resembles a circle or the letter “C” in the Draw panel of the Home tab.
- Circle
- Command Prompt: Type “CIRCLE” or “C” > Press Enter.

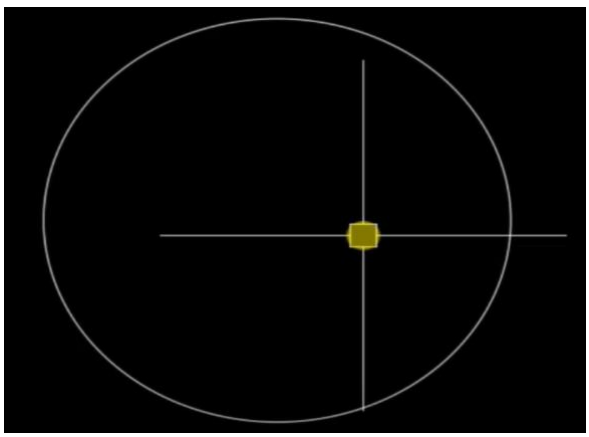
How to use it?

- Specify the center point: Choose the circle’s center by clicking at any point in the open window or by entering coordinates.
- Specify radius or diameter: Specify circle size as radius or diameter.
- Adjust properties: Modify attributes (e.g., layer, color) through the Properties palette or right-click menu.

When to use it?

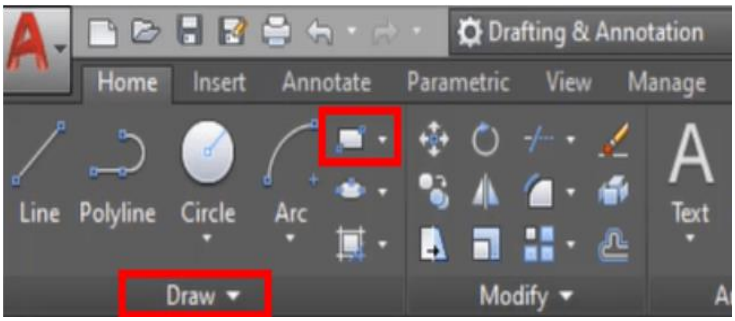
- Drawing wheels, gears, and other circular objects.
- Marking locations of circular objects in a site plan.
- Representing holes and openings in engineering drawings.

Output:



3. Rectangle

The rectangle tool constructs a four-sided shape with equal-length sides and right angles.



How to open it?

- It often appears as a rectangle-shaped icon under the Draw or Create panel.
- Rectangle
- Command Prompt: Type “RECTANGLE” or “REC” > Press Enter.

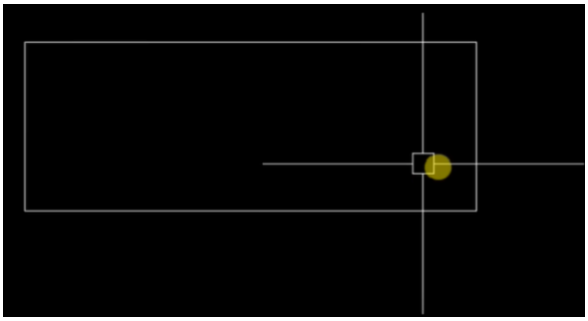
How to use it?

- First corner: Click to mark one corner of the rectangle.
- Second corner: Click again to mark the diagonally opposite corner. AutoCAD creates the rectangle between these two points.
- Adjust properties: You can change attributes like color or layer using the Properties palette or by right-clicking on the rectangle.

When to use it?

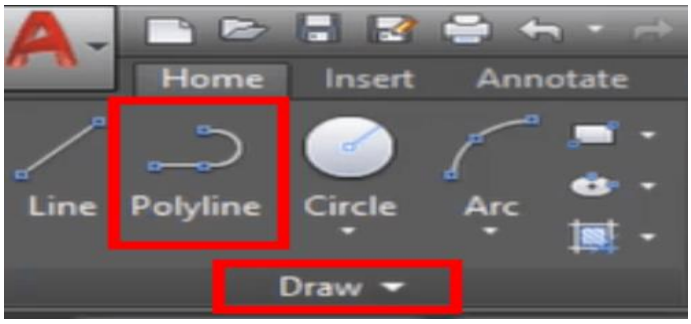
- Designing rooms and spaces in architectural drawings.
- Creating frames for illustrations and diagrams.
- Drafting floor plans and site layouts.

Output:



4. Polyline

The polyline tool connects multiple line segments or curves in CAD to form complex shapes.



How to open it?

- Search for the Polyline tool in the Ribbon. It typically looks like a series of connected line segments.
- AutoCAD Tools-Polyline
- Command Prompt: Type “PLINE” or “PL” > Press Enter.

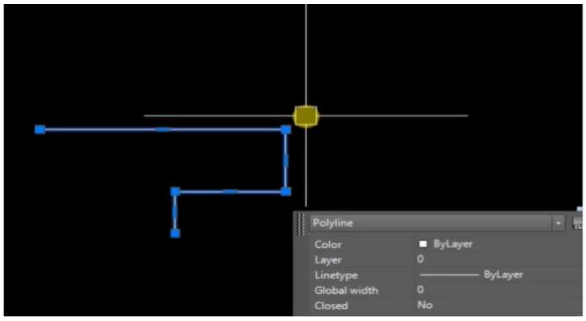
How to use it?

- Start: Click to begin the polyline at a point.
- Add segments: Click more points to create connected lines; AutoCAD joins them into one polyline.
- End: Double-click the last point or press Enter to finish creating the polyline. Also, AutoCAD closes the polyline only if the start and end points match; otherwise, you may have an open polyline.
- Adjust properties: You can change line attributes (like color) using the Properties palette or right-click menu.

When to use it?

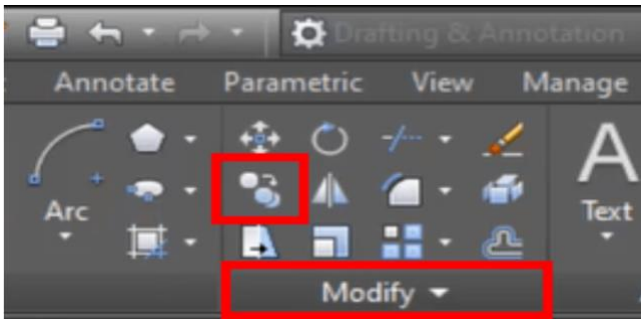
- Creating complex outlines and shapes like building footprints.
- Designing piping and ductwork layouts.
- Tracing irregular boundaries in land surveys.

Output:



5. Copy

The copy tool duplicates selected objects within a CAD drawing.



How to open it?

- The Copy tool is present in the Modify group. The icon has one small circle and two overlapping circles.
- Copy
- Command Prompt: Type “COPY” > press Enter.

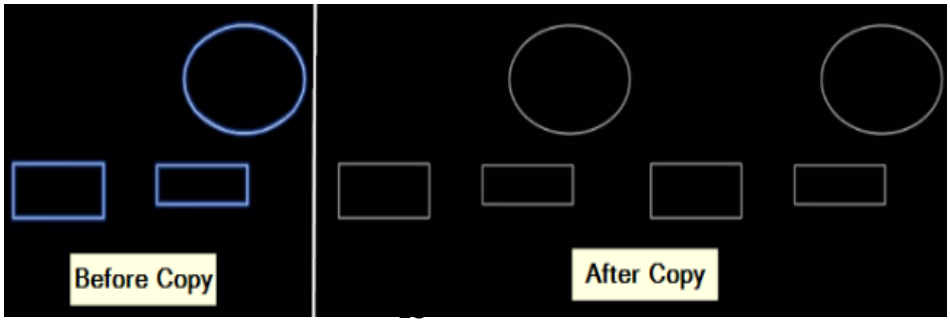
How to use it?

- Select what to duplicate: Click on the objects you want to copy. Hold Shift for multiple items or draw a box around them.
- Choose a starting point: Click where you want the copying to begin. Objects will be pasted in relation to this point.
- Pick the new spot: Click where you want to paste the copied objects (The objects will be positioned based on the starting point).
- Keep going: Repeat by selecting, choosing a start, and picking new spots. Finish with Enter or right-click and “Enter.”

When to use it?

- Replicating furniture or fixtures in an interior design layout.
- Placing multiple instances of the same detail in a drawing.
- Creating symmetrical patterns and layouts.

Output:



3.6 INTRODUCTION TO BAR BENDING SCHEDULES

The Bar Bending Schedule, often known as BBS, represents the bend forms and cut lengths of bars according to the construction plans. The BBS is fabricated based on the building plans. Because the bars are bent into various shapes based on the curvature of the member, distinct BBS must be made for each member.

The bar bending schedule is presented in a table for easy visual reference. The bar bending schedule table shows the diameter, the shape of the bend, the length of the straight and bent parts, the curve angle, the total length of each bar, and their number. You need all this information when figuring out how much to buy.

The following are some crucial considerations for the bar bending schedule:

- The steel reinforcements should be carefully organised for each level and kept in a group so they may be quickly identified for use in each structural unit.
- The numbered sequence should be used to position the steel bars.
- In addition, every bar in each bundle must have the correct label, indicating its shape, size, and length.
- Bar lengths for cutting and bending must be determined independently.

How to Create a Bar Bending Schedule for Construction Project?

Creation of a bar bending schedule (BBS) in civil engineering is essential for efficient reinforcement planning. It ensures accurate material estimation and minimizes wastage. It also enhances structural integrity. Below are the key steps to prepare a BBS.

- Analyze Structural Drawings- Review construction blueprints to determine reinforcement requirements.
- Identify Bar Specifications- List the bar sizes, shapes, and required bending details.

- Calculate Cutting and Bending Lengths- Consider the bend correction in BBS to ensure accurate bar lengths.
- Prepare a Tabular Format- Organize details like bar diameter, length, quantity, and bending angles.
- Verify and Approve- Engineers check for accuracy before implementation.
- Execute the BBS- Carry out bar bending work on-site or in a factory.

Things to know about BBS in construction are

- Diameter of the reinforcement bar
- The standard length of the steel bars
- Weight of the reinforcement bar per meter length
- Size of the bar
- Overlapping length
- Concrete cover
- Spacing
- Number of steel bars
- Grade of reinforcement bars

CHAPTER FOUR

4.1 PROBLEM ENCOUNTERED DURING SITE

SAFETY: the safety precaution taken by students was very poor. All the SIWES students on site were not provided with safety materials such as: safety boot, helmet and other things they are supposed to have on site to keep them safe.

Some student were using face cap as helmet which is totally wrong.

4.2 RECOMMENDATIONS

The following suggestion refer to the establishment I undertook my SIWES program, my polytechnic. Industrial training fund and the Government: in order to improve and enhance the expected results of the student Industrial Work Experience Scheme:

1. The federal government should establish and promote laws and agencies that regulate land use to prevent pollution
2. The federal government should provide industries and organizations with incentives to encourage and solicit for their cooperation and contribution to the program.
3. The Industrial Training Fund should provide a network in which Establishment and Students could communicate better to promote means of finding placements.

References

- Kwara State Polytechnic Students SIWES Manual