TRADE OF

Industrial Insulation

PHASE 2

Module 2

Geometry & Pattern Development

UNIT: 10

Flattened Bends & Straights

Produced by

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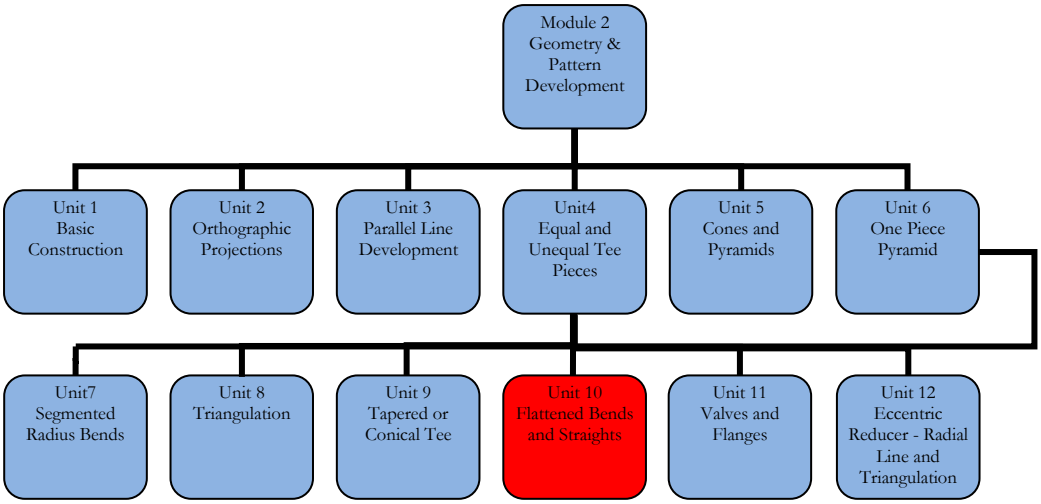
Unit Objective

By the end of this unit ***each apprentice*** will be able to:

- Explain the concept of flattened forms and state suitable applications.
- Draw the half plan and elevation of a flattened form.
- Develop a pattern for a flattened form.



Introduction

Flattened bends and straights are used in industrial insulation applications where pipe-work and tubes are installed too close together to allow for individual lagging and cladding.

1.0 Flattened Bends

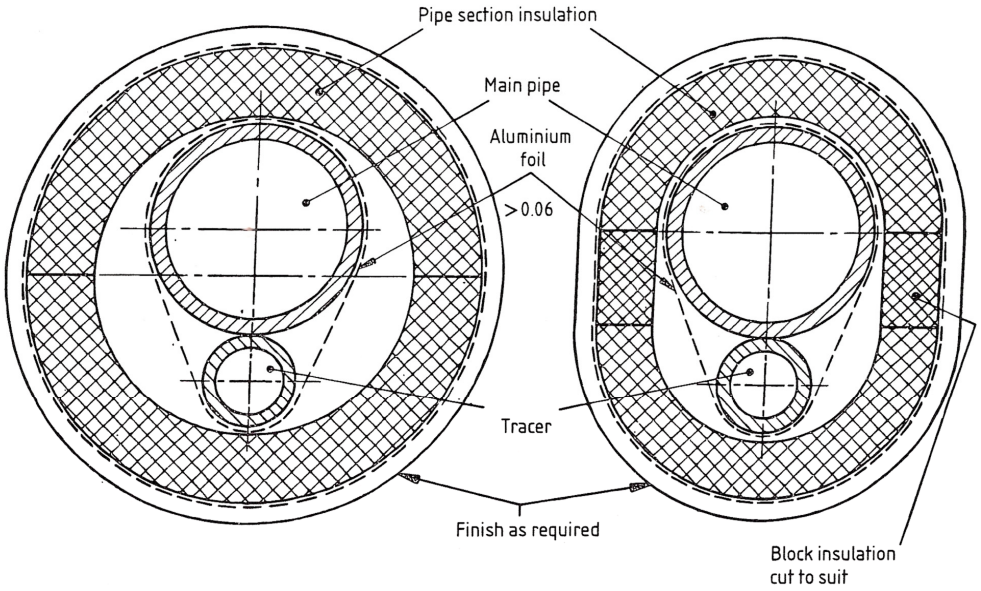
Key Learning Points

- Identify applications where flattened forms occur or are required
- Layout of plan and elevation
- Development of flattened segments. Use of lettering and numbering.

1.1 Applications of Flattened Bends and Straights

Flattened bends and straights are used generally in the following situations:

- Frequently, especially with steam boilers, several tubes or pipes are so close together that they cannot be insulated separately but have to be bundled.
- External pipe tracing, in which a small bore heating pipe is placed close to the main pipe.
- Plant room applications.



Flattened section used to cover main pipe and tracer pipe.

1.2 Developing a Flattened Bend

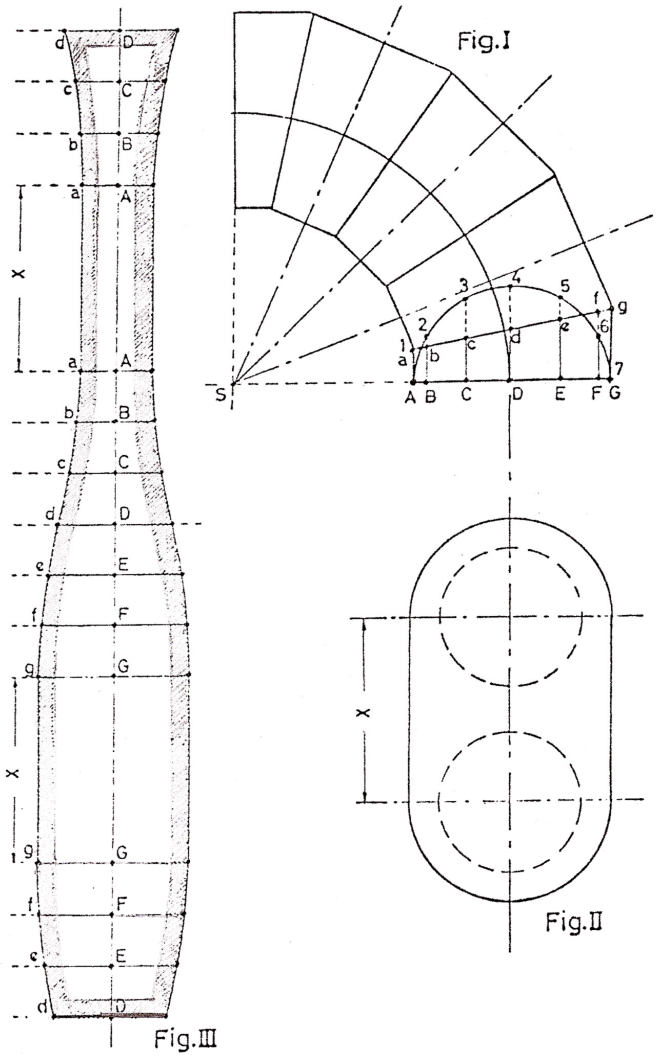


Figure I: Elevation.

Figure II: Part Plan view.

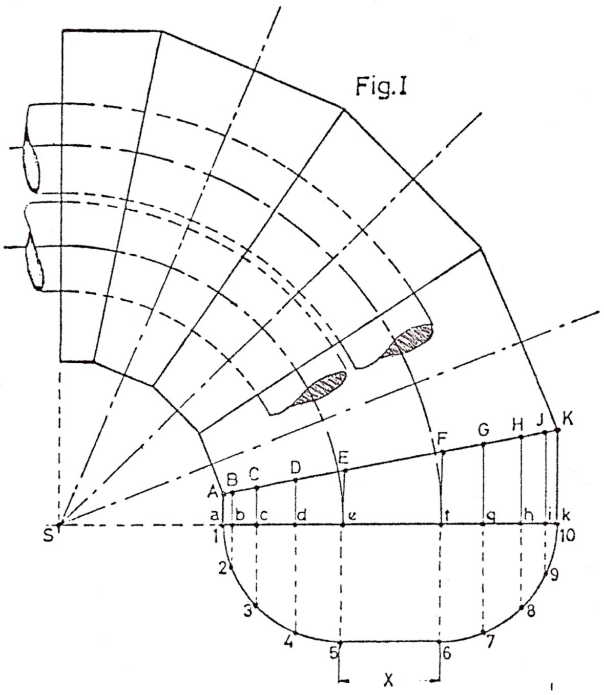
Figure III: Development of a full segment.

Frequently, especially with steam boilers, several tubes or pipes are so close together that they cannot be insulated separately but have to be bundled.

The development of such a bend for a nest of boiler pipes is the same as described earlier for a 90° bend. It must be noted, however, that in figure III the extra section X of figure II has to be interposed between points a and a and points g and g.

Refer to module 2 – unit 7 – Segmented Radius Bends.

1.3 Developing a Flattened Bend with Pipes Installed One over the Other



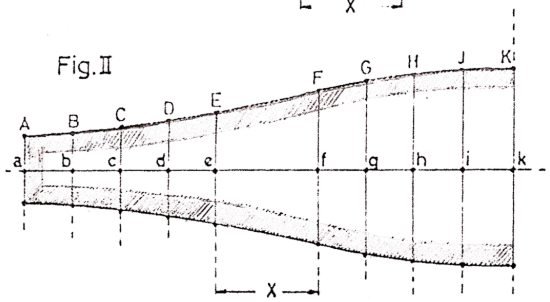


Figure I: Elevation.

Figure II: Half a development for a full segment.

First draw figure I similarly as for the normal 90º segmental bend shown earlier in module 2 – unit 7, but with the extra section X added. Draw the quarter circles with centres at points e and f and divide each quarter into three or more divisions. Draw the perpendiculars at points 2 to 9 intersecting the joint line made at points B to J. The lines aA, bB, etc. correspond to the true lengths for the development. Note, however, that the straight line segment X has to be interposed between points e and f.

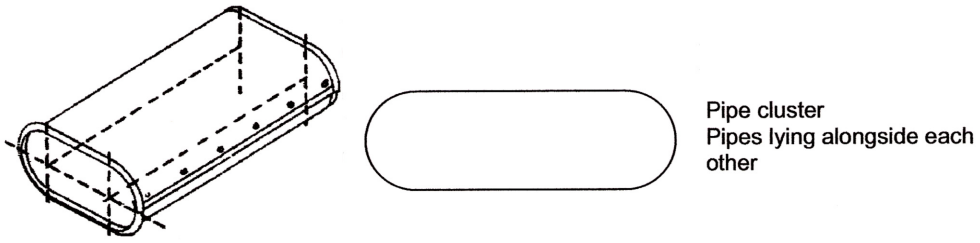
Refer to module 2 – unit 7 – Segmented Radius Bends.

2.0 Flattened Straight Sections

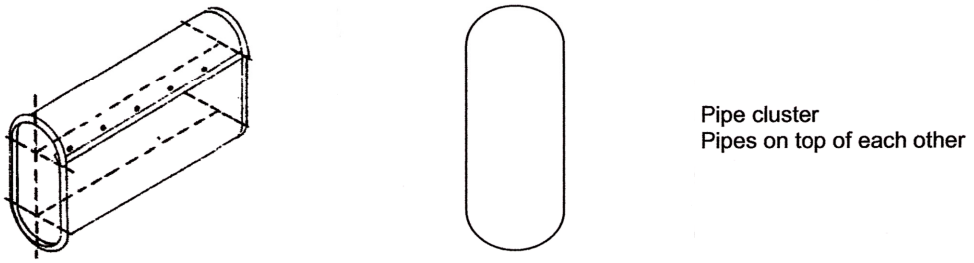
Key Learning Points

- Identification of flattened sections
- Determination of true lengths for flattened form
- Swag and lap allowances
- Fixing hole location
- Planning the sequence and efficient drawing layout

2.1 Identifying Flattened Straight Sections

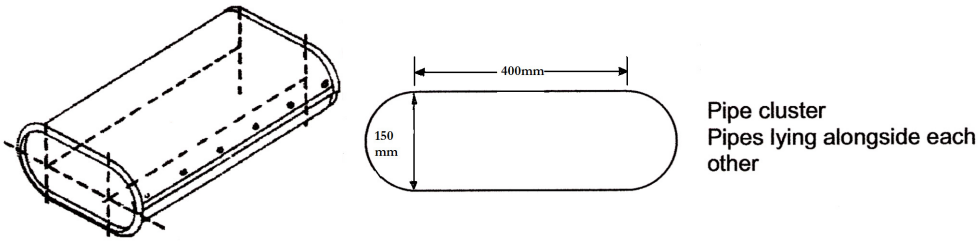


Pipe cluster
Pipes lying alongside each other



Pipe cluster
Pipes on top of each other

2.2 Developing a Flattened Straight Section



Pipe cluster
Pipes lying alongside each other

Calculate the circumference of the circle using πd.

- Calculate the combined straight sections.
- Add both measurements together to get the perimeter of the flattened straight section.
- Add the allowance for the lap joint.

Example

1. Circumference of the circle = πd = 150mm x 3.14 = 471mm
2. Calculate the combined straights sections = 400mm+ 400mm = 800mm
3. Perimeter of straight section = 800mm + 471mm = 1271mm
4. Add allowance for a lap joint = 20mm + 20mm = 40mm
5. Total material required for straight section = 1271mm+ 40mm

Total: 1311mm

2.3 Swage and Lap Allowances

Refer to module 1 – unit 5 – section 3.0 – Lap allowances.

Refer to Module 1 – Unit 7 – section 2.0 – Swaging.

2.4 Fixing Hole Location

Refer to module 1 – unit 6 – Marking, Cutting, Punching, Rolling, Seam swaging and Screwing.

2.5 Planning and Sequencing

Planning and organisation is vitally important when measuring a large insulation and cladding job. Communication between people and the delegation of tasks will ensure the smooth running of the job. Record keeping, filing of drawings, notes and understanding the works specification are all very important aspects of any job, and a system should be in place whereby information is available in a clear and concise and organised manner.

Summary

Flattened bends and straights are frequently used in plant rooms and steam boiler rooms where pipe-work and tubes have to be bundled together in order to fit them into the tight spaces. Flattened forms are also used where heat tracer pipes are installed close to the main pipe to allow hat transfer between pipes through direct conduction.

Development of segments of a flattened bend is carried out similarly to that of a radius segmental bend; however the extra straight section must be interposed between points on the development.

Planning and organisation is vitally important when measuring a large insulation and cladding job. Communication between people and the delegation of tasks will ensure the smooth running of the job.

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