

Subject: Technical Drawing

Year/Level: 12C/D

<b>Strand: 1</b>	<b>Geometry</b>
<b>Sub Strand</b>	<b>Solid Geometry and Surface Development</b>
<b>Content Learning Outcome</b>	<ul style="list-style-type: none"> <li>Identify the types of development used in various types of solids</li> <li>Produce surface developments of solids and truncated solids</li> <li>Produce lines of intersection of two interpenetrating solids</li> </ul>

**LESSON NOTES**

**OUTCOME**

By the end of this topic, students will:

- Define interpenetration.
- Identify and sketch the intersecting lines of different solids.
- Draw the line of intersection for different solids.
- Complete the orthographic drawing and developments of the solids.
- Draw the development to show the true shape of the intersection.

The intersection of two solids of similar or different form will result in a regular or irregular figure. They are evident in everyday life and pipe connections are a very good application of intersecting solids.

When one solid penetrate into another solid then their surfaces intersect at the junction of intersection - a typical curve is formed which remains common to both solids - the curve/line is called curve/line of intersection and it is a result of interpenetration of solids.

Examples: Square prism penetrating a cylinder, square prism penetrating another square prism, triangular prism penetrating a cylinder, cylinder penetrating a cylinder.

What is the purpose of drawing these curves? When two objects are to be joined together, the maximum surface contact between both objects becomes a basic requirement for strongest & leak proof joint. Curves/lines of intersections are common to both intersecting solids, show exact & maximum surface contact of both solids.

**Interpenetration of unequal diameter cylinders intersecting at an angle**

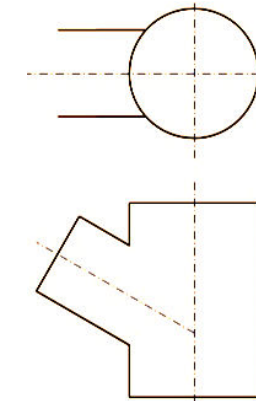


**WORKED EXAMPLE**

**Interpenetration of unequal diameter cylinders intersecting at an angle**

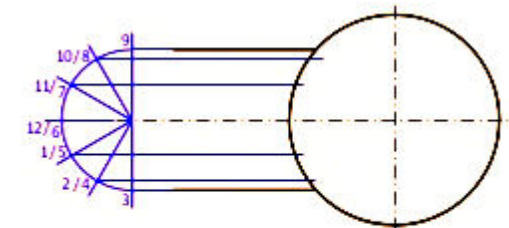
**Step 1: Draw:**

- Plan and
- Elevation



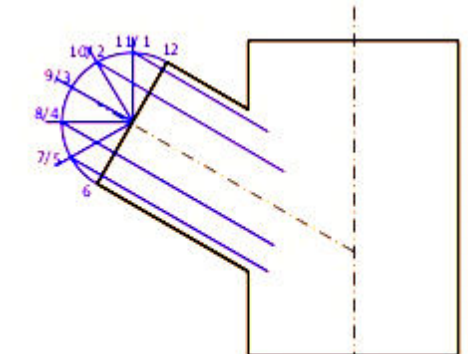
**Drawing Generators in the Plan and Elevation**

**Step 2:** Divide both the cylinders in the Elevation and Plan into 12 equal parts. It would be appropriate to divide using a 30°/60° set square for accuracy.



**Step 3:** Label the 12 points starting from 1 to 12.

**Step 4:** Draw the generators of these 12 points on the Plan until they intersect the larger cylinder in the same view.



**Step 5:** Project the generators in the Elevation parallel to the angle of the smaller cylinder.

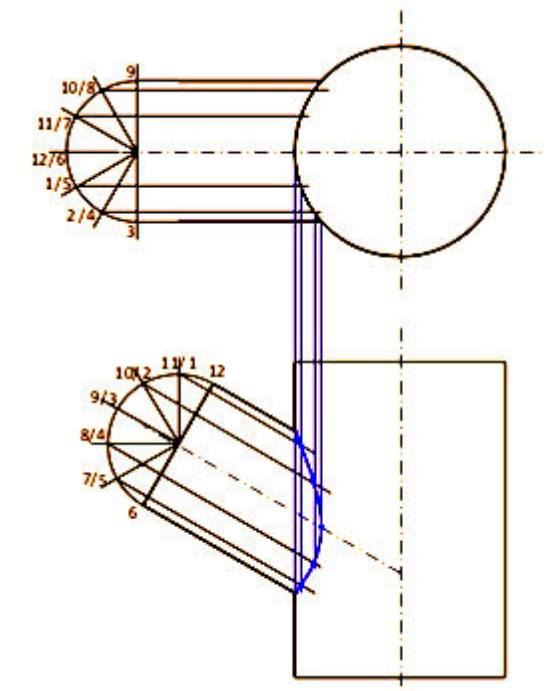
**Intersecting Generators in the Elevation**

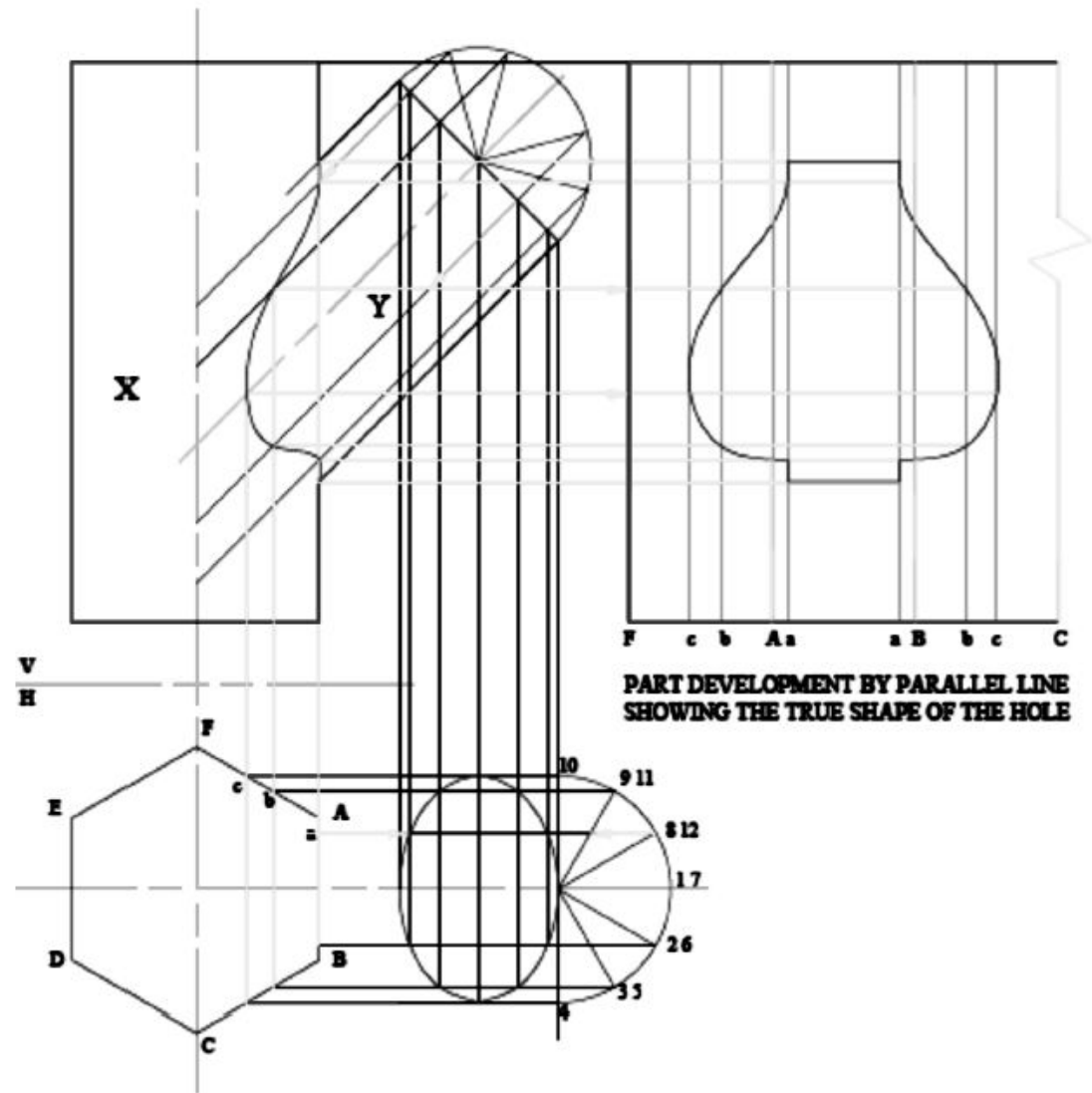
**Step 6:** The place where the points intersect the larger cylinder in the Plan need to be projected to the elevation.

**Step 7:** Place a dot where these lines intersect the corresponding lines in the elevation.

**Step 8:** Draw a smooth curve through these points.

**Step 9:** Darken the line of Intersection/Interpenetration.



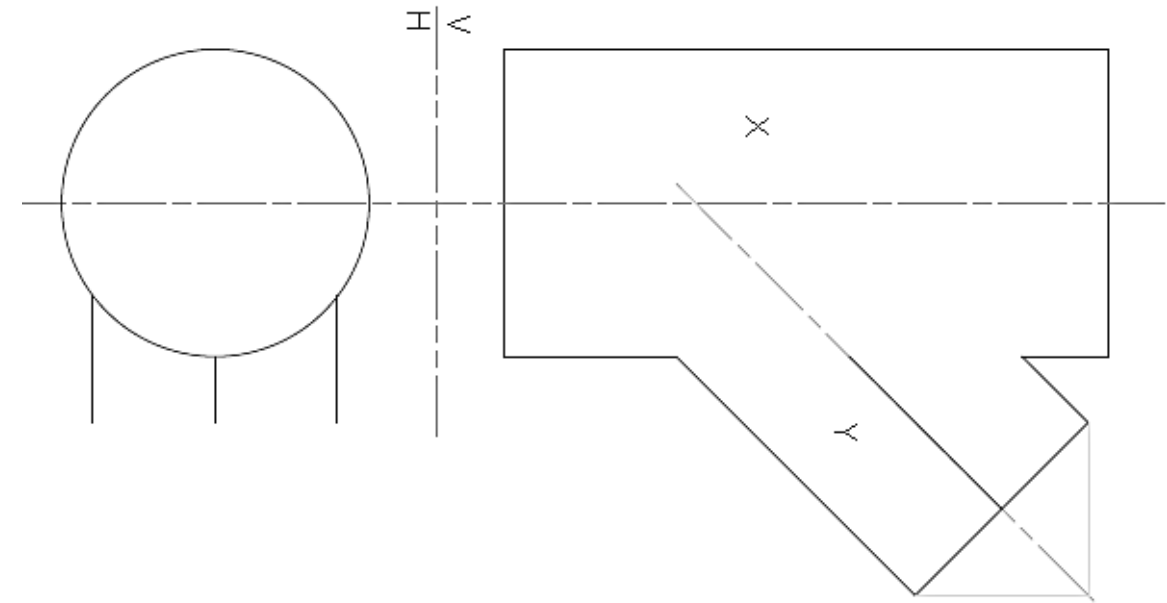


**STUDENT ACTIVITY**

**GIVEN:** The sketch and a 3rd angle orthographic projection of a cylinder to cylinder (pipe) of unequal diameters intersecting at right angle.

**REQUIRED:**

1. Complete the Plan
2. Draw the line of Intersection
3. Show the hole in the half development of pipe X
4. Draw the development of pipe Y



**THE END**