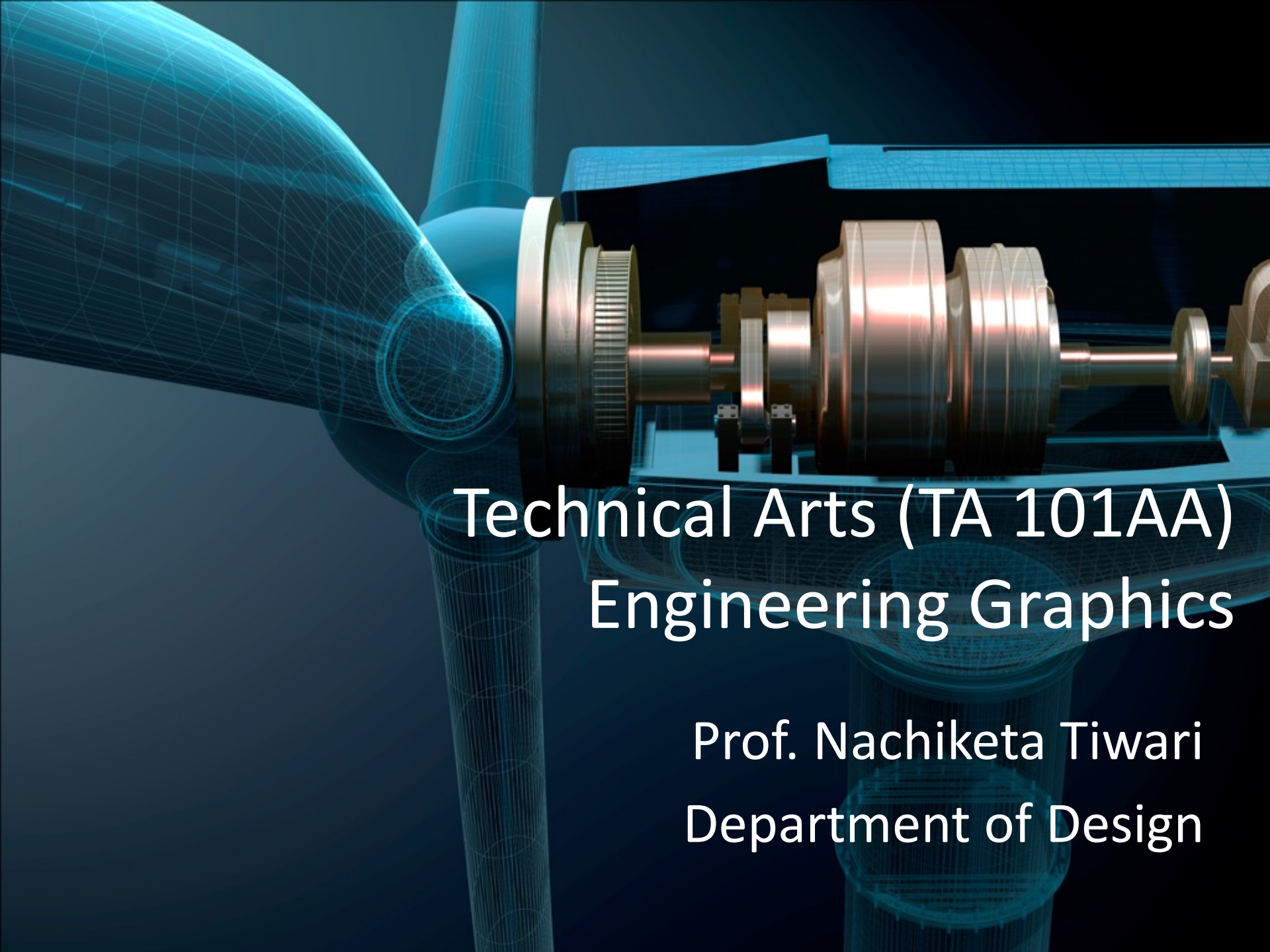

Technical Arts (TA 101AA)
Engineering Graphics

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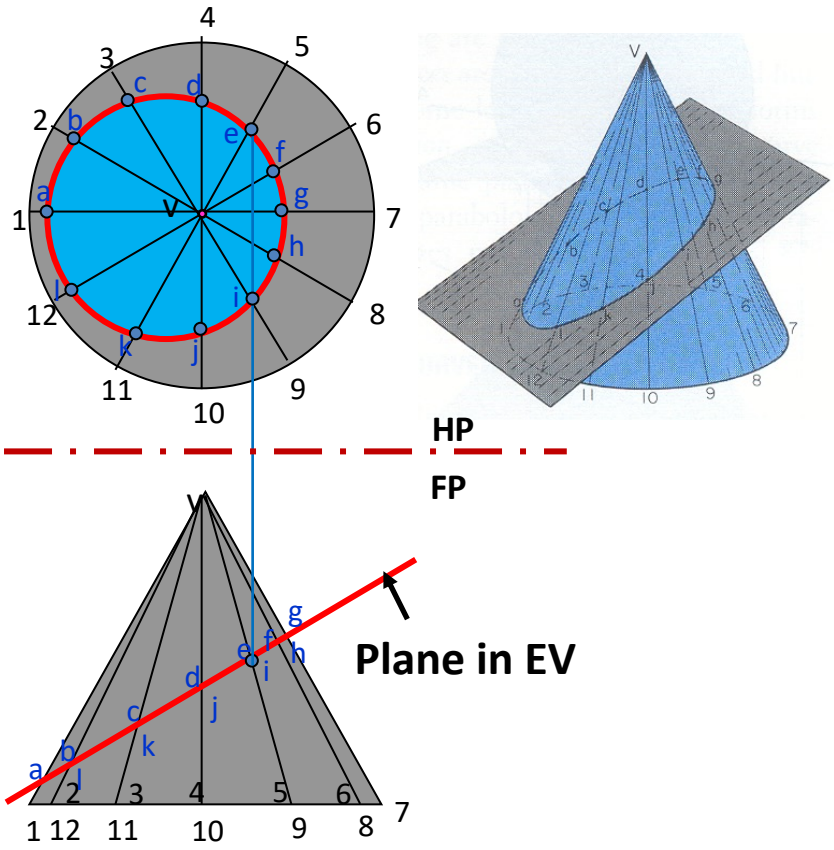
Department of Design

Solid-Solid Interactions

Intersection of a Plane & a Cone

- **Method 1**: **Selected Line Method** - **When an edge view (EV) of the plane is available!**

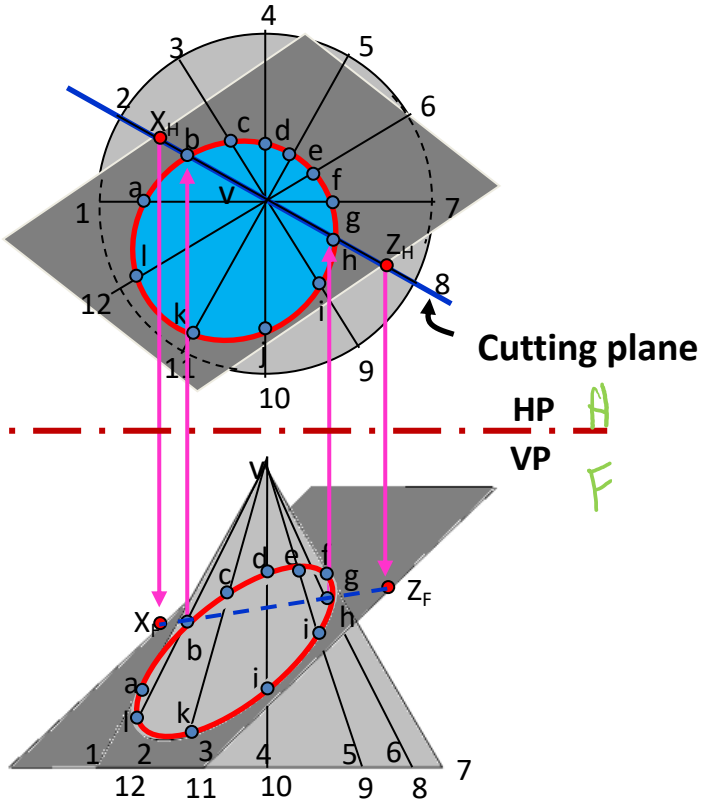
1) In FP, the cone is seen as a triangle and the plane as Edge View.
2) Draw lines V-1, V-2 , etc. called '*elements*' or '*generators*' in top and front views.
3) The points of intersection of 'generators' and EV give the *'line of intersection'* of plane and cone in FP.
4) Locate the points of intersection (*e* and *i*) in the HP.
5) Similarly, locate all other points of intersection in top view and draw the *'curve of intersection.'*
6) What will be the shape of the 'curve of intersection' in top view?



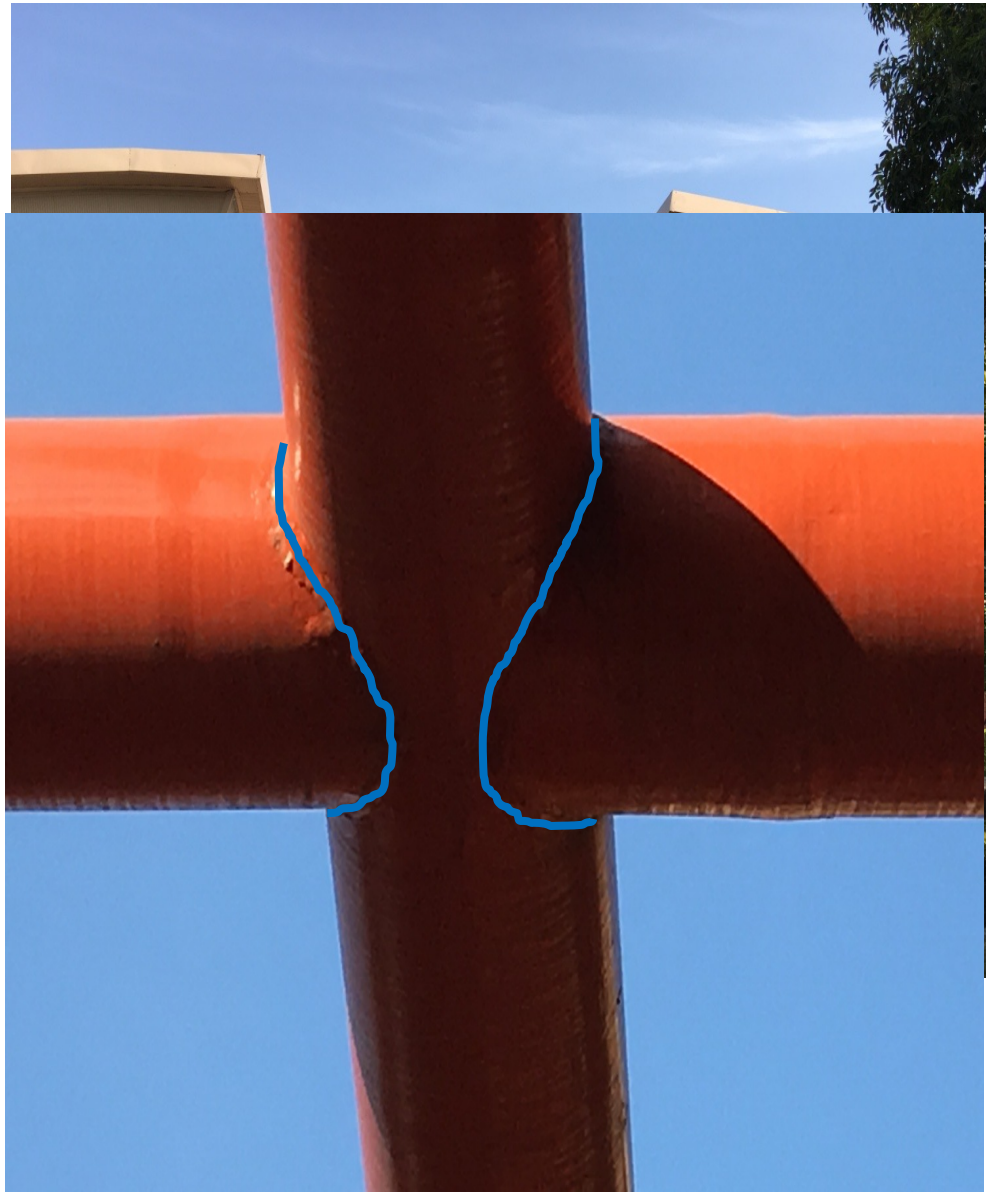
Intersection of a Plane & a Cone

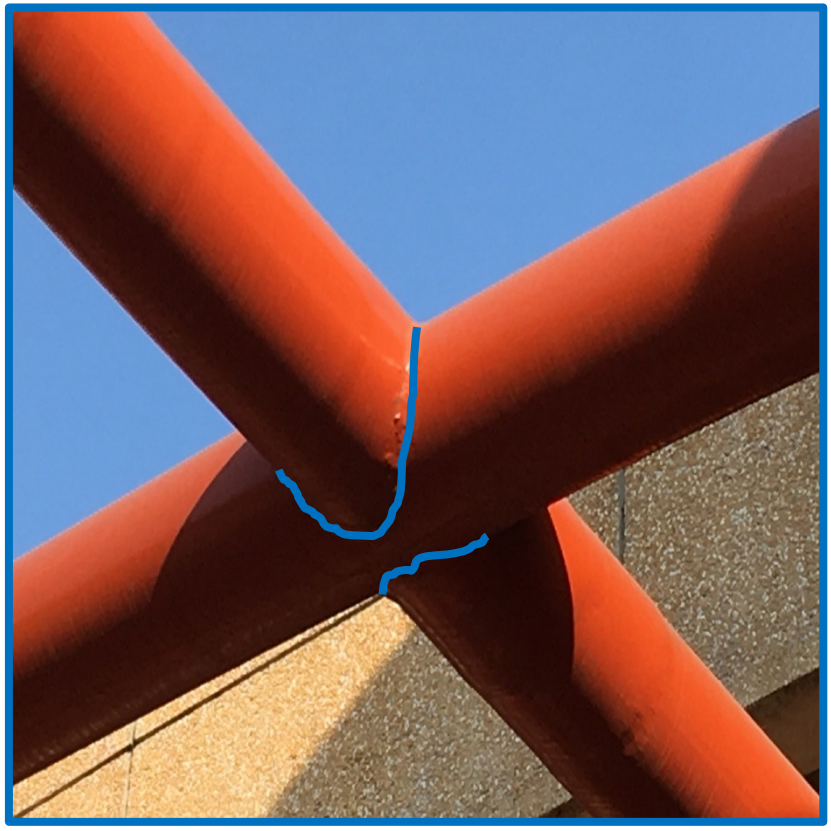
- **Method 2: Cutting Plane Method -When an oblique plane cuts the cone**

- Draw *generators* in both top and front views.
- Pass a 'vertical *cutting plane*' through generators V-2 and V-8, it will be in EV in top view.
- The '*cutting plane*' cuts the cone in two halves; and cuts the oblique plane at points X and Z.
- Transfer the points X-Z in the VP.
- Points of intersection of line X-Z with generators (V-2 and V-8) in VP yield desired 'points of intersection of cone and the oblique plane'.
- Transfer these 'points of intersection' (b and h) from VP to HP.
- Similarly, get all other points of intersection.



Importance of Solid-Solid Intersections?





Intersection of Two Solids

- **Two Methods:**

1) **Selected line method**
   - Select sufficient number of lines on a surface.
   - Find the points where each of these lines pierces the other surface.
   - A line joining these piercing points would give the curve of intersection between the two surfaces.

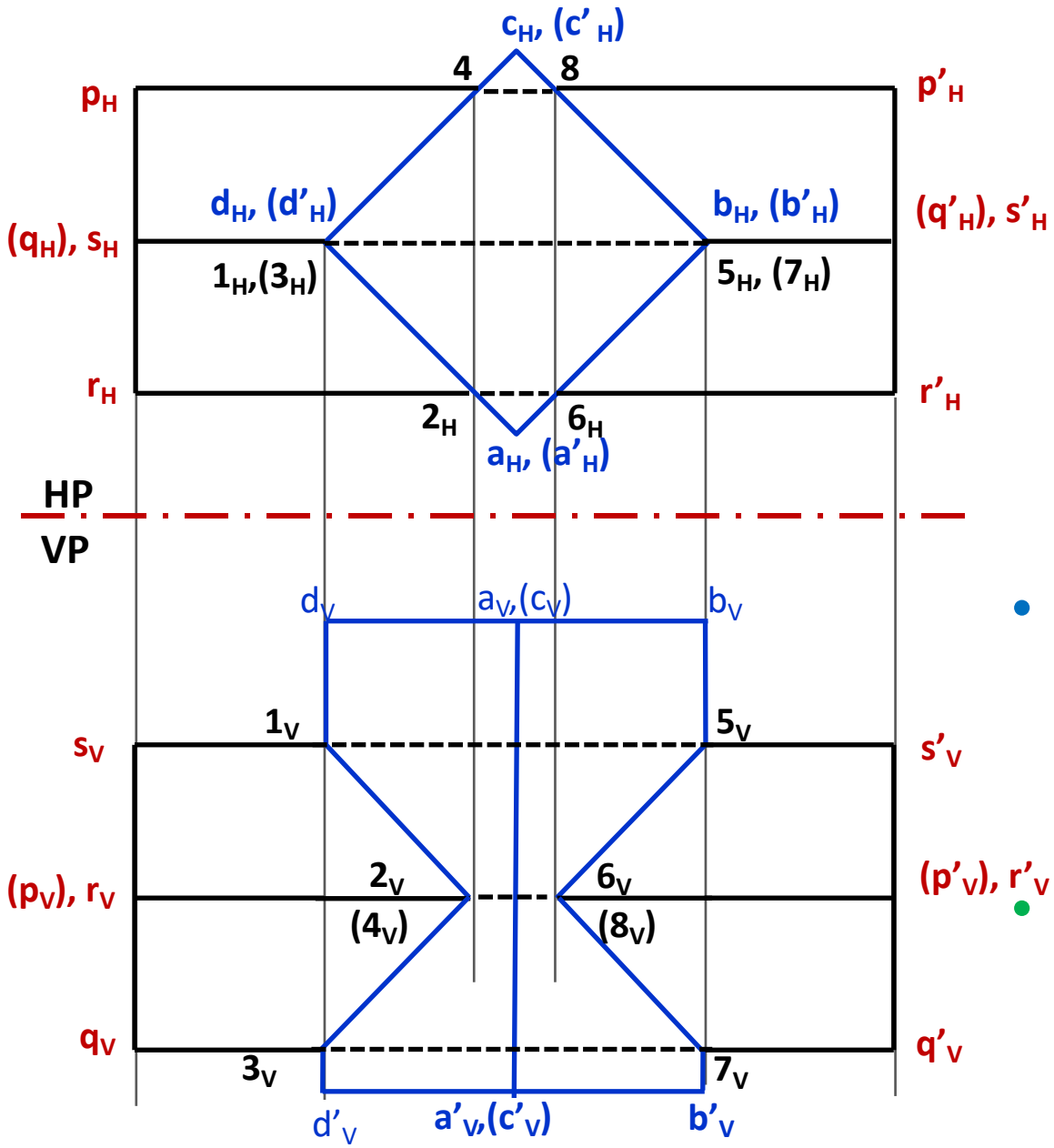
Intersection of Two Solids

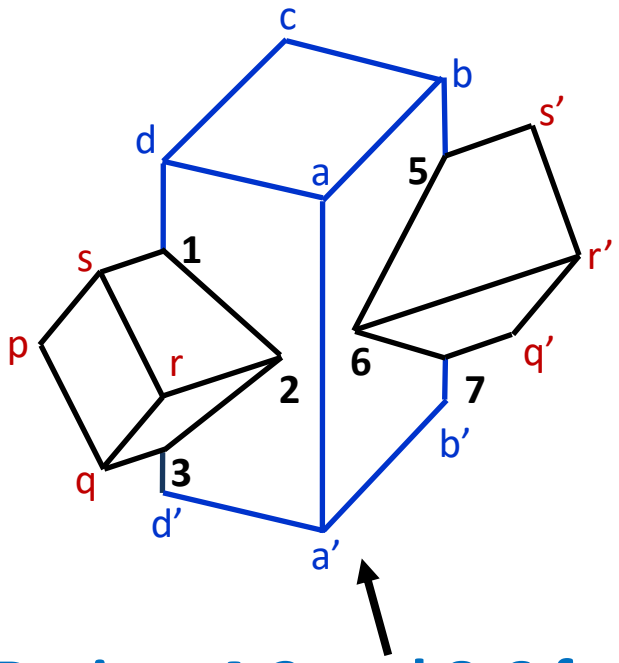
- **Two Methods:**

2) Cutting plane method

- Pass a number of cutting planes through each of the given surfaces simultaneously.
- Each plane will cut a line (straight or curved) from each given surface.
- These lines will intersect in a point (or points) common to both surfaces.
- A curve connecting those points will give the curve of intersection between the two surfaces.

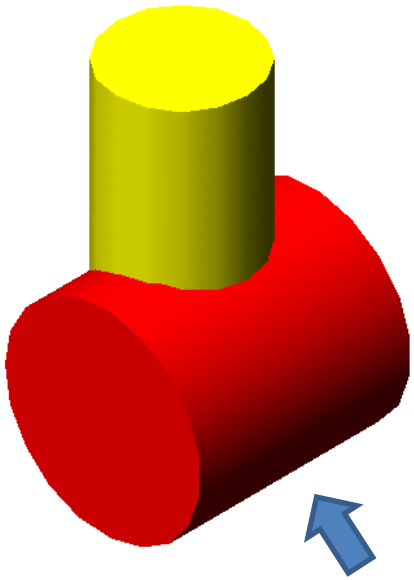
Two Prisms: Selected Line Method

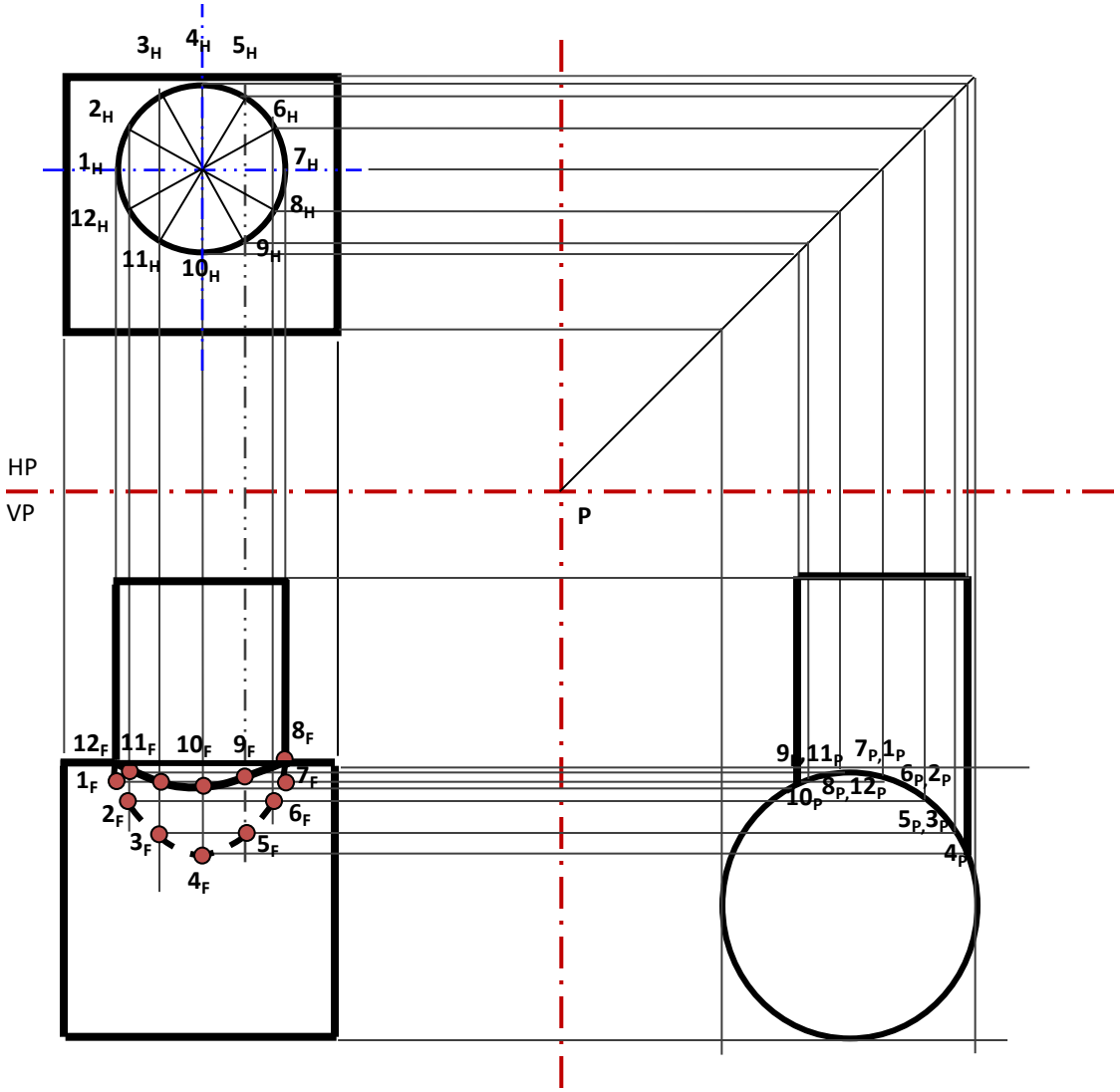




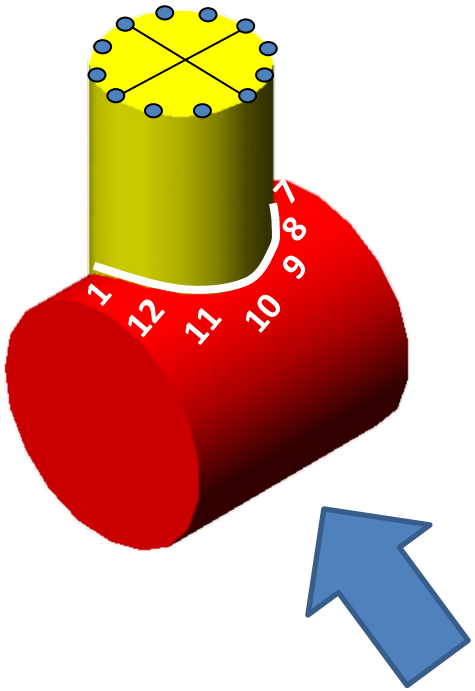
- Project 4-2 and 8-6 from HP and find the intersection with p-p' in VP
- Join the intersection lines 1-2, 3-2, 5-6 and 7-6

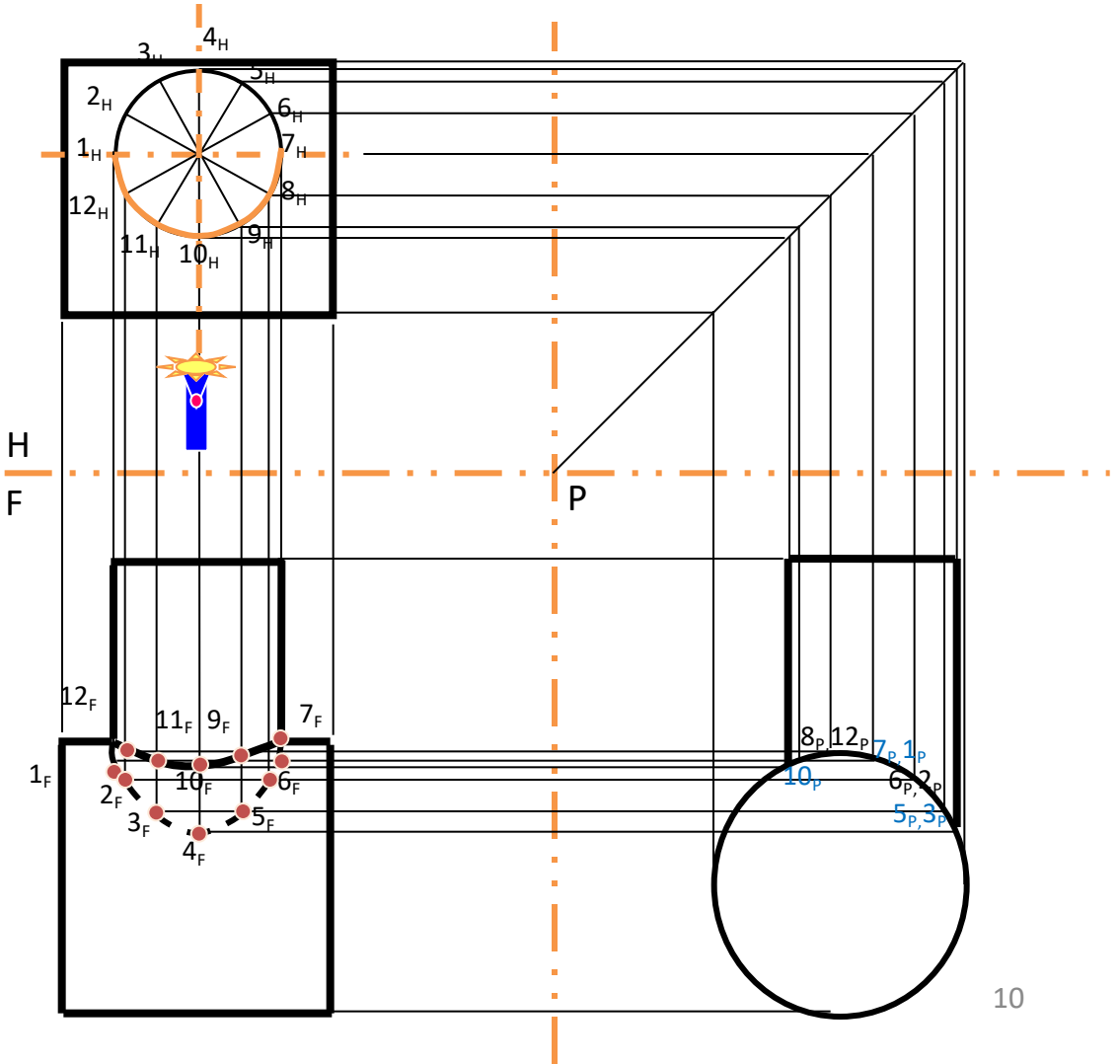
Two Cylinders: Selected Line Method



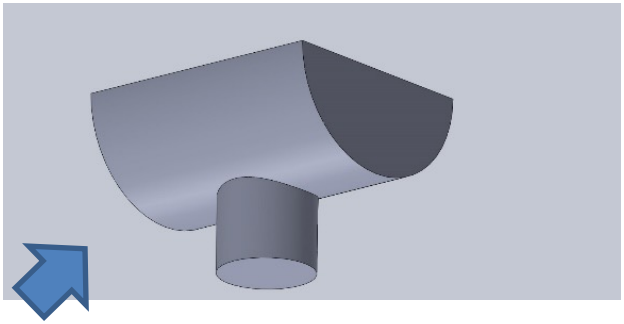


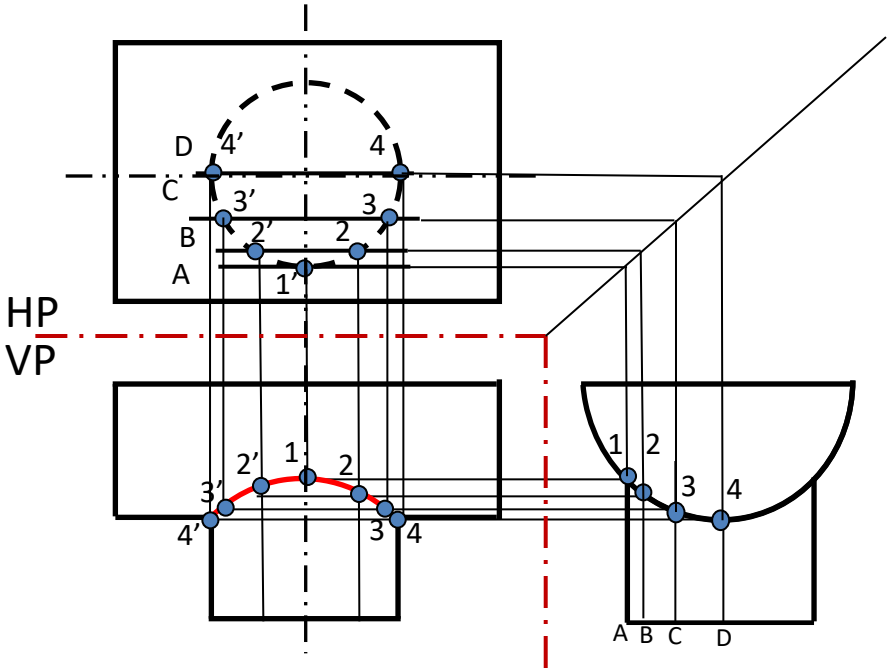
Intersection of Two Cylinders





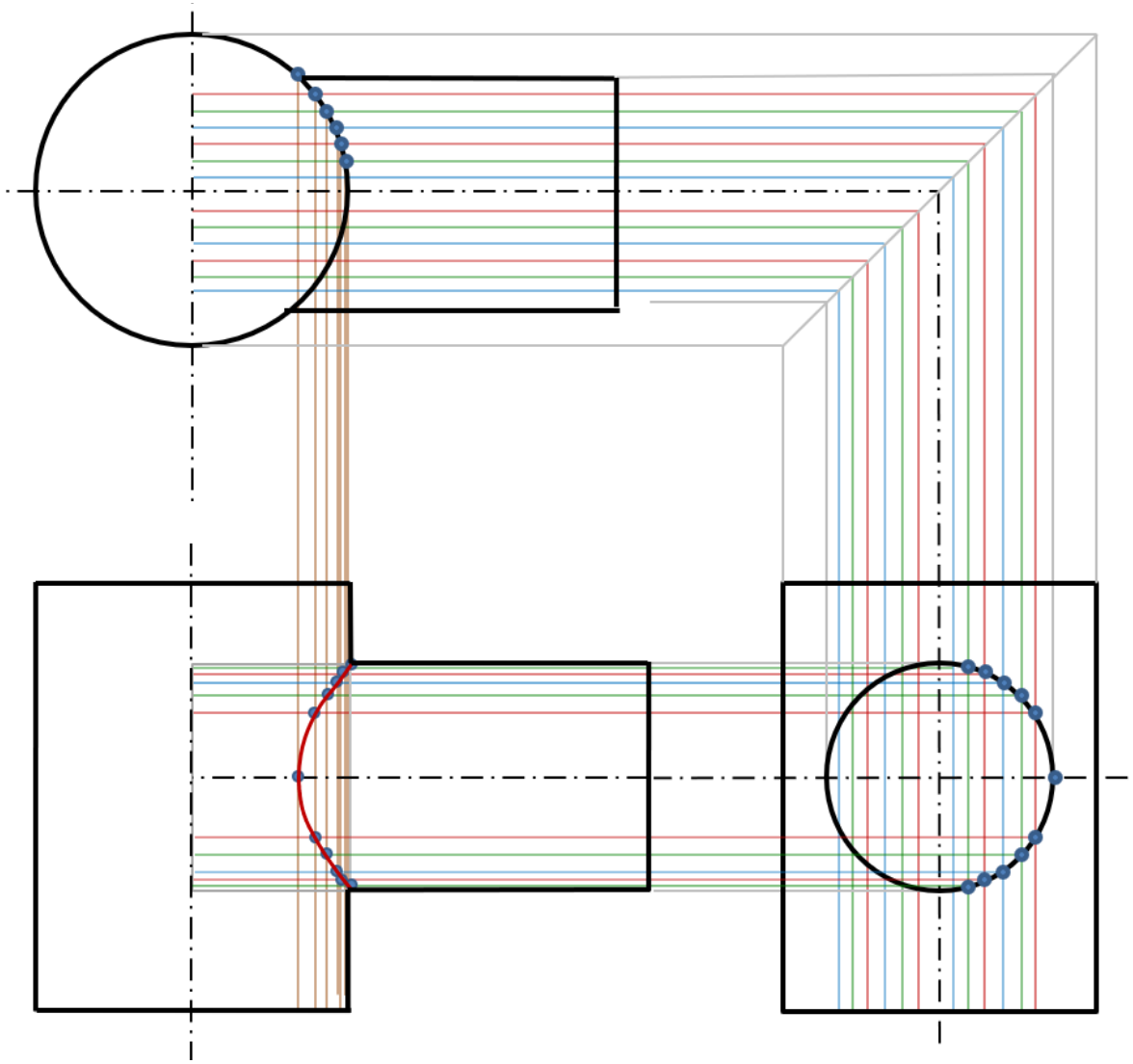
Two Cylinders: Cutting Plane Method

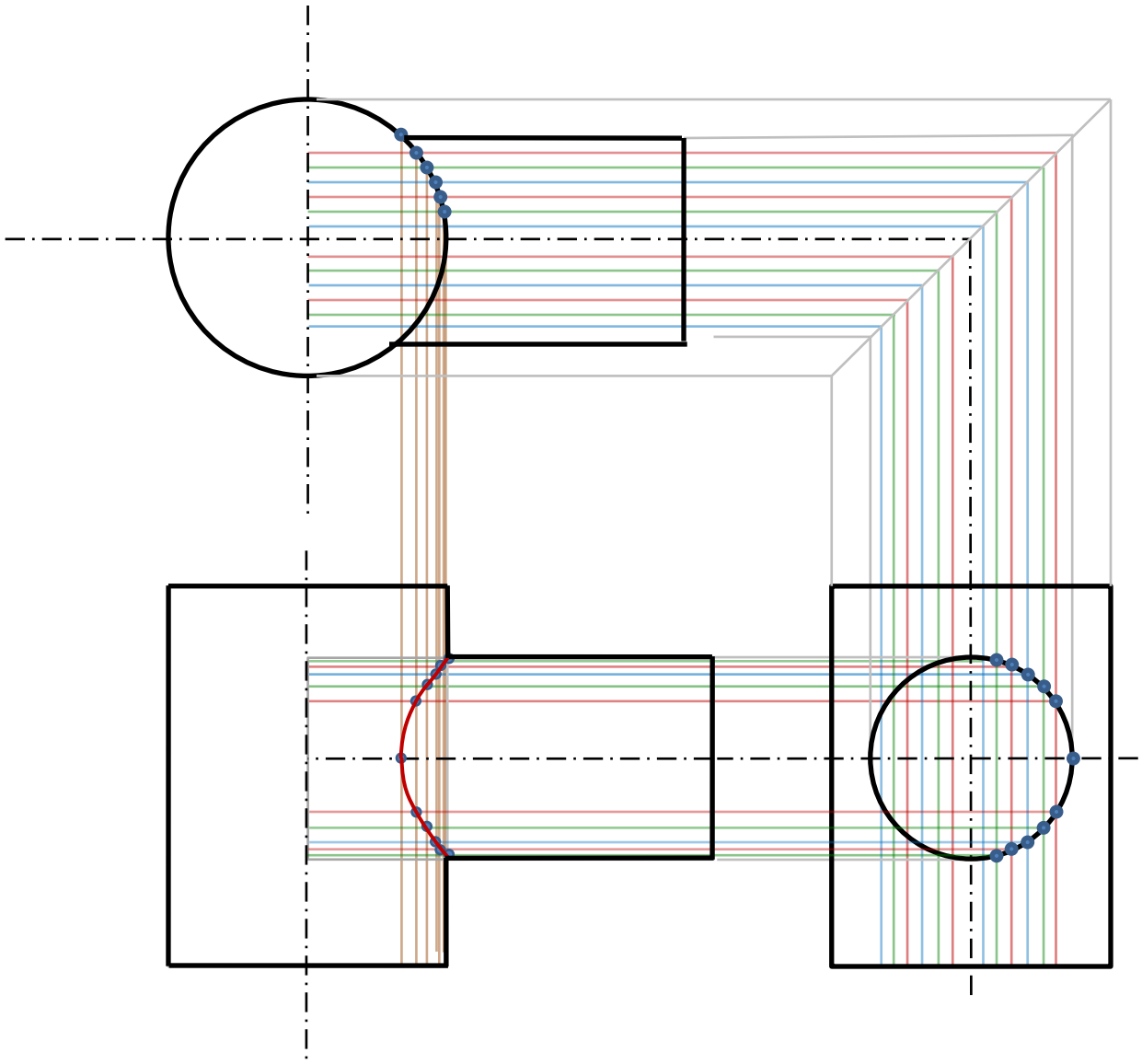




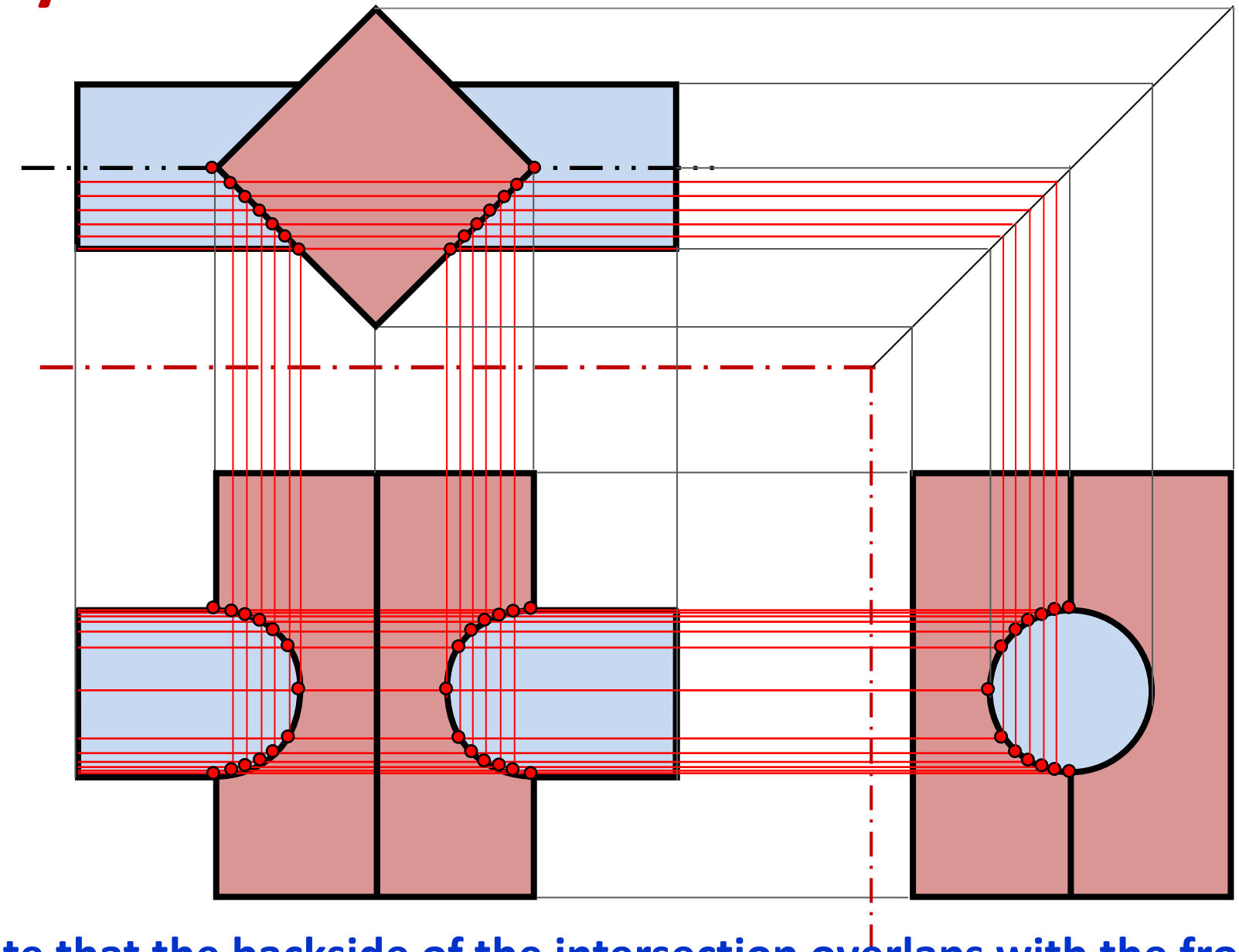
- Draw the principal views.
- Take a *'vertical cutting plane'* cutting one of the cylinders (vertical one) in front view.
- Draw the 'cutting plane' in profile view and get its intersection with the other (horizontal) cylinder.
- The points of intersection of two cylinders are located in front view through projectors from top and profile views.
- Repeat this process by taking more 'cutting planes' and get the corresponding 'points of intersections' in VP.
- Join the points 4'-3'-2'-1-2-3-4 to get the *'curve of intersection'.*

Two Cylinders



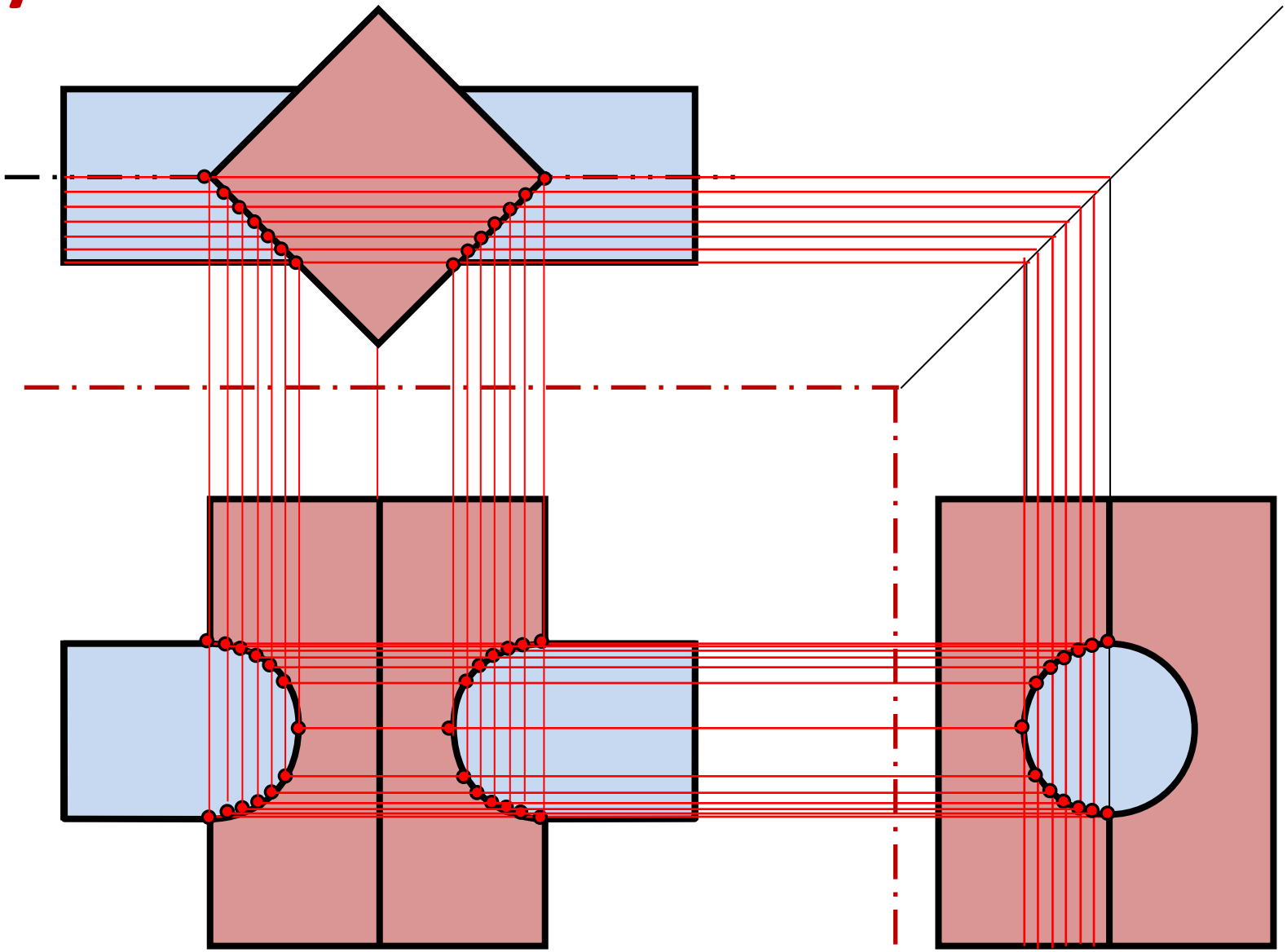


Cylinder & Prism: Selected Line Method



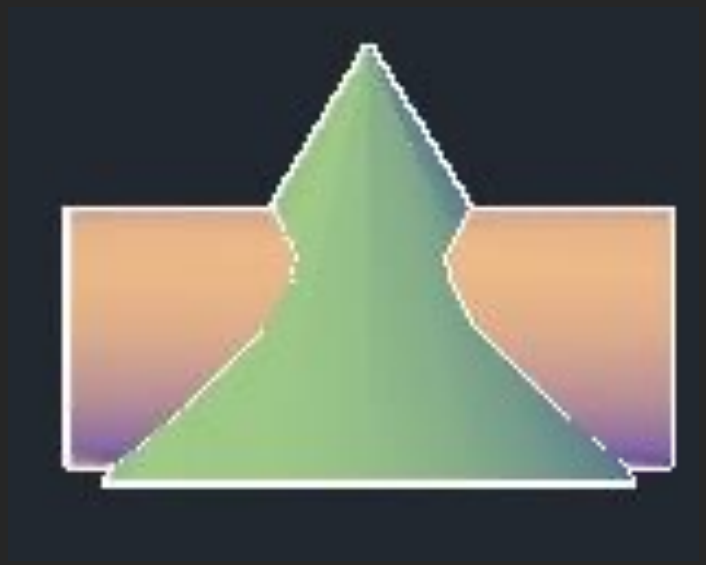
Note that the backside of the intersection overlaps with the front side.

Cylinder & Prism: Selected Line Method

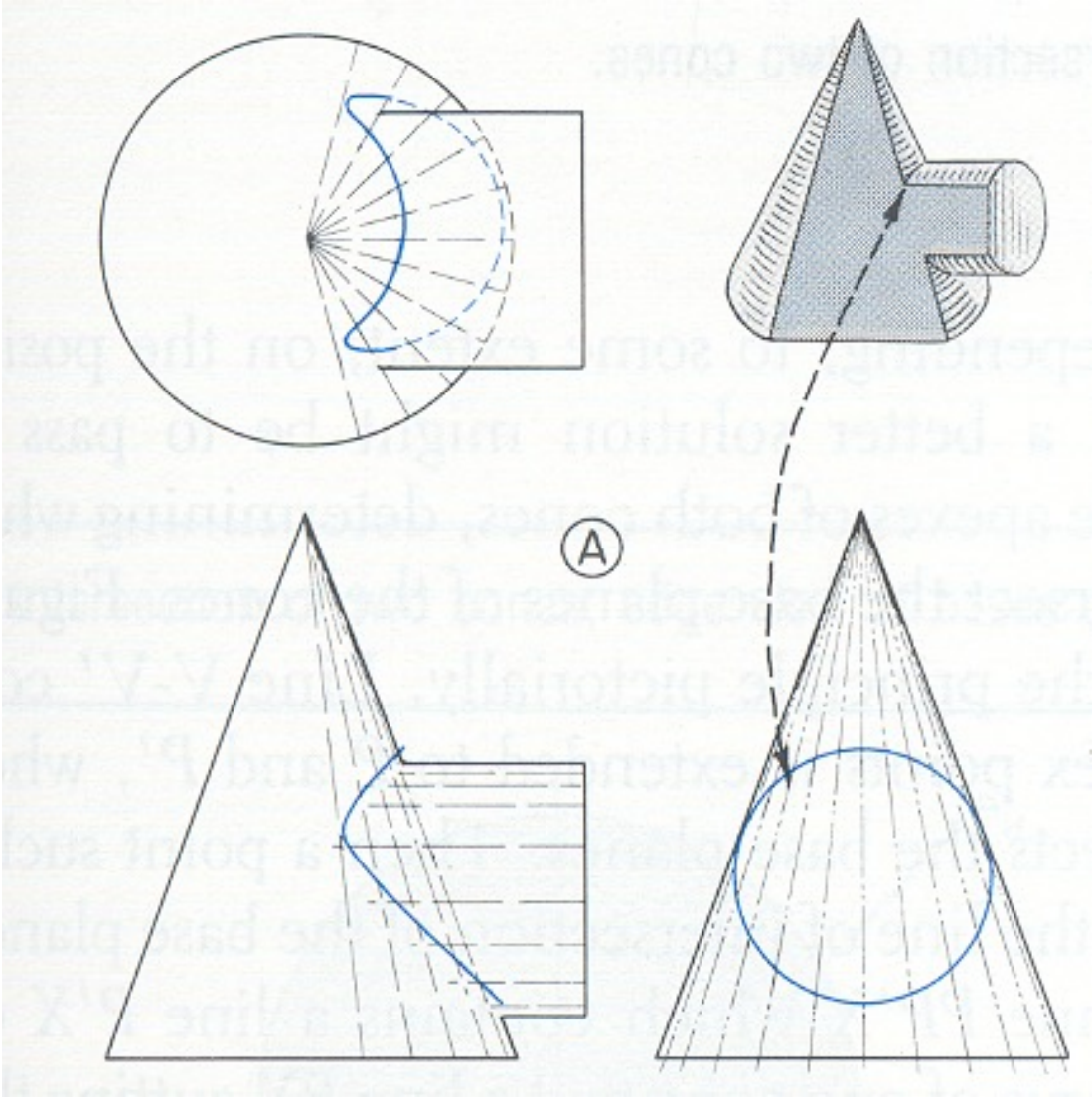


Note that the backside of the intersection overlaps with the front side.

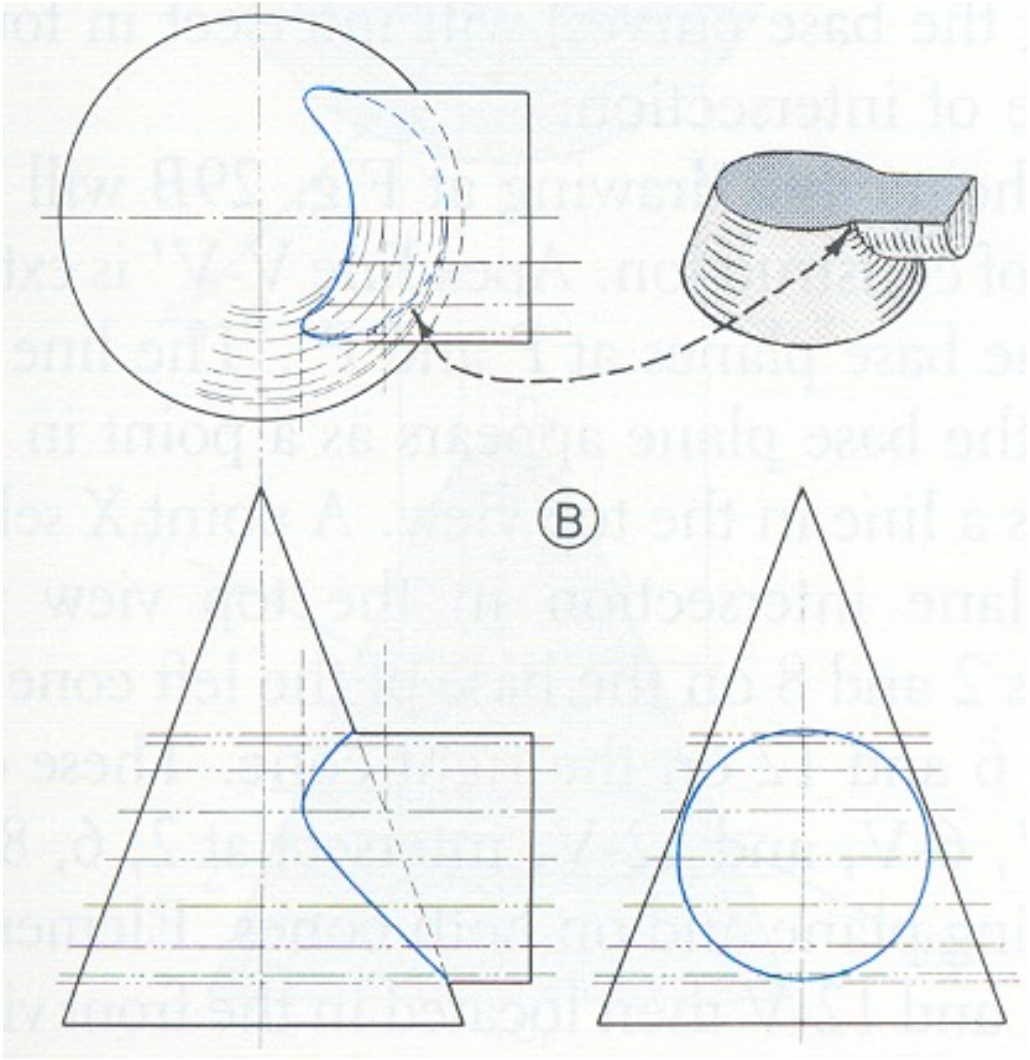
Cylinder & Cone: Selected Line Method



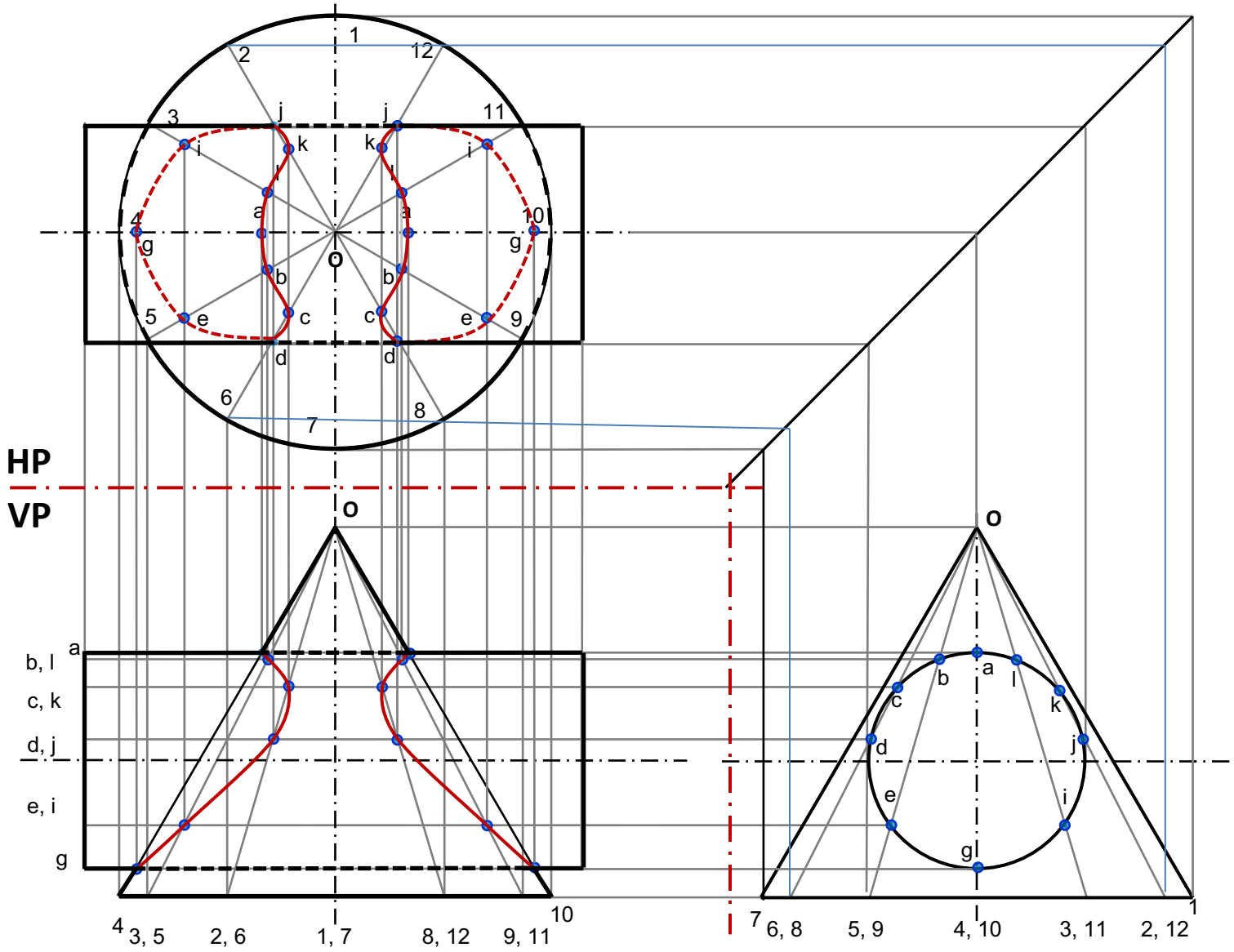
Intersection of Cone and Cylinder



Intersection of Cone and Cylinder



Cone-Cylinder: Selected Line Method




Thank You