

TA 101A:2019-20:II

Lecture 25 – Surface Intersections II

Dr. Bharat Lohani

Professor, Geoinformatics

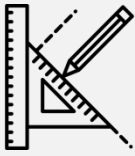
Department of Civil Engineering

IIT Kanpur, Kanpur

Office: WLE 113

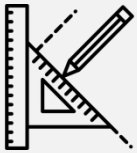
Phone: 7413

Email: blohani@iitk.ac.in



Recapitulation

- Intersection of line with a solid
 - General case (line and pyramid)
 - Specific cases (lines and different solids)
- Intersection of two planes
 - General case (Edge view and Cutting plane methods)
 - Specific cases (different cases of planes)
- Basic concepts used to locate the point of intersection between line and plane and two planes
 - Edge view method
 - Intersection of edge view of a plane and a line gives the point of intersection between the plane and line on the view
 - Intersection of edge view of a plane with other plane gives the line of intersection of two planes
 - Cutting plane method
 - Gives the intersection of a line with a plane
 - Joining the points of intersection of two sides of a plane A with another plane B gives the line of intersection between two planes A & B



Intersection of a Plane and a Prism

Step I: Determine the expected number of intersection points

- Line 1-4/EV \rightarrow 2 points
- Line 2-3/EV \rightarrow 2 points
- Vertical lines 9-14 and 7-12 / plane 1234 \rightarrow 2 points
- TOTAL 6 POINTS

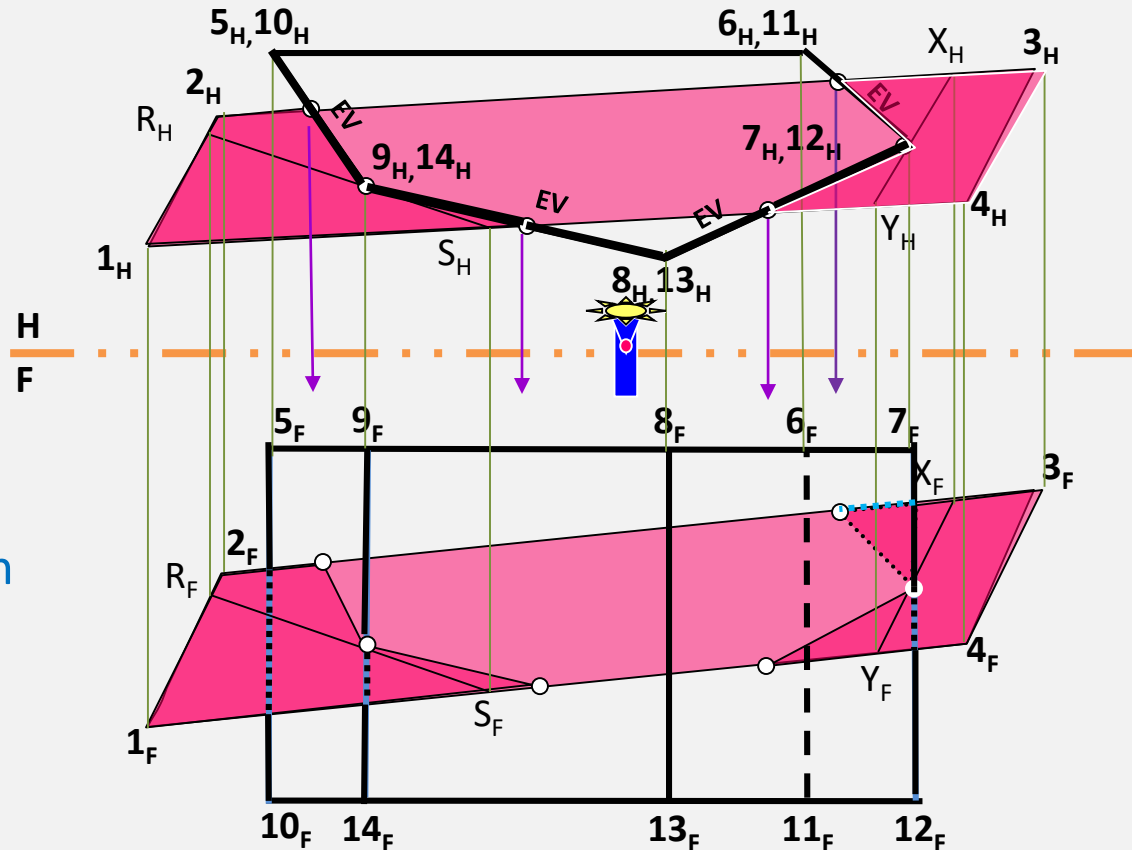
Step II: Locate intersection points

Step III: Connect the intersection points in logical manner

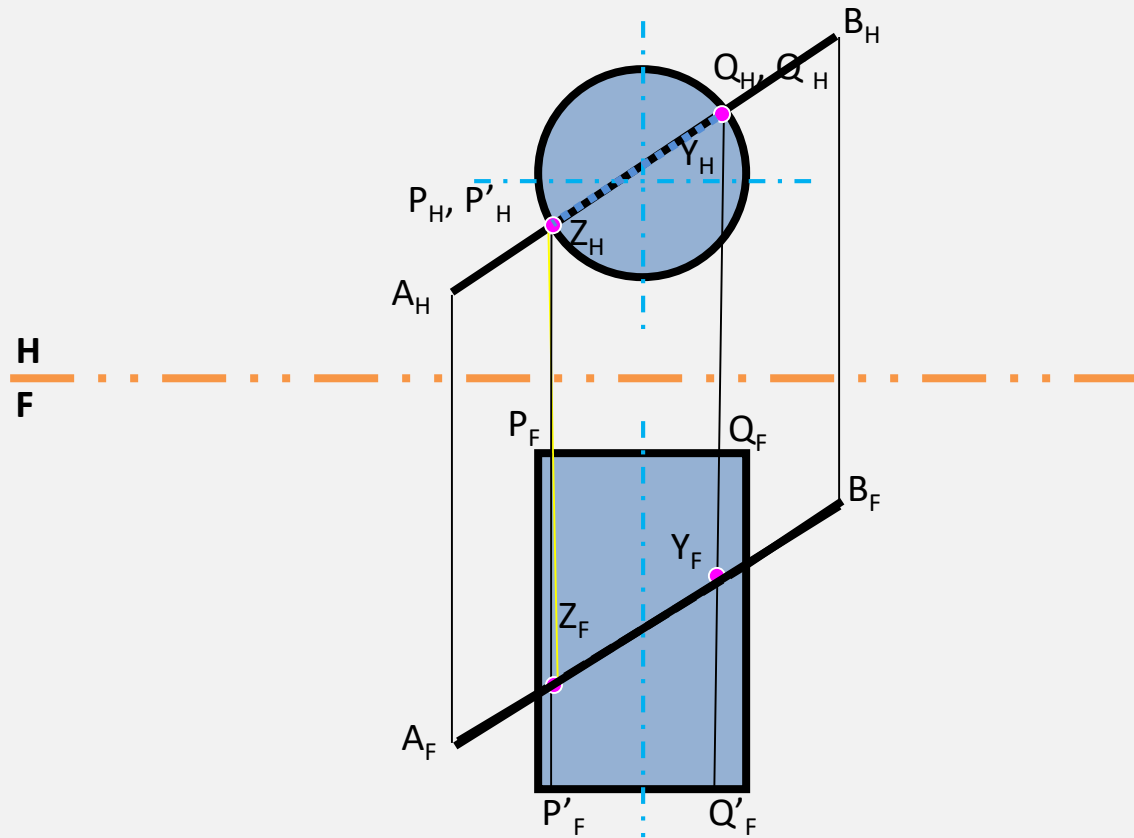
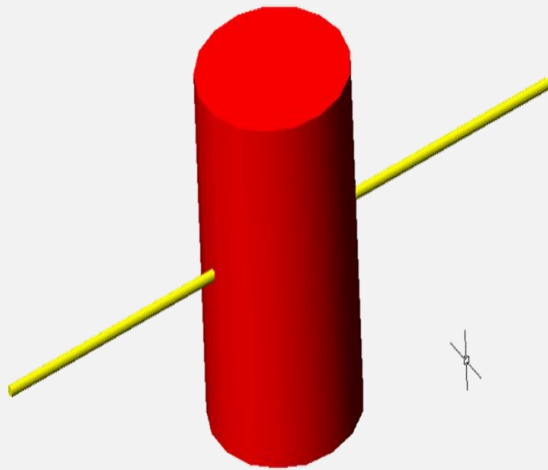
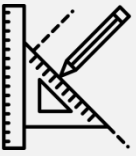
\rightarrow Move clockwise from IP to IP

Step IV: Determine the visibility

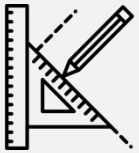
- Visibility of plane in regard to the prism
- Visibility for the paths of intersection.



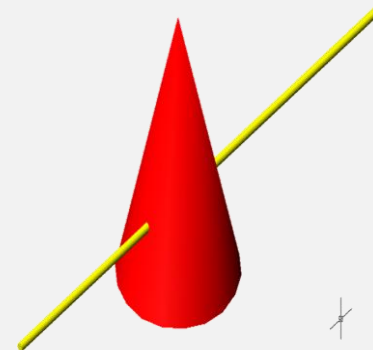
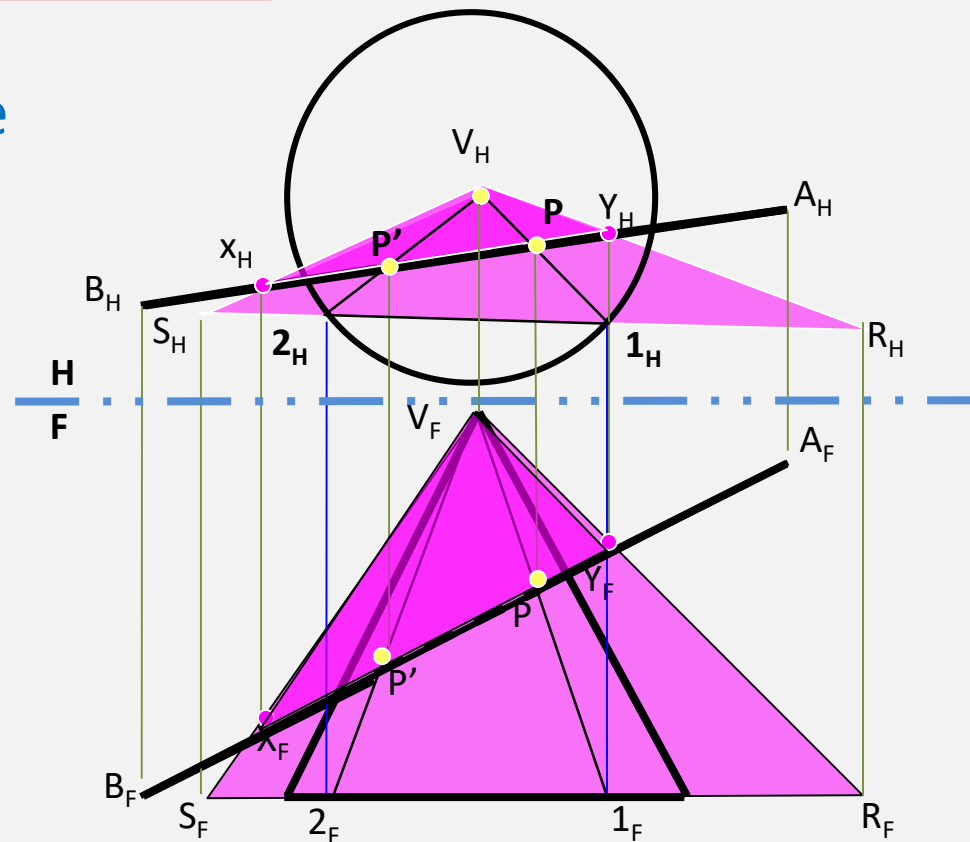
Intersection of a Line and Cylinder



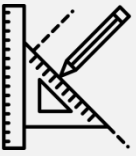
Intersection of a Line and a Cone



- A plane containing the line and passing through the apex of cone will intersect the cone in straight lines
- First create this plane as VXY and later extend to base i.e. VSR
- Find where plane VSR cuts the base curve of cone
- V-1 and V-2 are lines on the surface of cone intersecting the line AB at its point of entry and exit into the cone

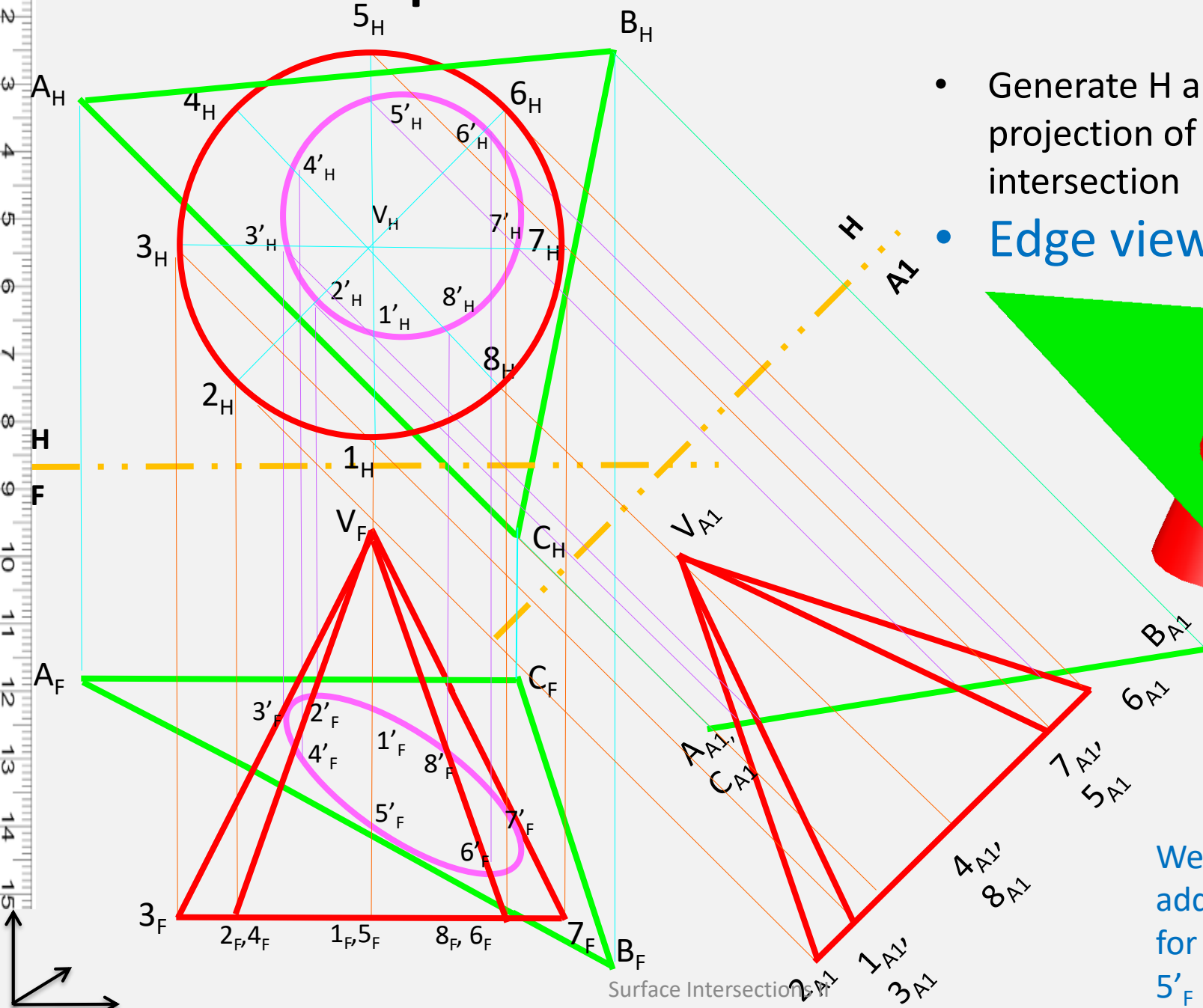


Intersection of plane and cone



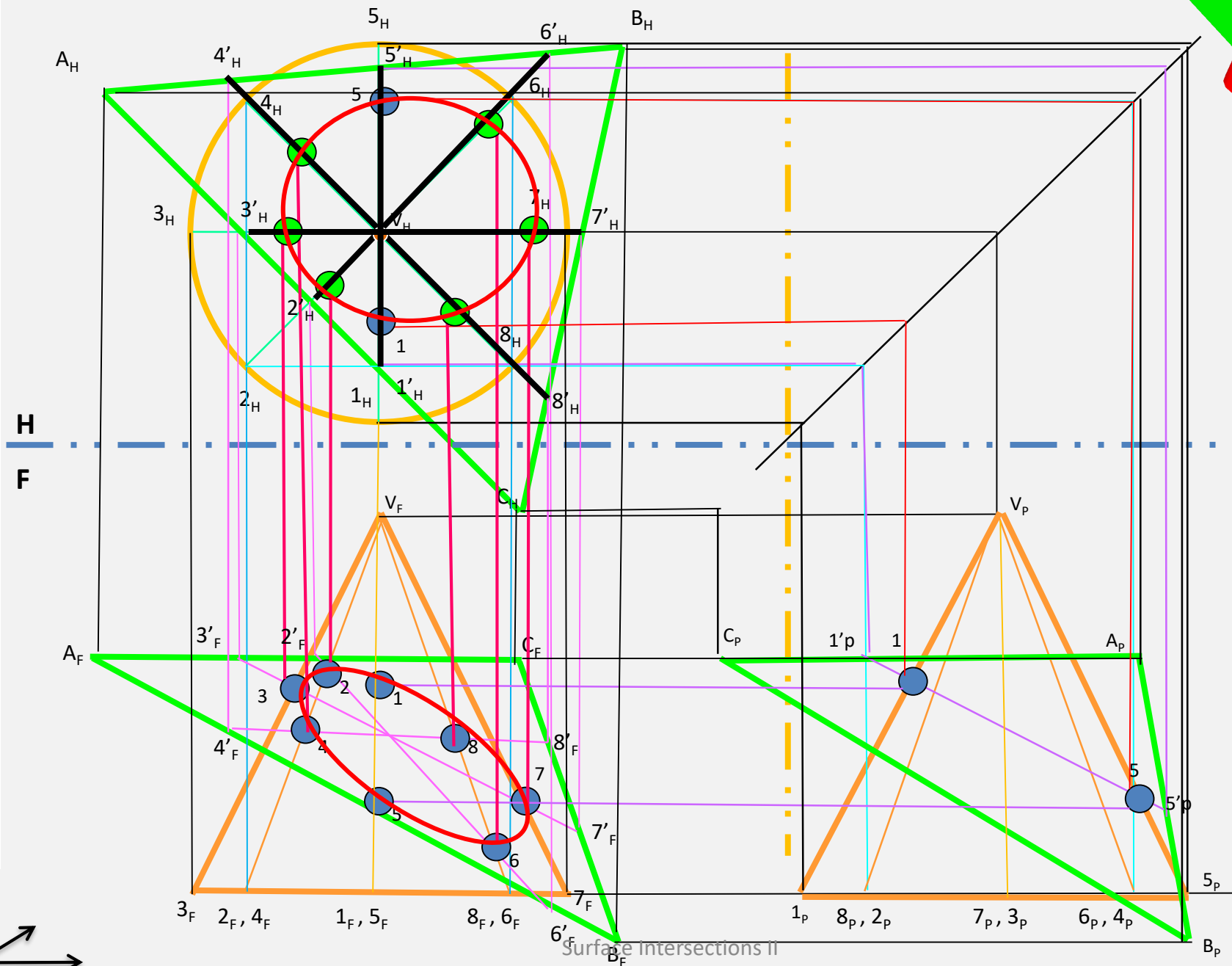
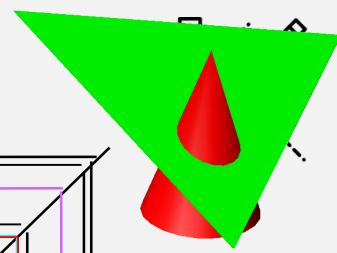
- Generate H and F projection of the line of intersection

- Edge view method

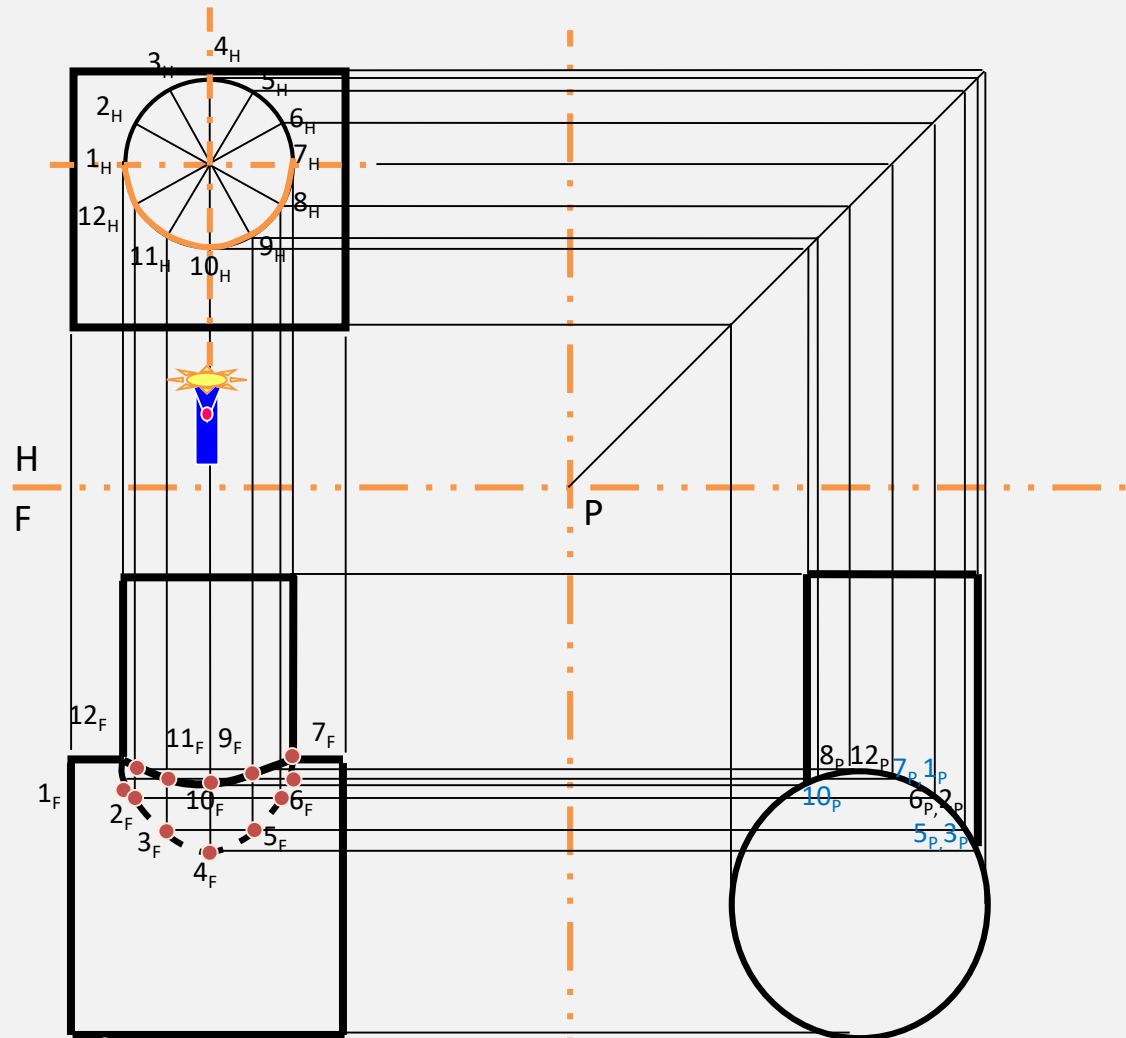
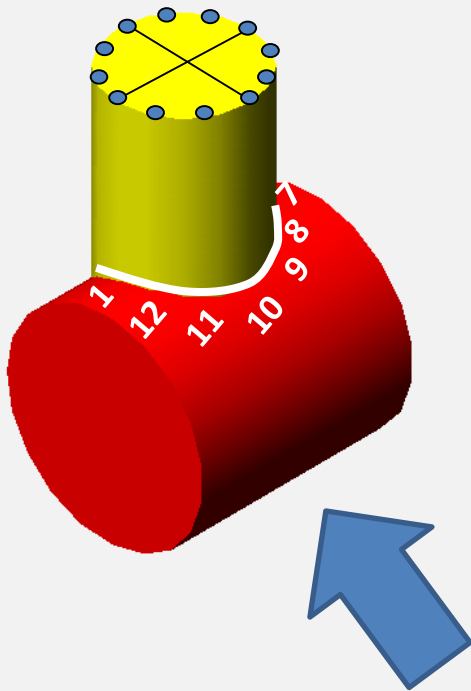
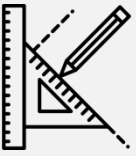


We will need additional views for $4'_H$, $8'_H$ and $1'_F$, $5'_F$

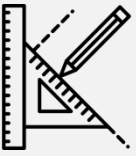
Intersection of plane and cone—Cutting Plane Method



Intersection of Two Cylinders



Surface Intersections II



Thank you !