

# User Manual 3.3 Facets

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### Definition

A facet is a surface defined by its area and a normal vector, no supposition made of its exact shape. From those information, it can compute its cross section seen from any incidental vector.

A facet is visible only from one half-space : the cross section computed is not null only if the dot product with the incidental vector is negative.

It shall be used to describe a spacecraft geometry in cross section computations for force models.



### Implementation

This class implements the `CrossSectionProvider` interface (`org.apache.commons.math.geometry.euclidean.threed`).

Please refer to the [Javadoc](#) for a complete list of public methods.

### Instantiation

The `Facet` class is built from its area and normal vector :

```
Vector3D normalvector = new Vector3D(1.0, 5.6, -3.2);  
CrossSectionProvider facet = new Facet(normalvector , 5.0);
```

### Usage

The `Facet` class proposes basic methods to get its area and normal vector.

It also provides the method `getCrossSection` (`CrossSectionProvider` interface), that shall be used this way :

```
Vector3D incidentalBeam = new Vector3D(7.0, -2.0, 8.0);  
double crossSection = facet.getCrossSection(incidentalBeam);
```

The result is not null only if "`incidentalBeam`" dot product with "`normalvector`" is negative.

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