Coordinate system

Visual Components Premium 4.3 | Version: June, 2021

This tutorial will introduce the use of coordinate system.

In this tutorial, you will go through:

1. Coordinate system overview
2. Components origin
3. Color coding
4. Coordinates of multiple components
5. Coordinate values
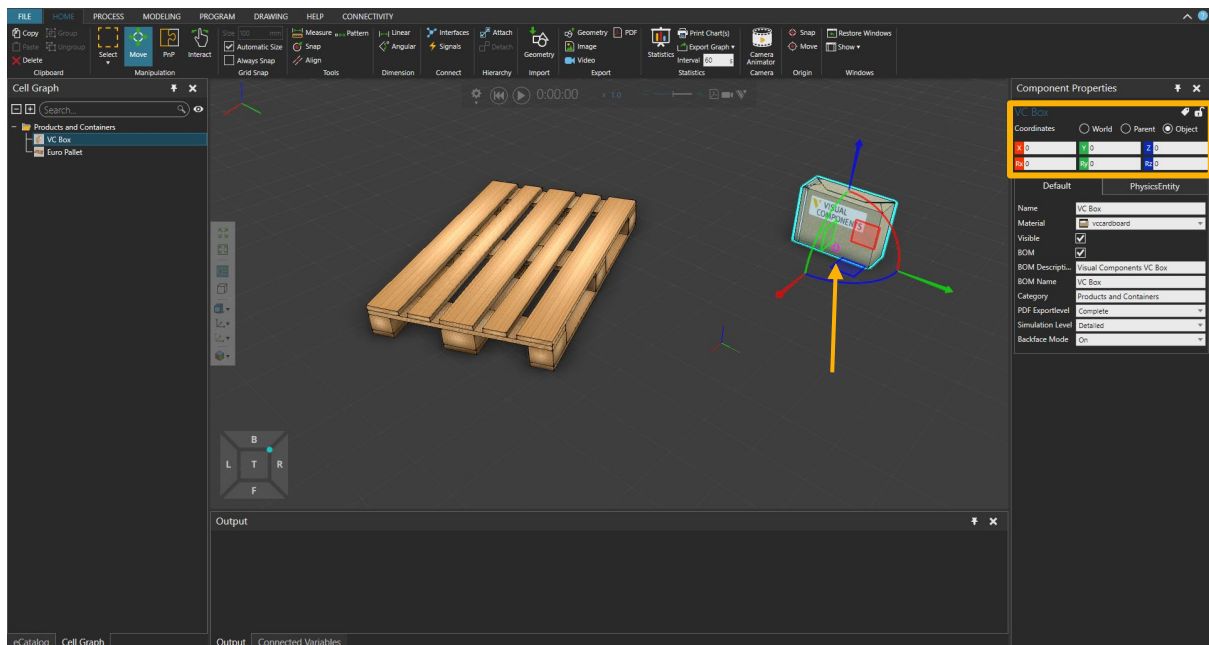6. Coordinate system selection
7. Coordinate system in different scopes
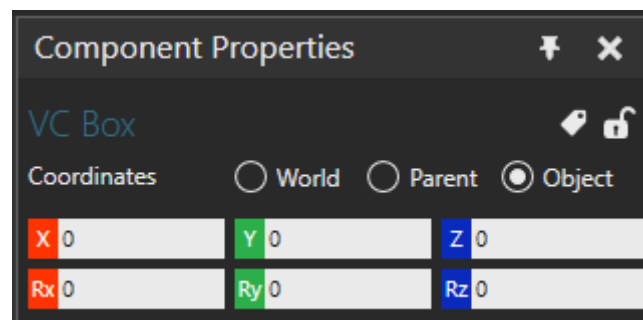
Coordinate system overview

The coordinate system is used to describe and define where objects are located in three-dimensional space. All components and nodes have a location in this space. The location of the object is defined with a matrix called coordinates, or coordinate system.


Selected objects coordinate system can be seen and modified from properties tab.

Coordinates are built from objects position axes (X, Y, Z) and orientation (Rx, Ry, Rz) in that position. Orientation of an object is defined as degrees of rotation around those same axes.

Component's origin

Objects coordinate system refers to selected objects Origin. If object origin is moved, also coordinate system updates itself.
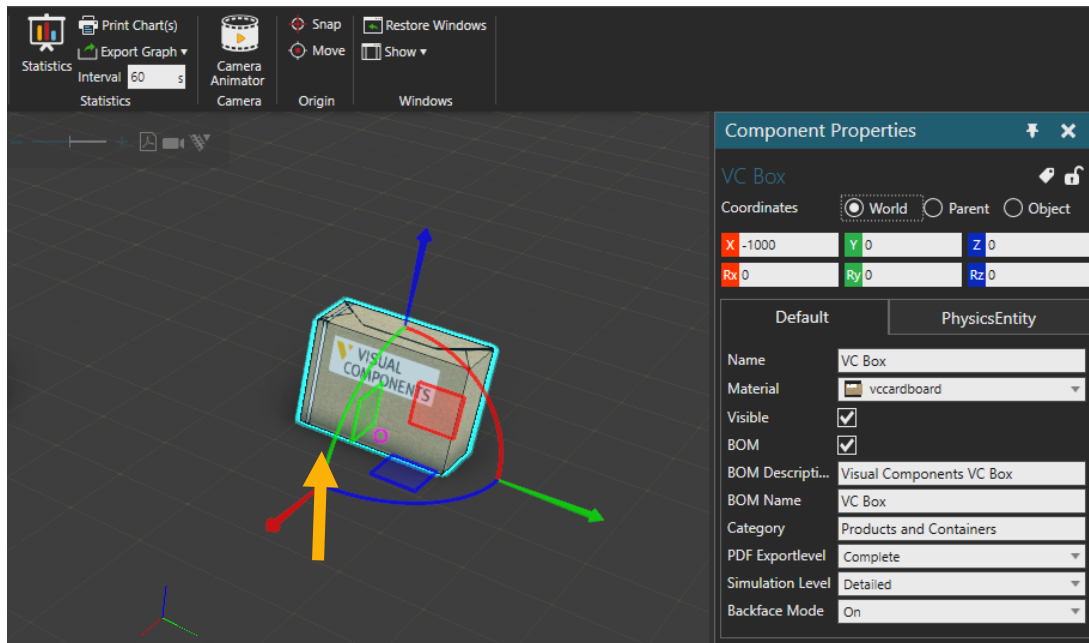

In this example, origin of a component is in the bottom of the component and component is located one meter offcenter from the world.
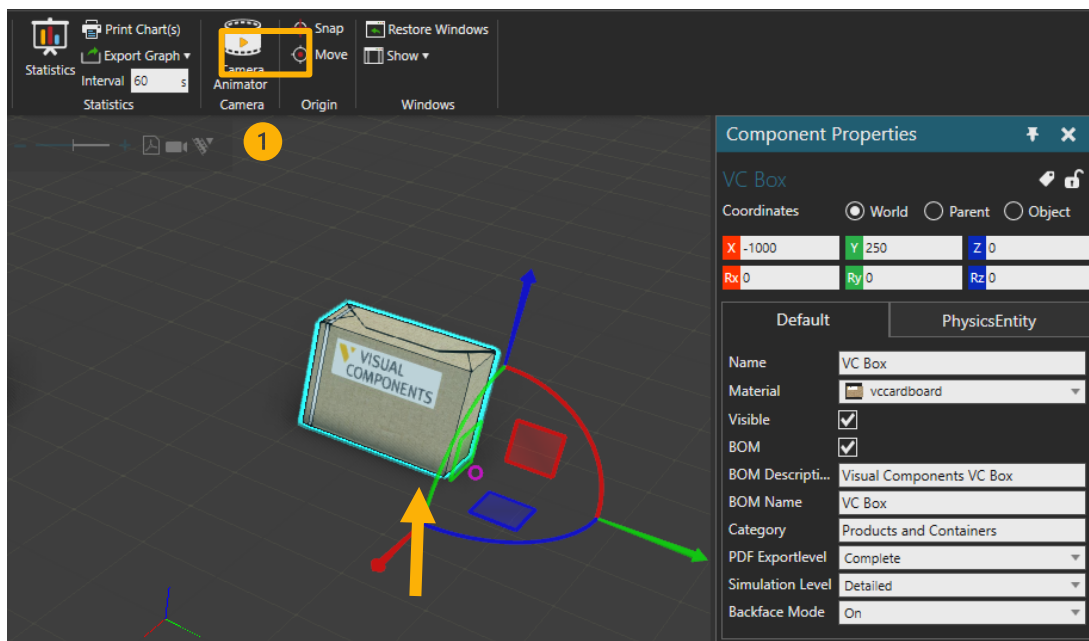
If origin is moved (marked with ① in above Figure) 250mm into Y axis direction, components's visual position in 3D environment remains same, but component's position has changed in coordinate system.
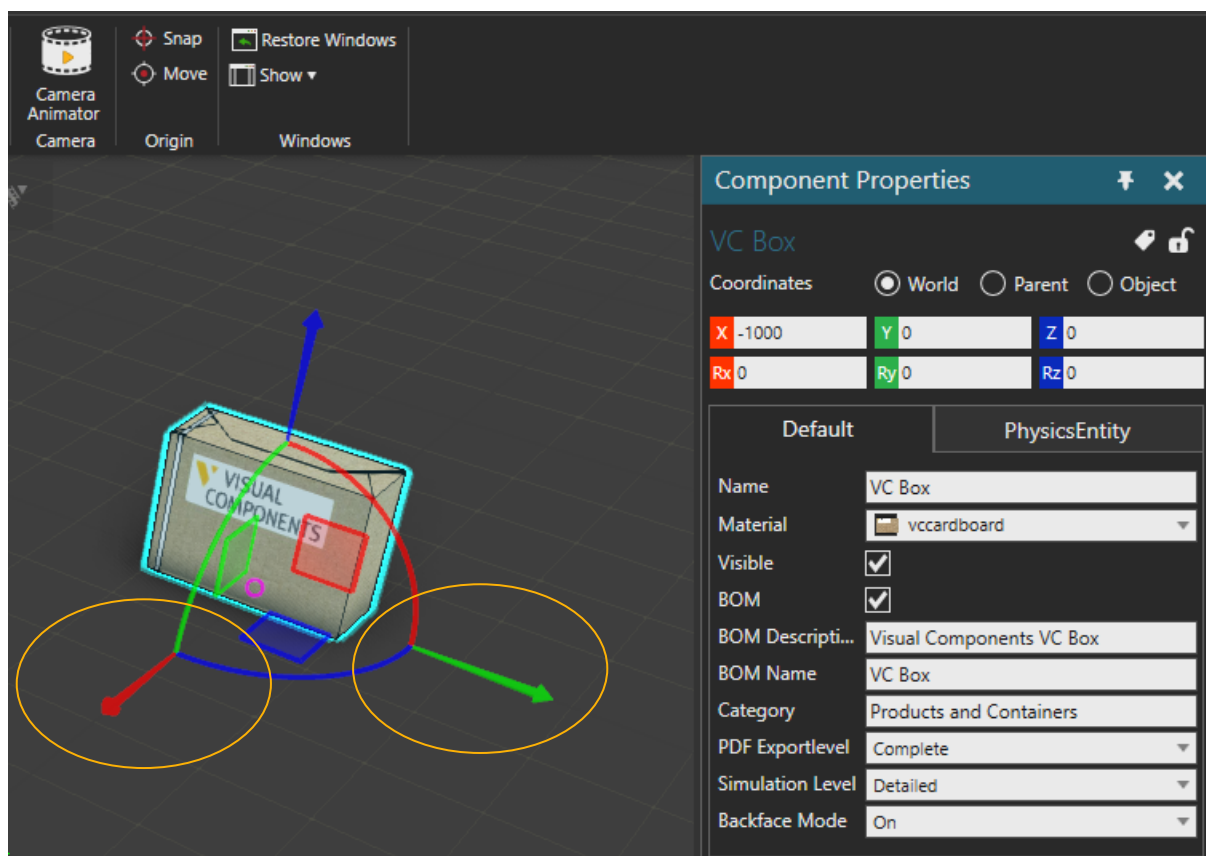
Color coding

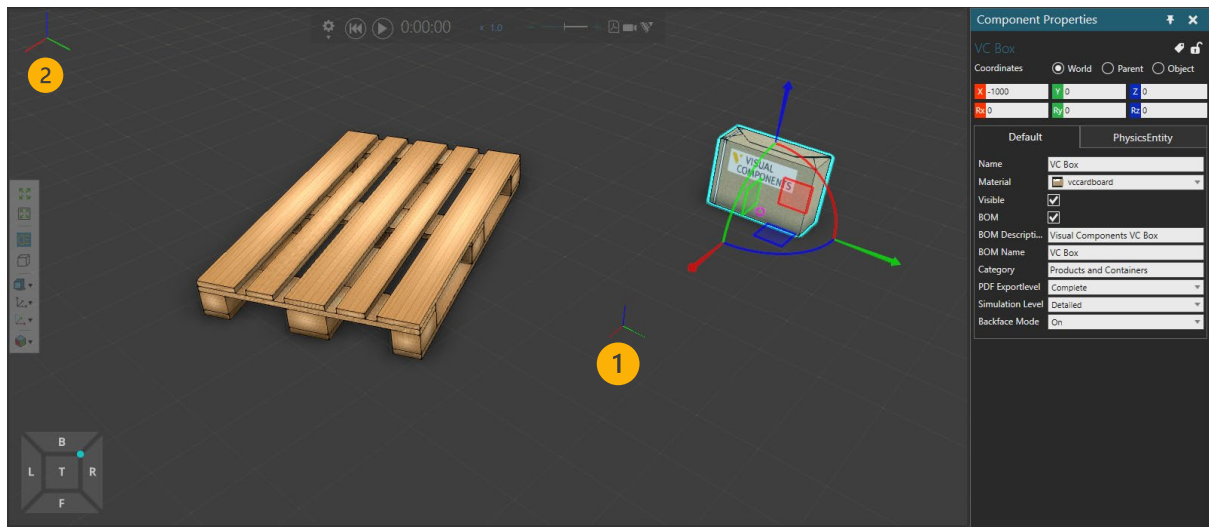Coordinates are also color-coded. Red is X axis, Green is Y and blue is Z axis.
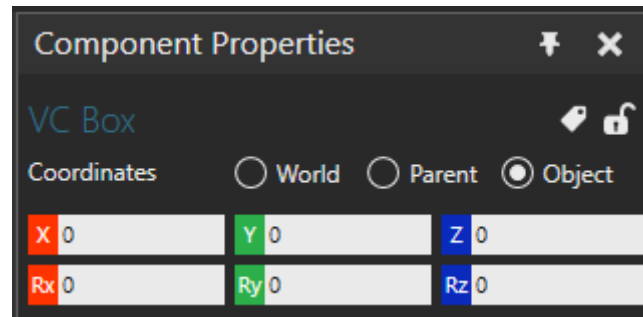
Colors can be referred also from the coordinates in property panel.

Common practise in components is that the X axis is the direction of travel or the "length of the component" while Y is the Width.

If move tool is active, you can see the same axis information and color coding in 3D space.
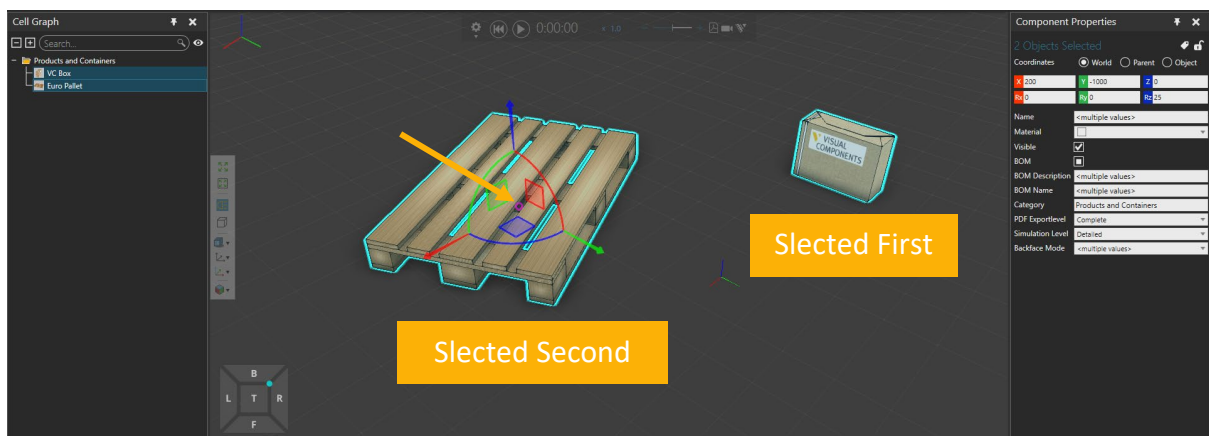
World origin (①) and floating origin (②) represents the XYZ axes of the World coordinate system. World origin visibility can be changed from the backstage (File → Options → Display).
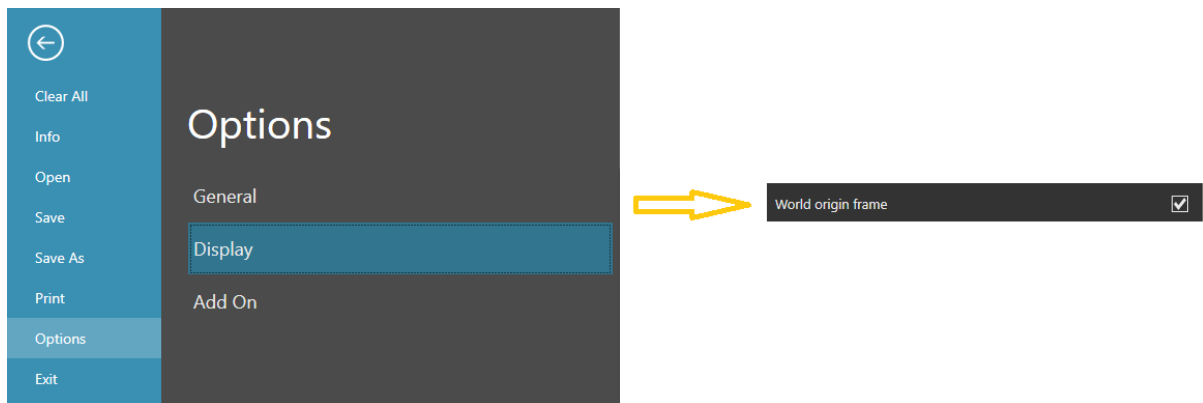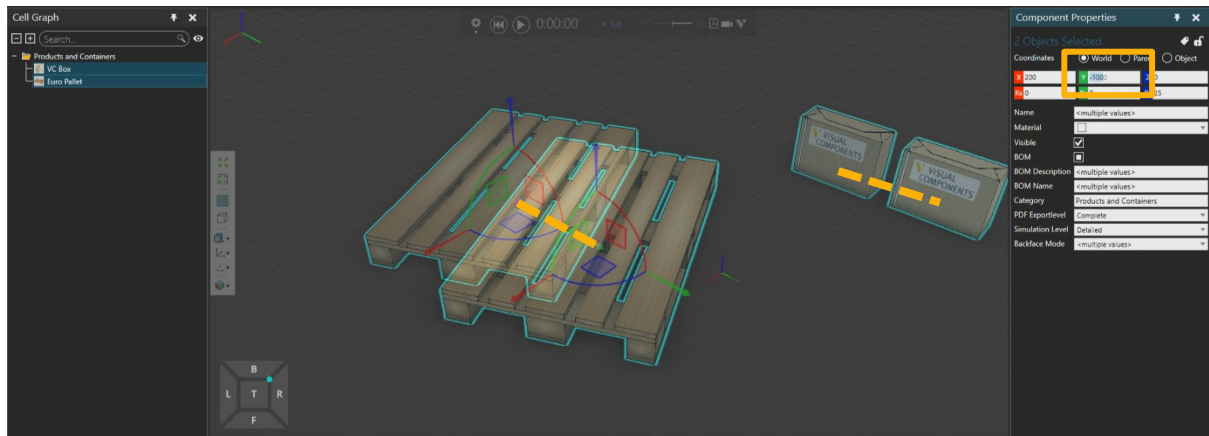

Coordinates of multiple components

If multiple components are selected, coordinates of last selected object are shown.
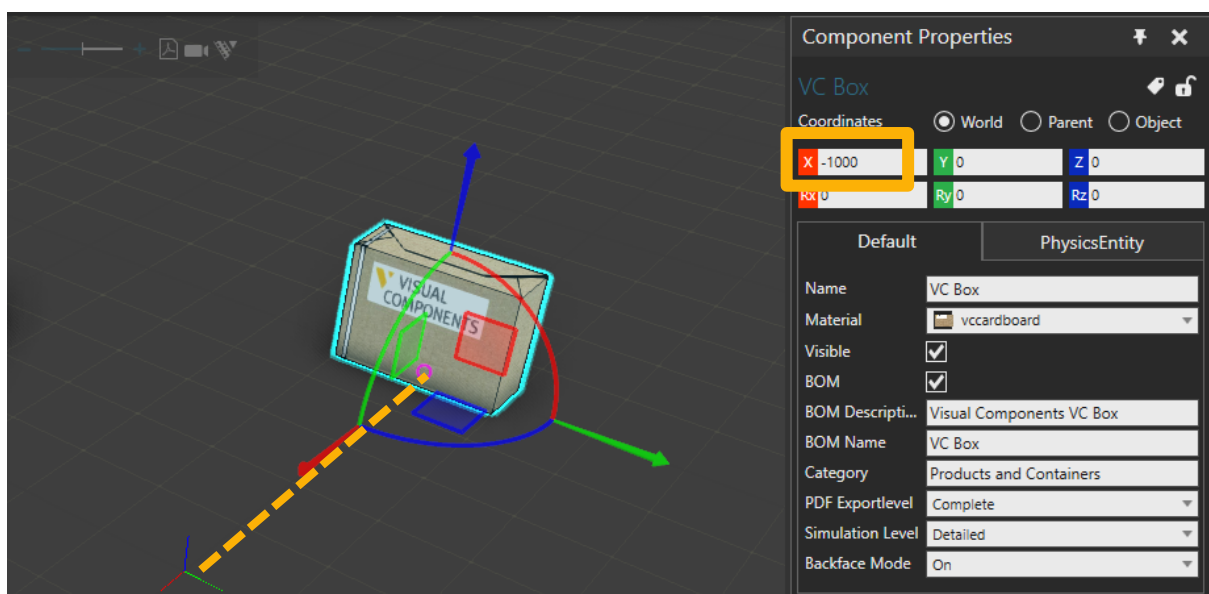
Box is selected first, then pallet. Property panel shows only common properties for both objects and pallet's coordinates.
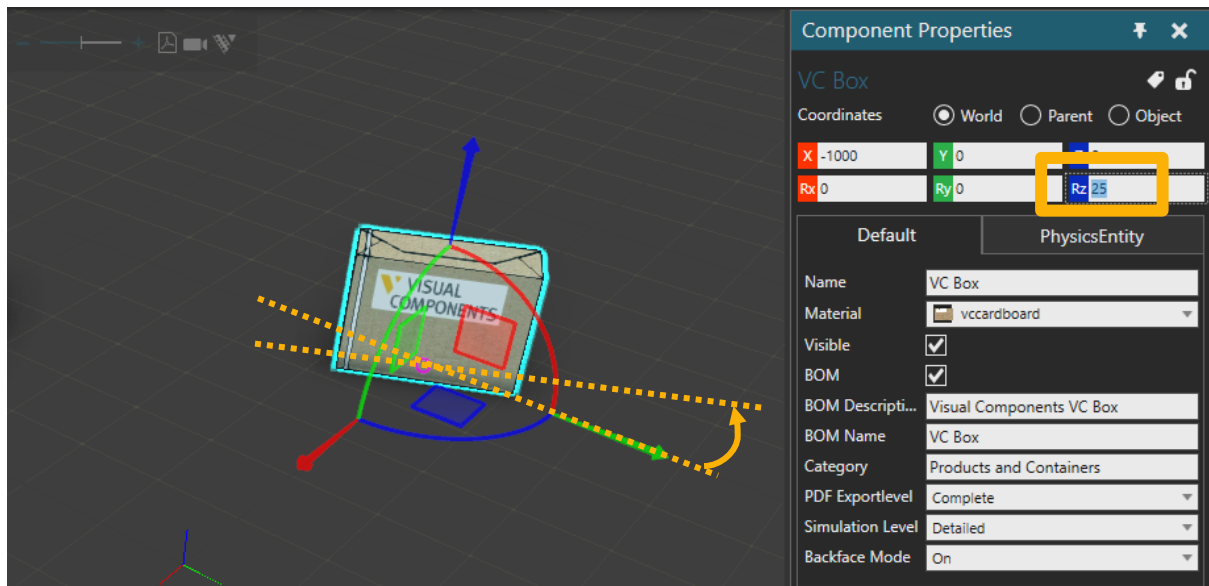

If pallet is moved, rest of the selection will move same amount.
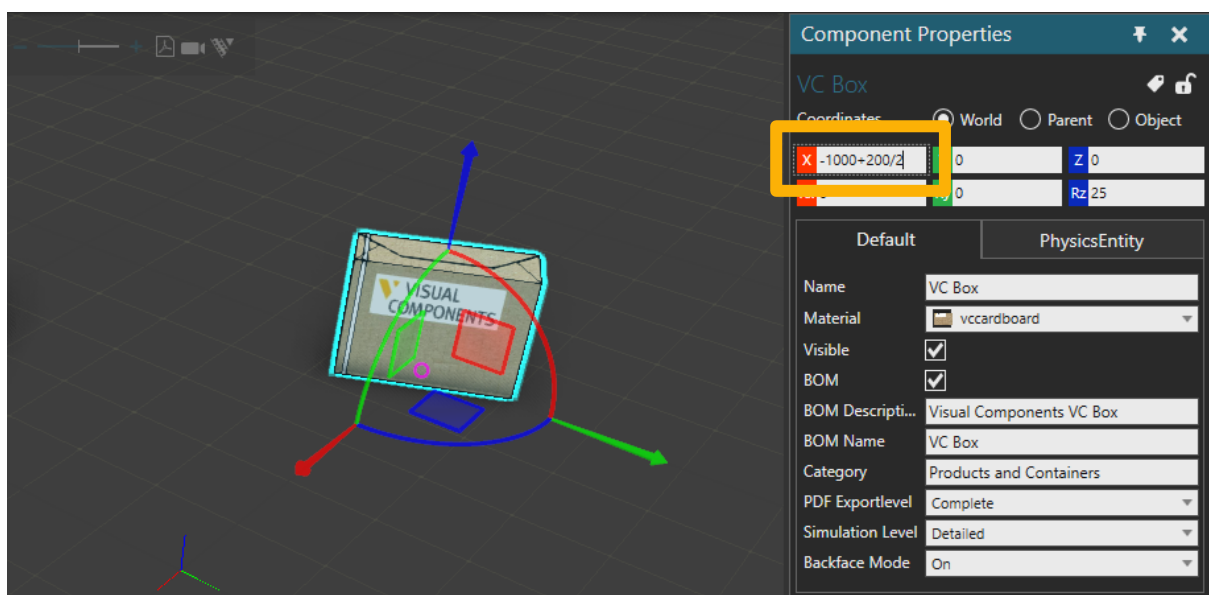
Coordinate values

When entering values directly to coordinates axis values, basic arithmetic and trigonometric functions can be used. End result will remain in axis value.

Box 1 meter offcenter from the world

Same box rotated 25 degrees around Z axis.

Box's X axis moved towards world center 200mm divided by 2 from the original position of -1000mm (end result will be -900mm).
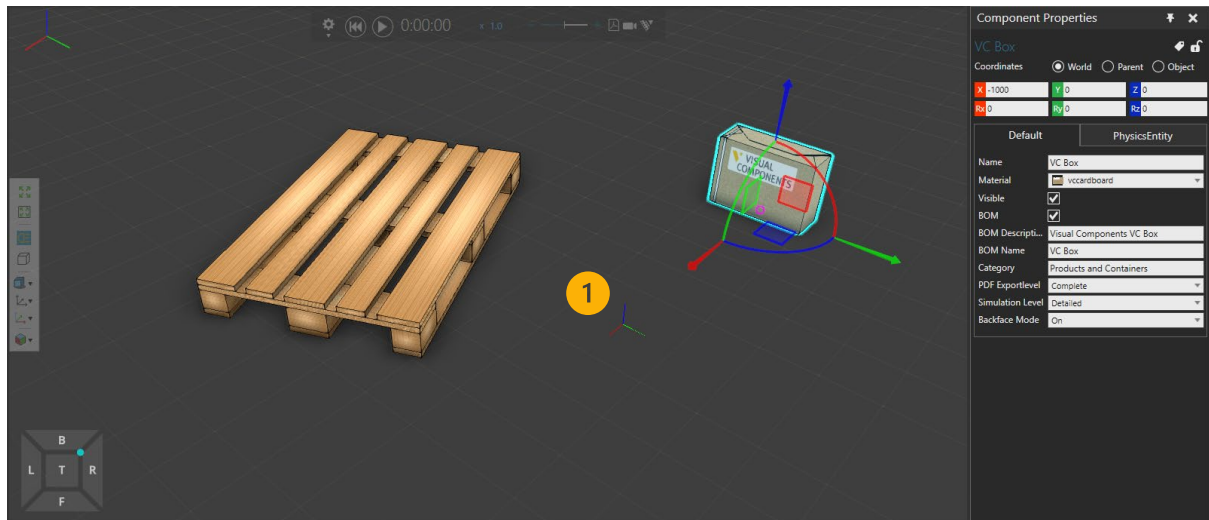
Coordinate system selection

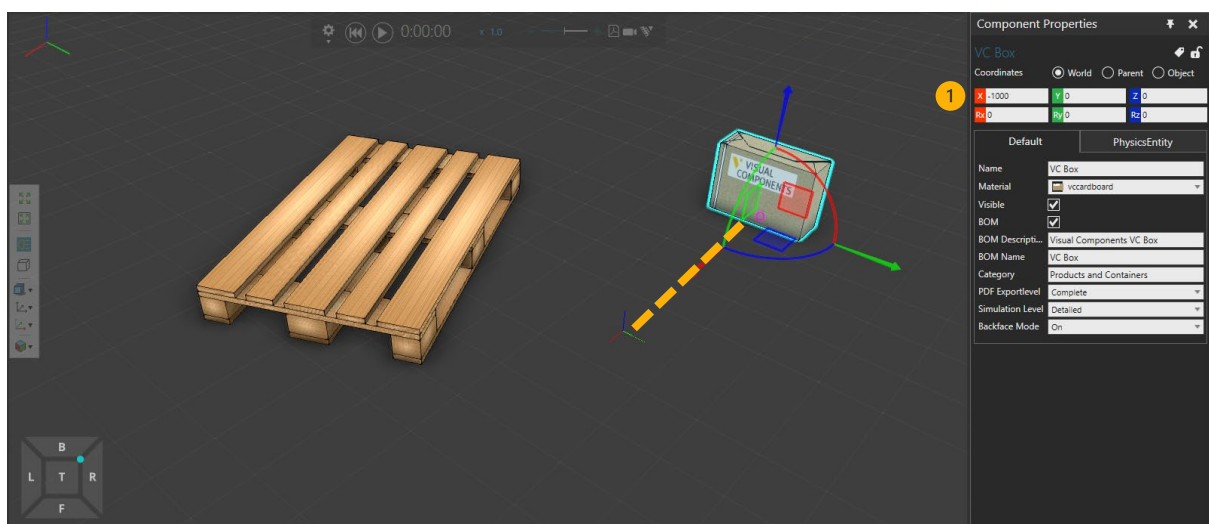There are three available selections for objects coordinate system:


World, Parent and Object.

World is a global coordinate system with a fixed origin. World origin visibility can be changed from the backstage.

This fixed origin is 3D worlds center (①) and if objects coordinates are all zero, then component is located into middle of the 3D world.
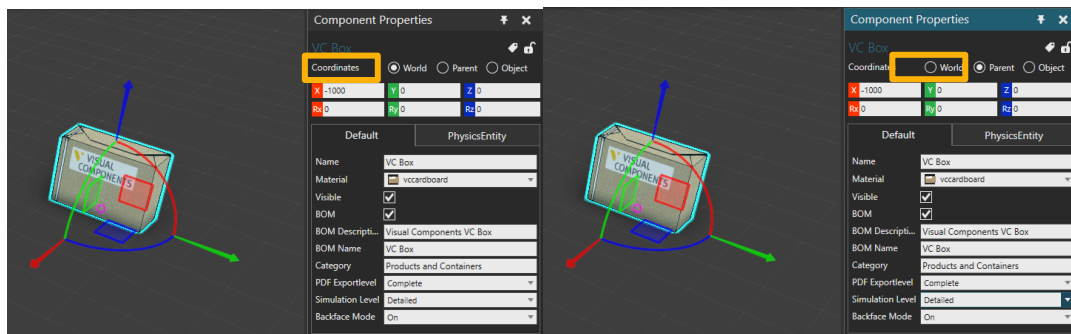

If object is moved for example -1000mm in X axis (①), the object (objects origin) is moved one meter away from world origin.
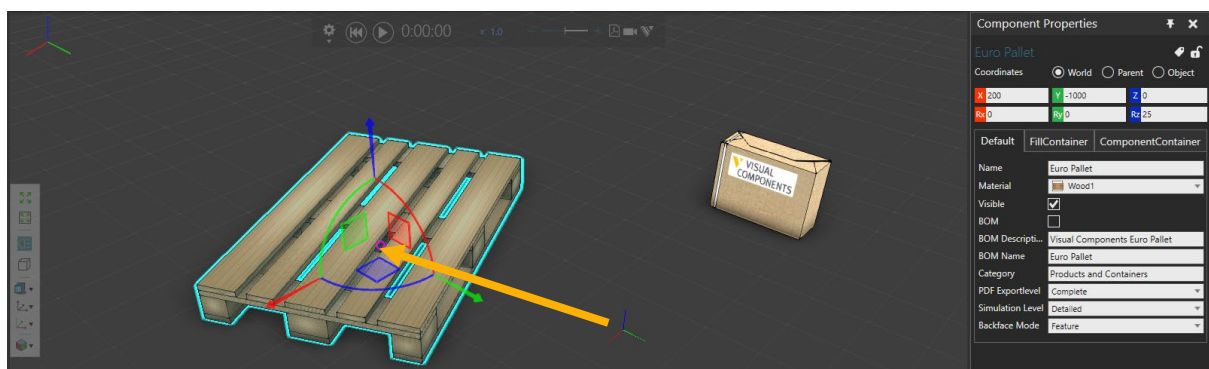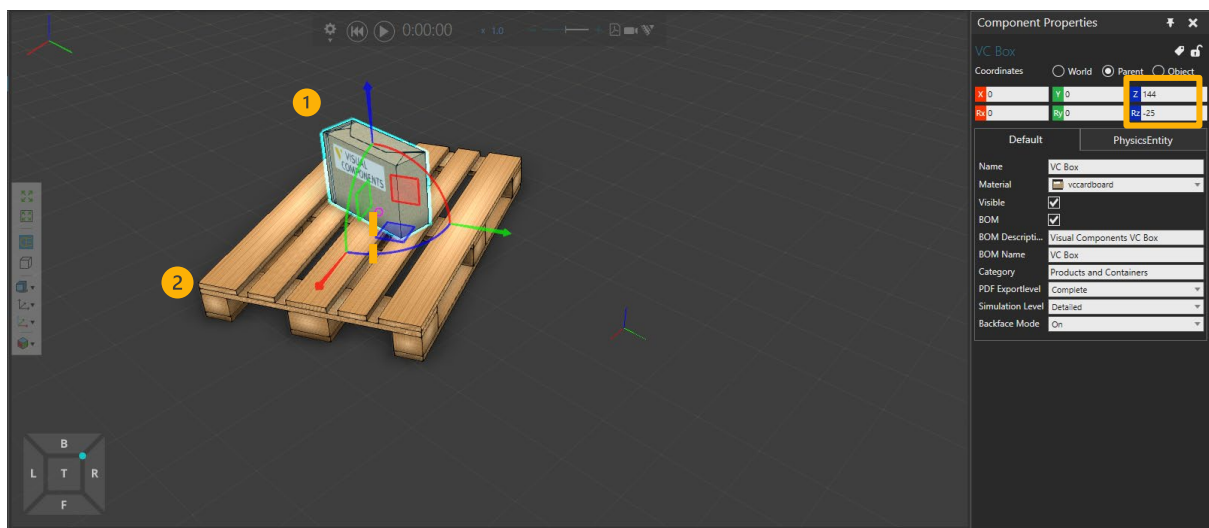

Pallet's position and rotation compared to World coordinate system (zero).

Parent references the object coordinate system of a selected component's parent.


If a component is not attached to a node in another component, the parent of a selected component is the 3D world. In that case, both the World and Parent coordinate systems would have the same origin.

If object (①) is attached to another object (②) (or node), the coordinates describe and define the location of the object compared to parent objects origin. In this example, Boxes coordinates compared to its parent (②, pallet) is displayed in property panel (145mm above the pallets origin and 25 degrees of rotation)
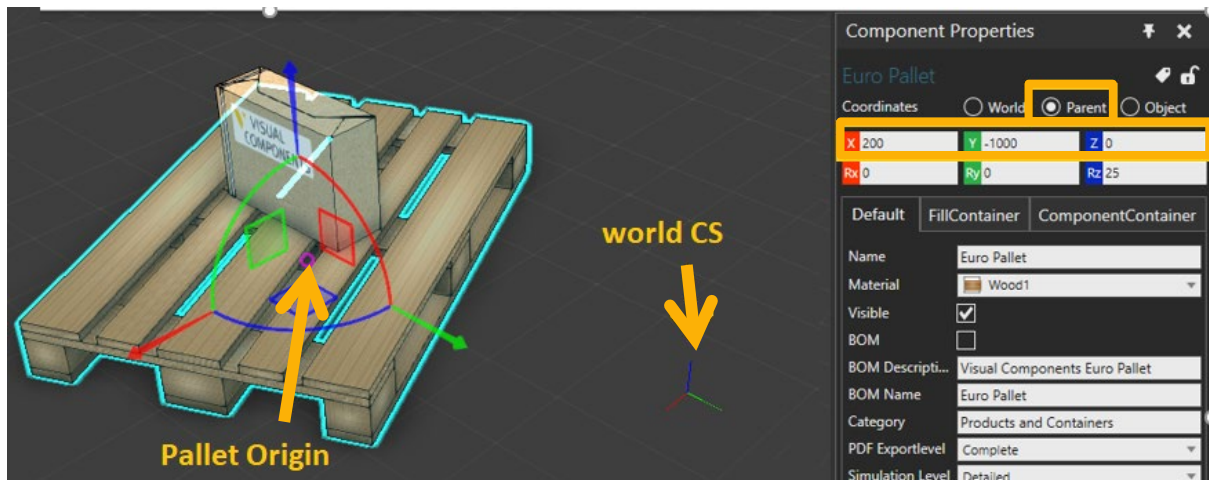
If pallet is selected, its location in World is shown, as pallet has no parent (Both World and Parent coordinate systems will display same values). In this example, pallet is moved 200mm in X axis, -1000mm in Y axis and rotated 25 degrees over Z axis.
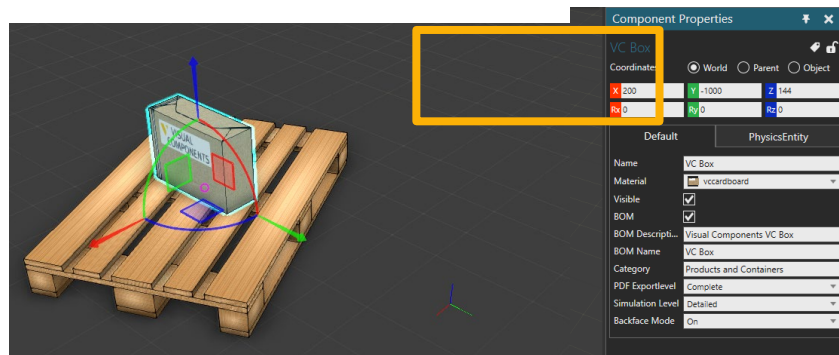

If box is selected and World coordinate system is used, user can see boxes location in World even it is attached to some parent. Coordinates are combination of parent components location and Boxes location compared to its parent (e.g. Rotation of pallet is 25 degreen over Z axis and boxes rotation comparent to its parent is -25 degrees over axis. End result in World coordinates is 0 degrees over Z axis)

Last selection is **object** coordinate system.
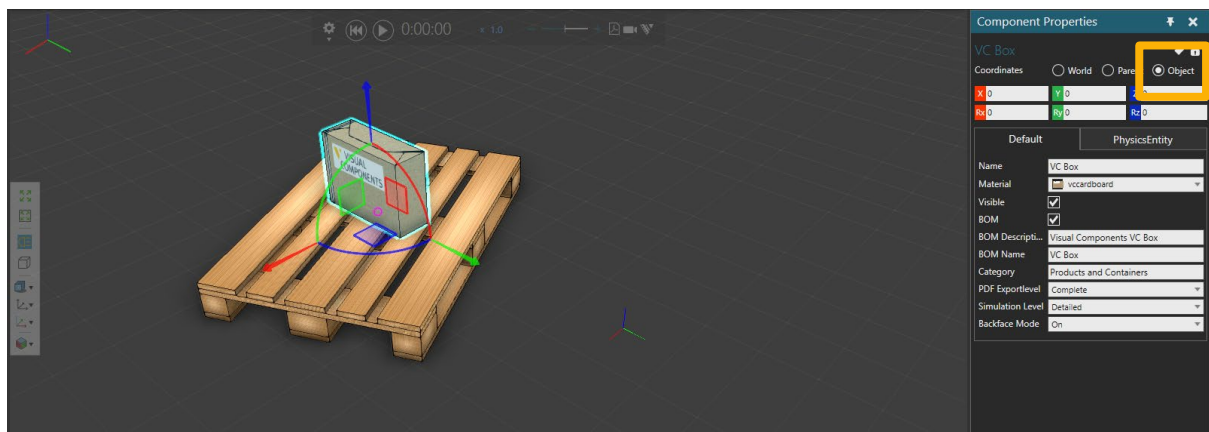
Object references a selected component's own coordinate system. That is, the location of a component is relative to its own origin.
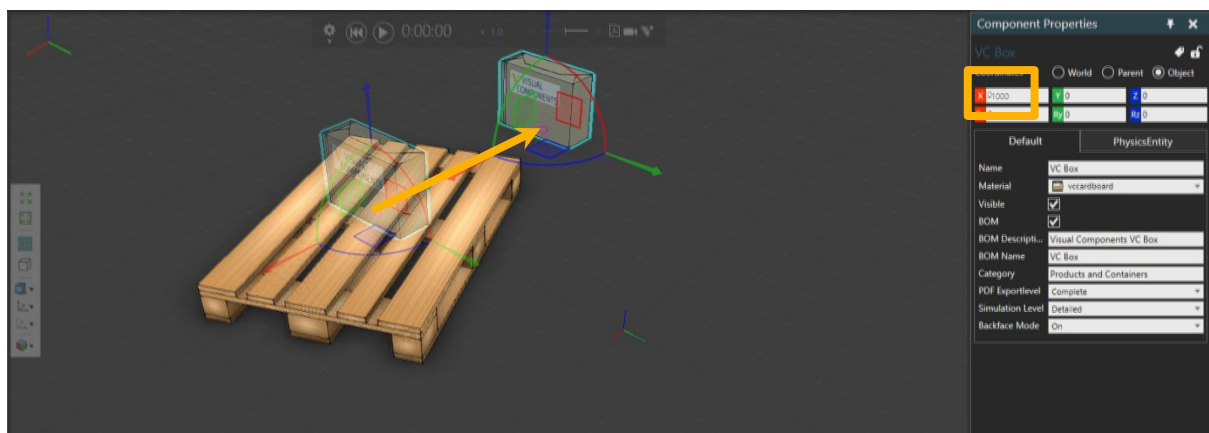

When object is moved with move tool or from coordinates, coordinate system will show the object location compared to the original location prior movement until some other component is selected or some other action is executed.
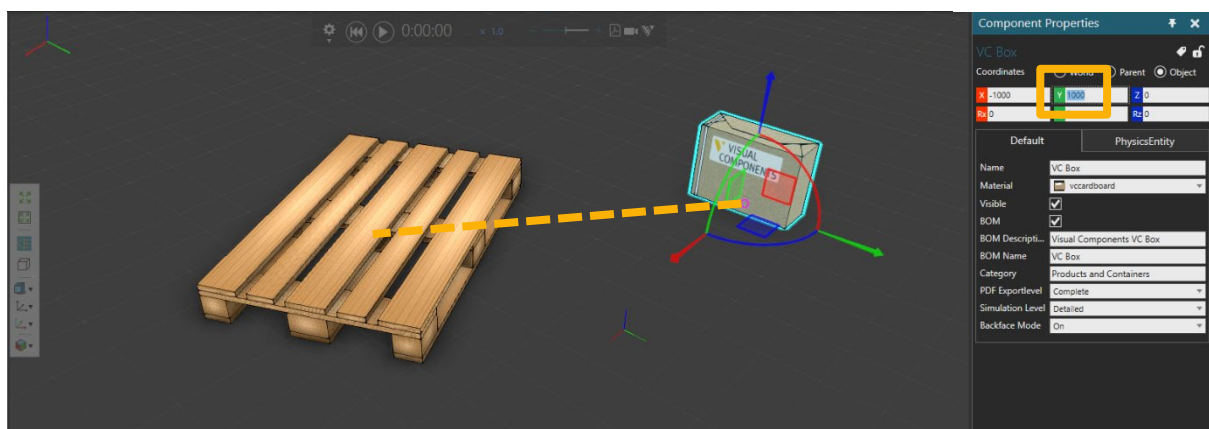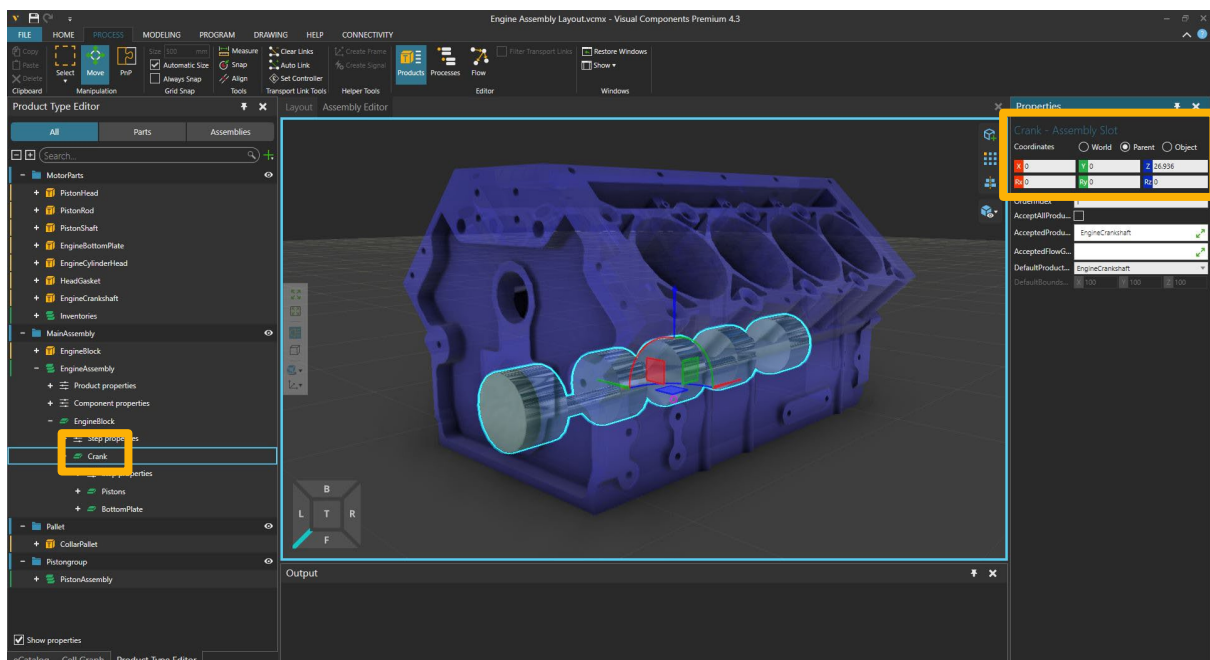

Box is moved second time in Y axis. Coordinates display location compared to original position.
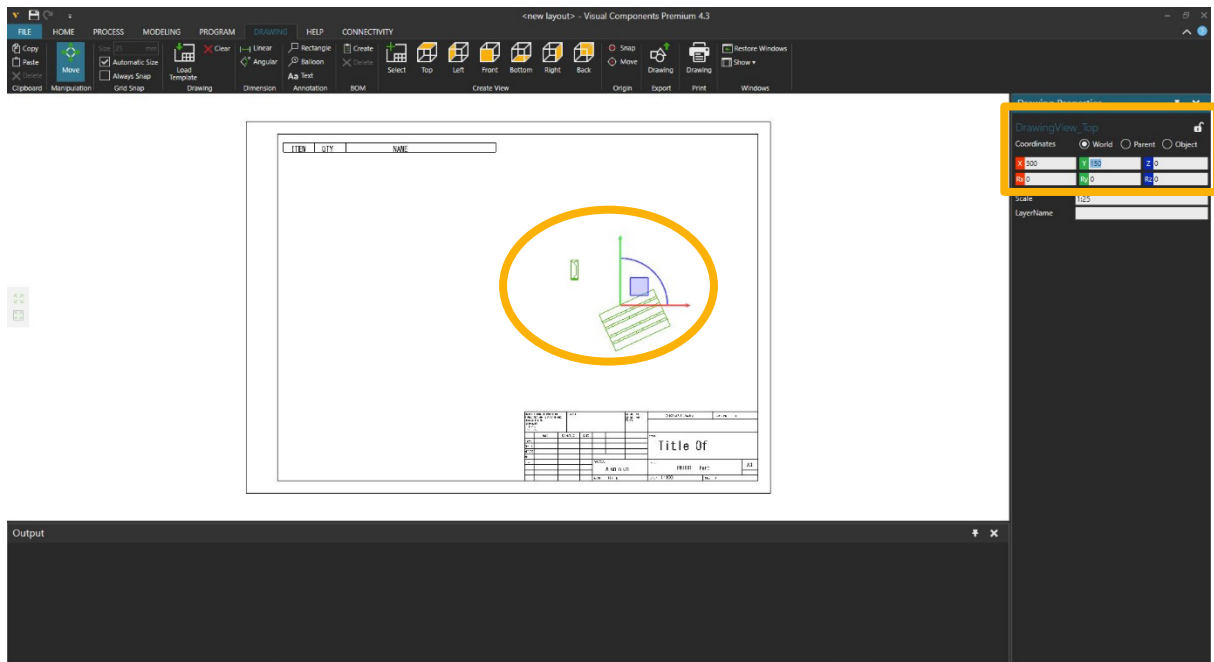
Coordinate system in different scopes

This same coordinate system and three selections are used everywhere in the software.
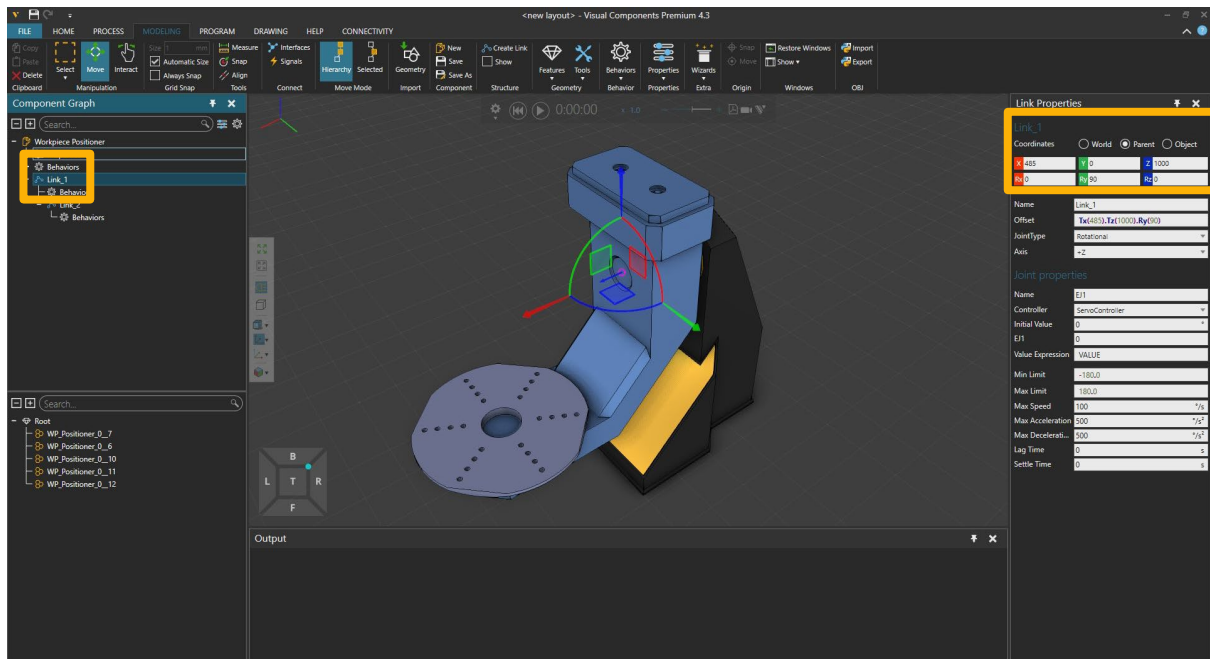
For example, node location in robot positioner compared to components origin in modelling tab.

Slots location compared to steps origin in assembly.

Views location compared to template's botton -left corner.

As a wrap-up, coordinate system describes the components' current position and orientation (origins) compared to world zero position, to its parent or to itself, when object is moved.