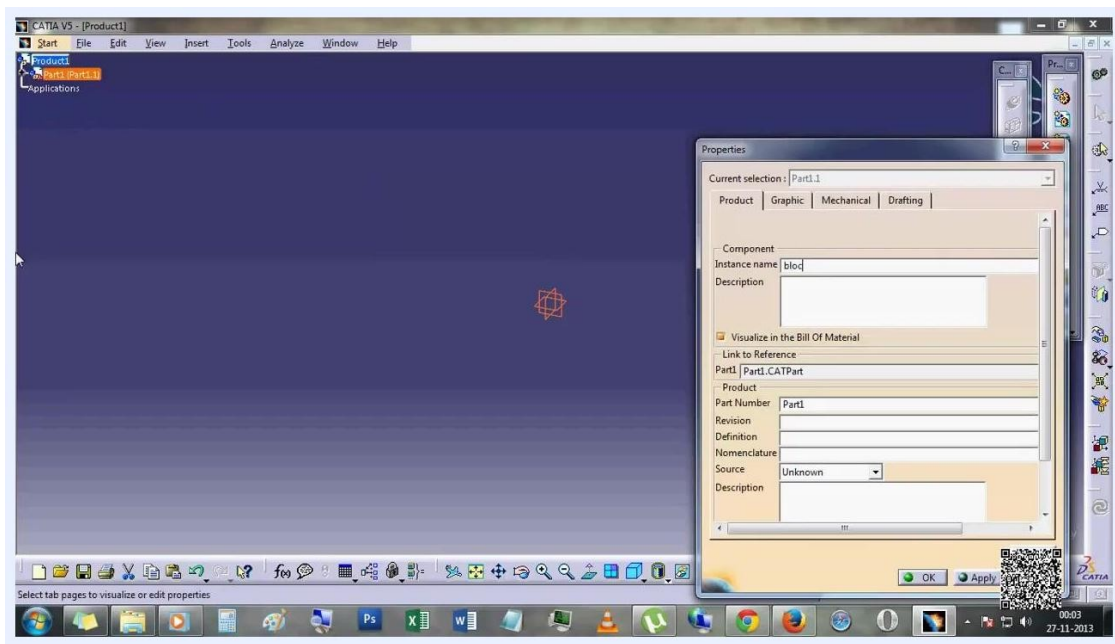


# How to Make an Animation in CATIA: Animating a 3D Crank

This guide shows you how to make an animation in CATIA V5 by building a simple crank mechanism and animating it to rotate from 0 to 360 degrees. You will create the individual parts, assemble them with constraints, convert the assembly into a kinematic mechanism, and compile a playable simulation of the crank's rotation.



Introductory message describing the tutorial's objective: animating a 3D crank in CATIA V5 to rotate from 0 to 360 degrees

## Prerequisites

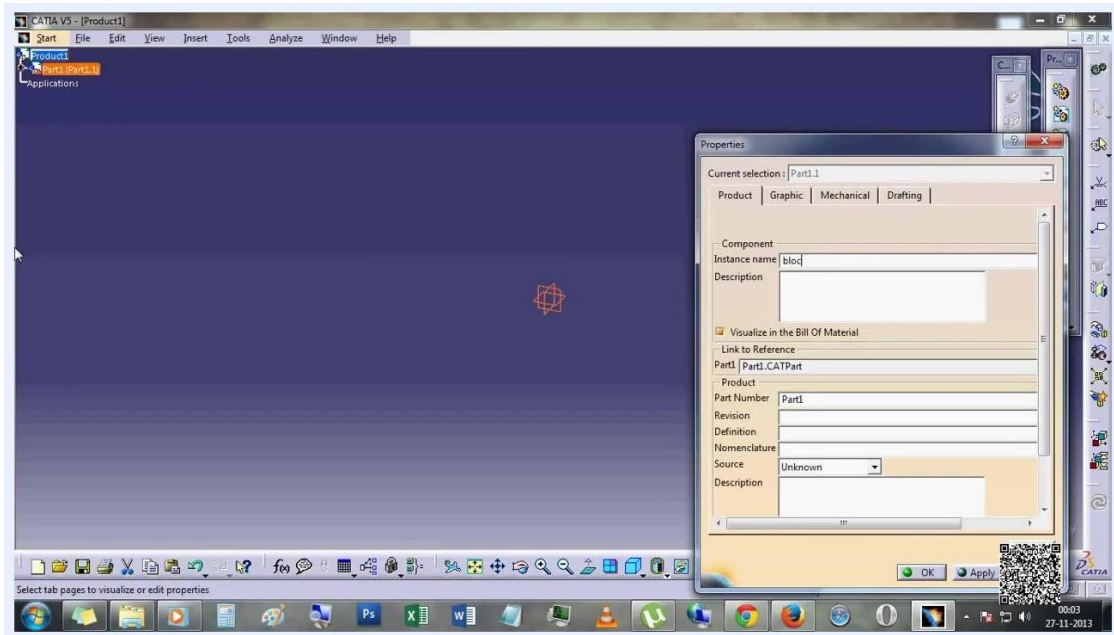
- CATIA V5 installed and ready to launch.
- Basic familiarity with the CATIA Part Design and Assembly Design workbenches.

## Setting up the product structure

### 1. Open CATIA V5 and prepare the product structure

Launch CATIA V5. You see a workspace titled **CATIA V5 - [Product1]**, with a product tree on the left showing **Product1** containing **Part1 (Part1.1)**.

Open the **Properties** dialog for **Part1.1**. In the **Component** section, set **Instance name** to **block**. Make sure **Visualize in the Bill Of Material** is checked. The **Product** section shows **Part Number: Part1**.

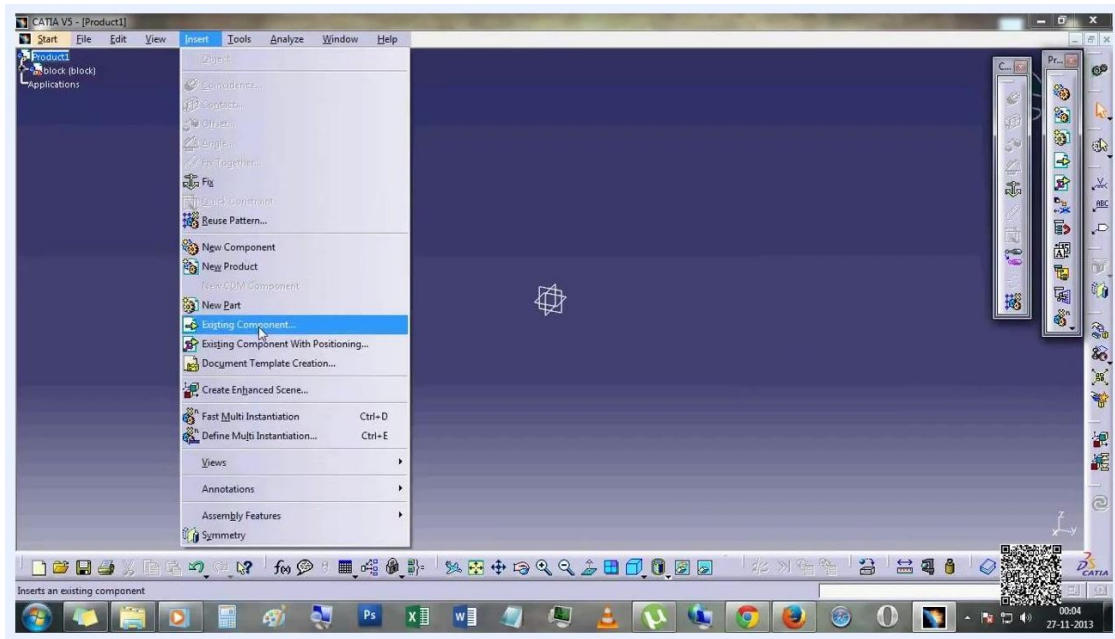


CATIA V5 workspace with the Properties dialog open for Part1.1, instance name set to "block"

## 2. Insert an existing component

In the menu bar, click **Insert**, then select **Existing Component...** from the dropdown. This adds another part to the product structure.

The product tree now shows **block (block)** under **Product1**.

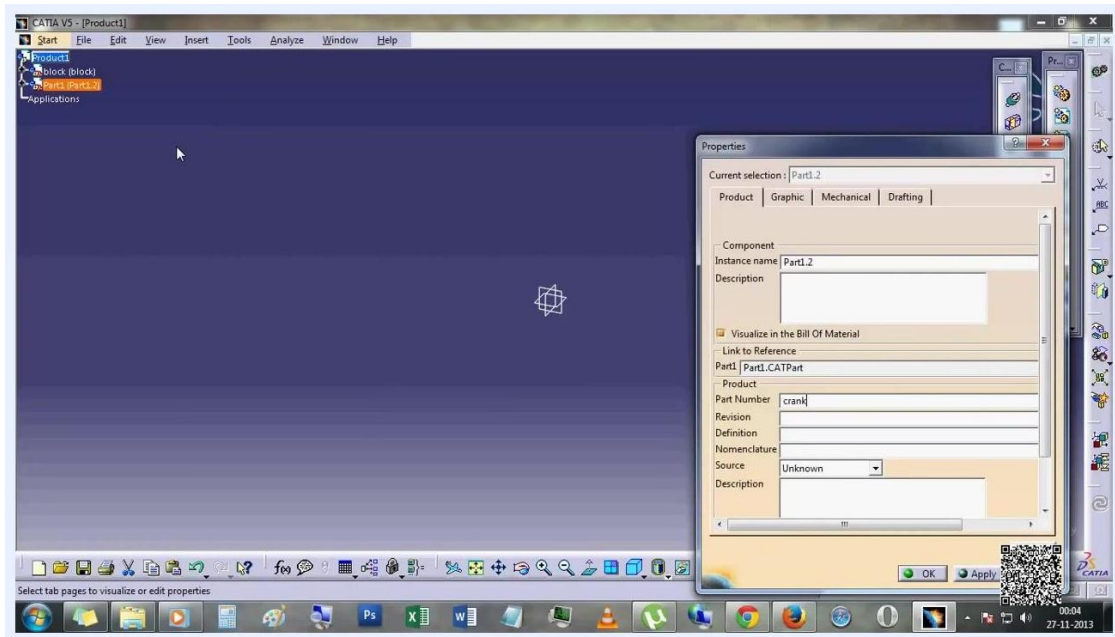


Insert menu open with "Existing Component..." highlighted, product tree showing "block (block)"

### 3. Set properties for the new component

The **Properties** dialog opens automatically for the newly inserted component, **Part1.2**. In the **Product** section, set **Part Number** to [crank](#).

The product tree now lists both **block (block)** and **Part1 (Part1.2)** under **Product1**.



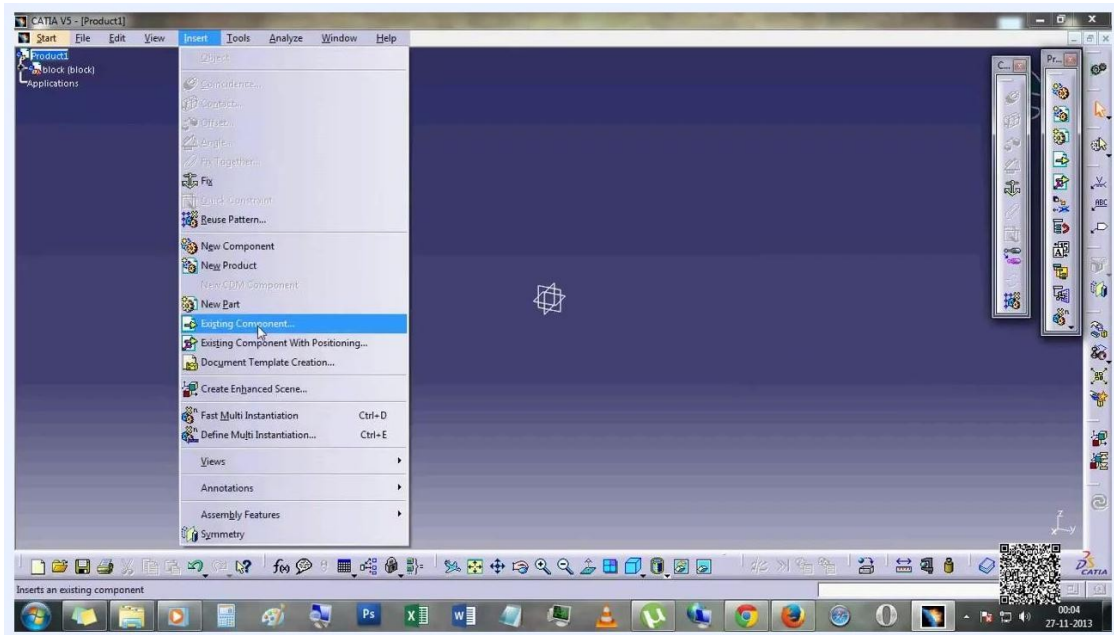
Properties dialog for Part1.2 with Part Number set to "crank", product tree showing both components

## Building the block and crank

### 4. Sketch the block

Enter the sketching environment for the **block** part. Use the rectangle tool to draw a square on the grid, positioned at the origin where the X and Y axes intersect.

The rectangle's dimensions appear as: Second Point H = 90 mm, V = -100 mm, Width = 90 mm. The **Sketch tools** toolbar is visible at the top of the workspace.

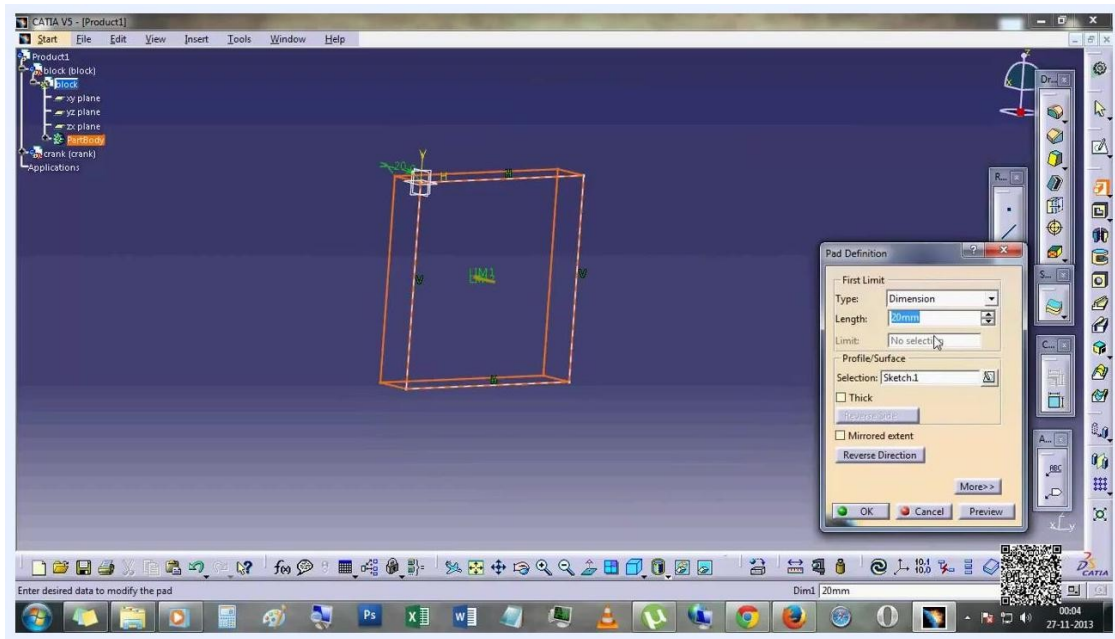


Sketching a rectangle for the block, with grid and dimensions visible

## 5. Pad the sketch into a 3D block

Exit the sketch and open the **Pad Definition** dialog. Set **First Limit** type to **Dimension** and enter **Length = 20mm**. Confirm **Profile/Surface** is set to **Sketch.1**.

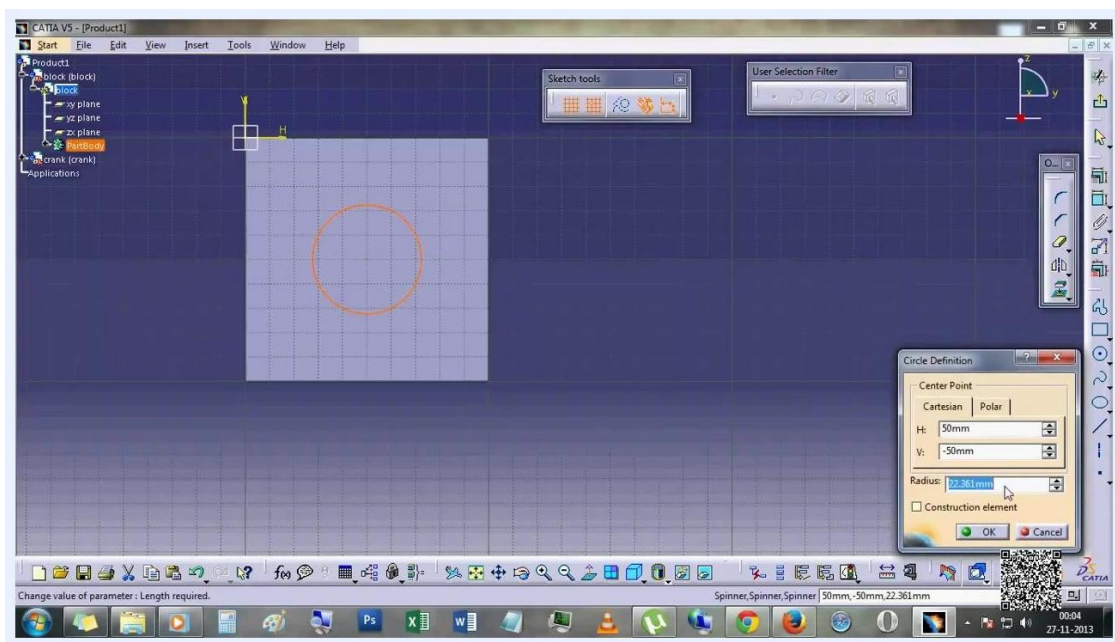
Click **OK** to create a 3D block from the rectangle.



Pad Definition dialog open with Length set to 20mm, previewing the 3D block

## 6. Sketch the crank

Enter the sketching environment for the **crank** part and draw a circle on the grid. In the **Circle Definition** dialog, set **Center Point** to H = 50 mm, V = -50 mm, with an initial **Radius** of 22.361 mm.

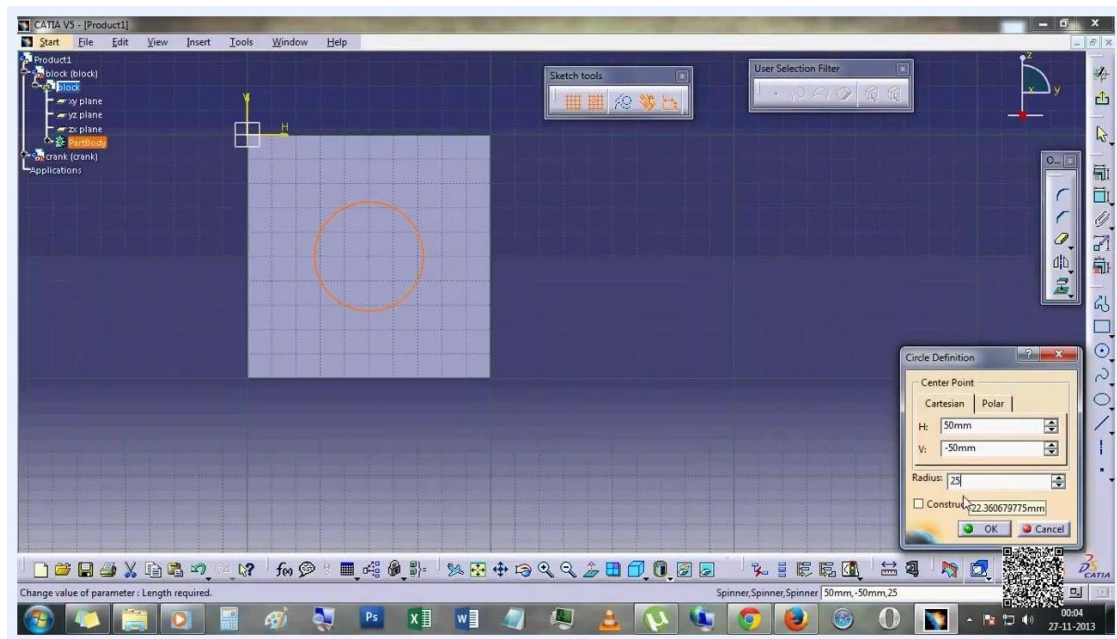


Circle Definition dialog open, center at (50mm, -50mm), radius 22.361mm  
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## 7. Adjust the circle radius

In the **Circle Definition** dialog, change the radius value to **25mm** and click **OK** to confirm.

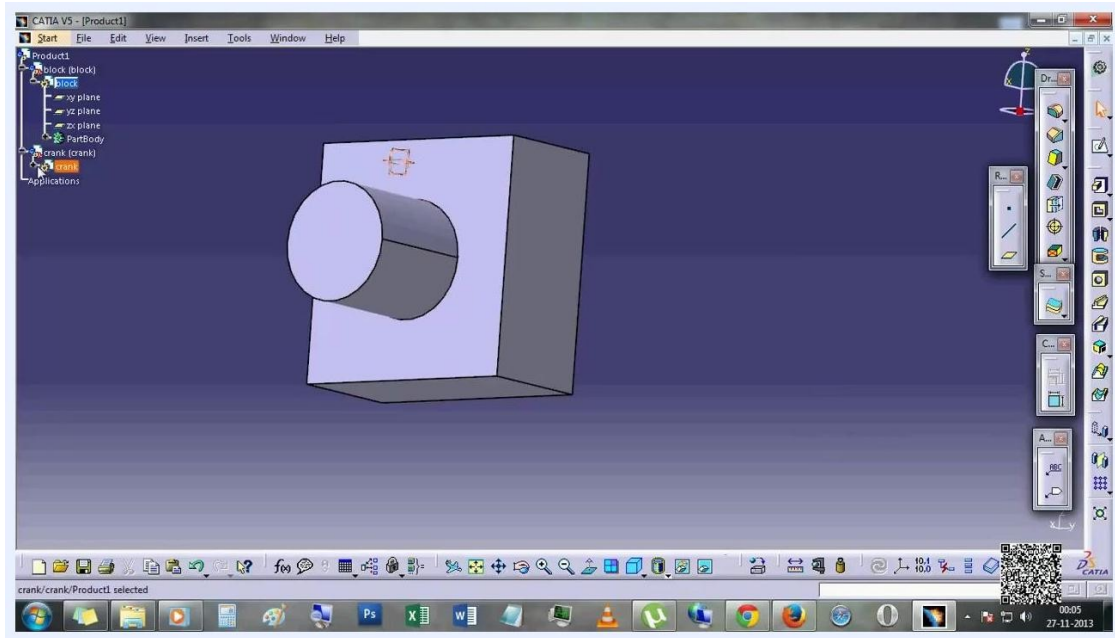
The circle updates to reflect the new radius.



Circle Definition dialog with radius changed to 25mm, circle updated accordingly

## 8. Visualize the assembled block and crank

Exit the sketching environment. The 3D view now shows a block with a cylindrical crank protruding from its face, and the product tree lists both **block** and **crank** under **Product1**.



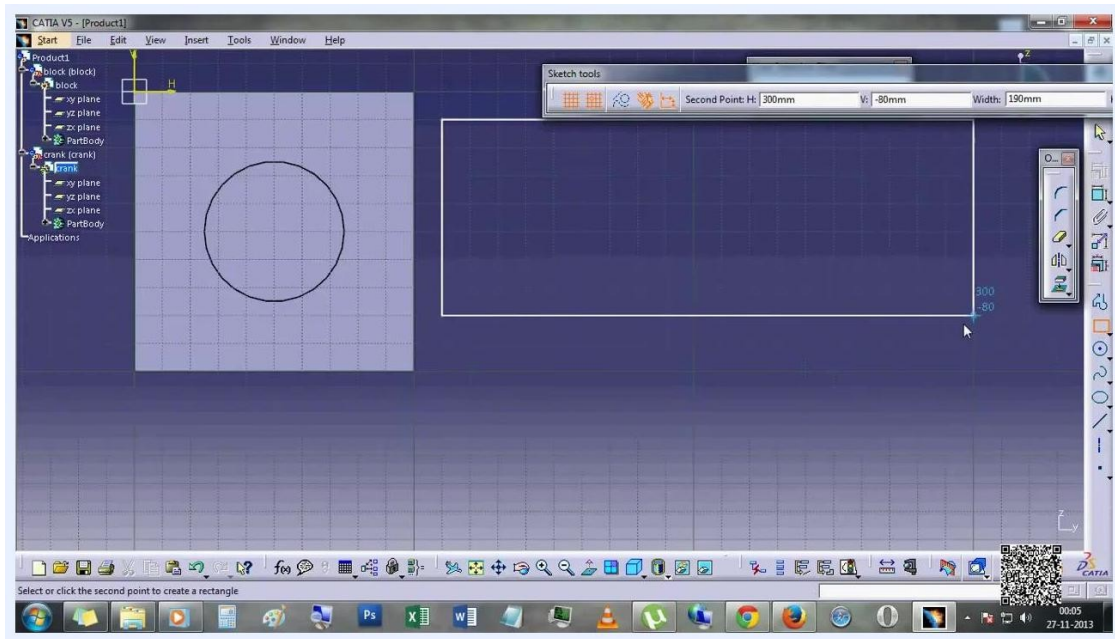
3D view of the block with the cylindrical crank, product tree showing both components

## Sketching the crank arm

### 9. Begin the crank arm sketch

Enter the sketching environment for the **crank** part again. Draw a large rectangle on the grid, starting from the left of the circle.

The rectangle's dimensions appear as: Second Point H = 300 mm, V = -80 mm, Width = 190 mm.

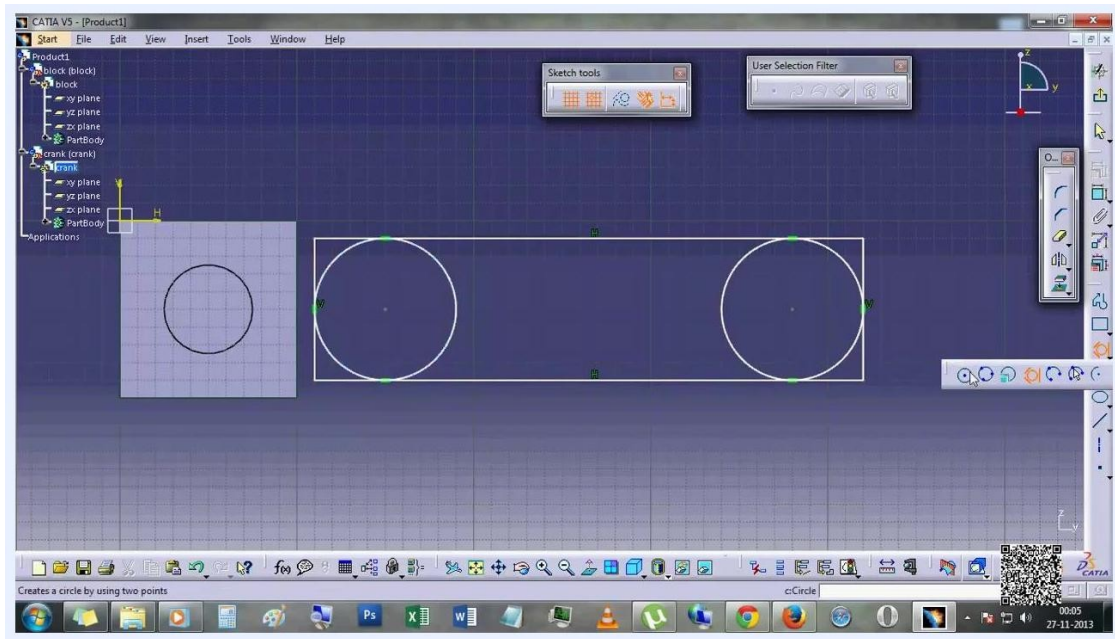


**Sketching a large rectangle for the crank arm, with grid and dimensions visible**

## 10. Add circles to the crank arm sketch

With the large rectangle (crank arm) and the previously drawn circle at the left end in view, draw two additional circles, one at each end of the rectangle. Position them tangent or nearly tangent to the rectangle's shorter sides.

These circles form the basis for the holes or pivots in the crank arm.

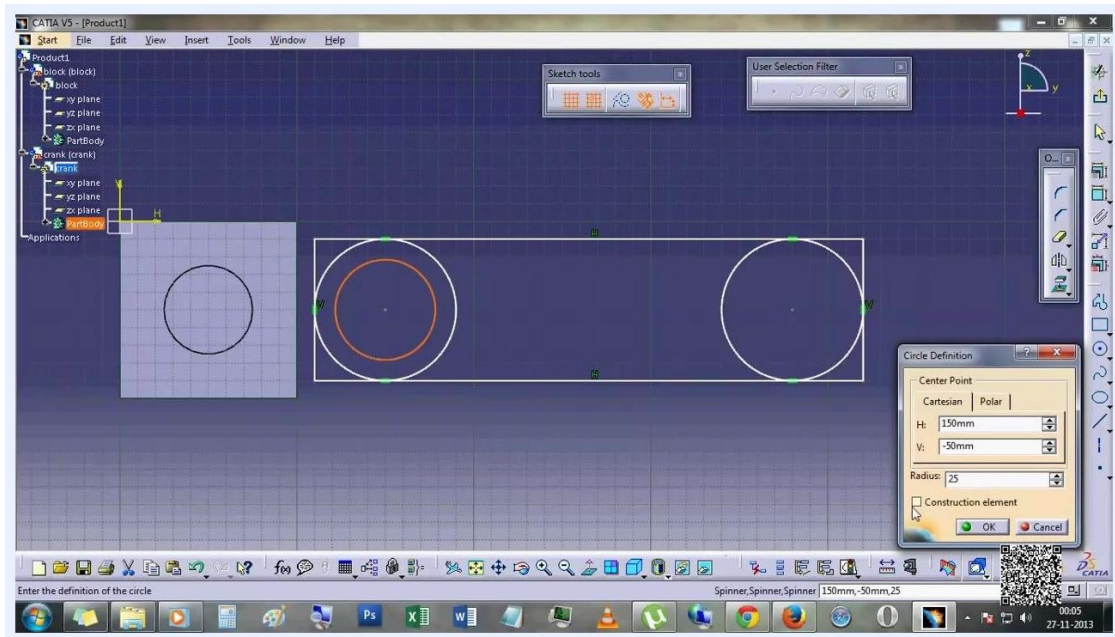


Sketch showing a rectangle with two circles at each end, forming the crank arm profile

### 11. Add an inner circle for the pivot hole

Draw an inner circle concentric with the leftmost large circle. In the **Circle Definition** dialog, set **Center Point** to  $H = 150 \text{ mm}$ ,  $V = -50 \text{ mm}$ , with **Radius** = **25mm**.

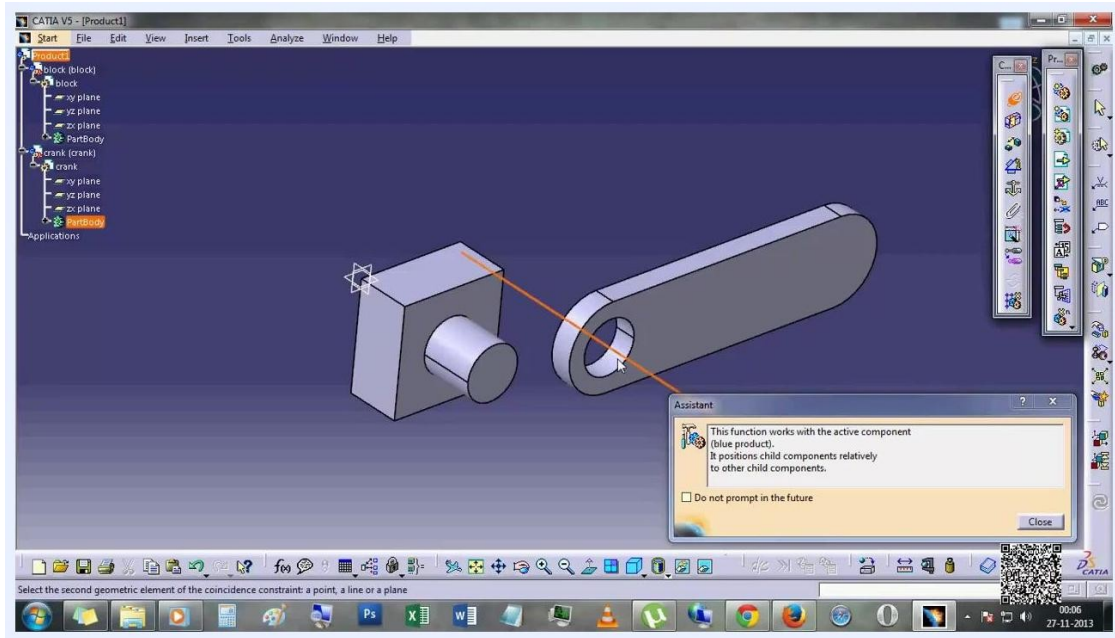
Make sure **Construction element** is unchecked so the circle becomes a solid feature, then click **OK**.



Circle Definition dialog open, adding the inner circle at (150mm, -50mm) with 25mm radius

## 12. Finalize the crank arm sketch

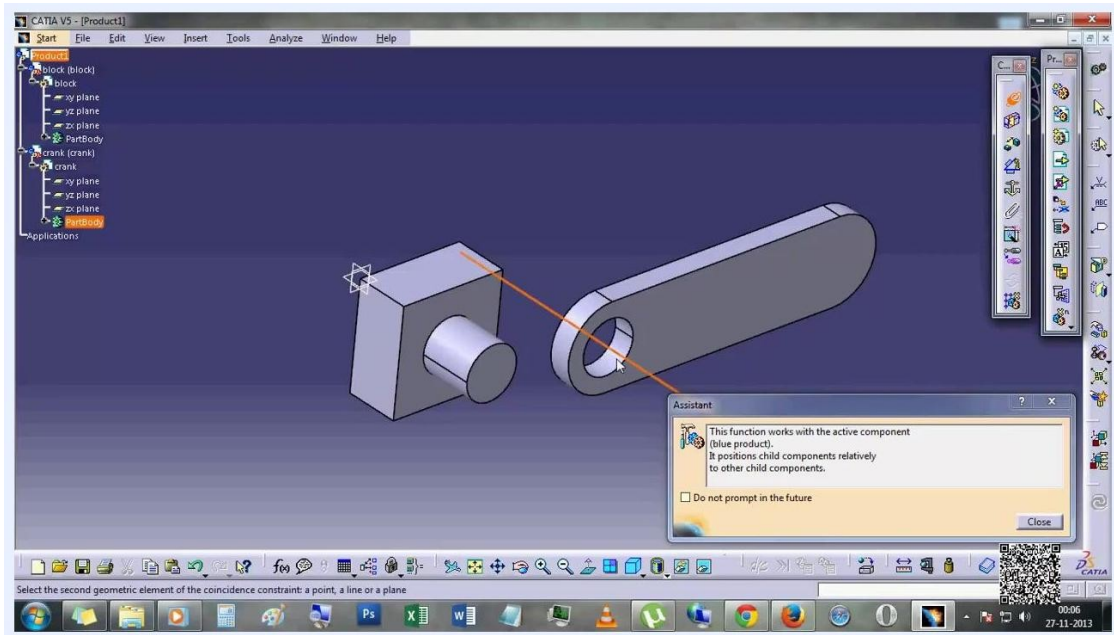
Confirm the sketch now contains a large rectangle (the crank arm body), two large circles at each end, and an inner circle at the left end (the pivot hole). Exit the sketching environment to proceed with 3D operations.



**Finalized sketch with rectangle, two large end circles, and an inner circle at the left end**

### 13. Pad and assemble the crank arm

Use the **Pad** feature to extrude the crank arm sketch into a 3D solid. The 3D view now shows the block and the crank arm as separate solid bodies, with the crank arm displaying rounded ends and a hole at the left end that matches the block's cylindrical protrusion.



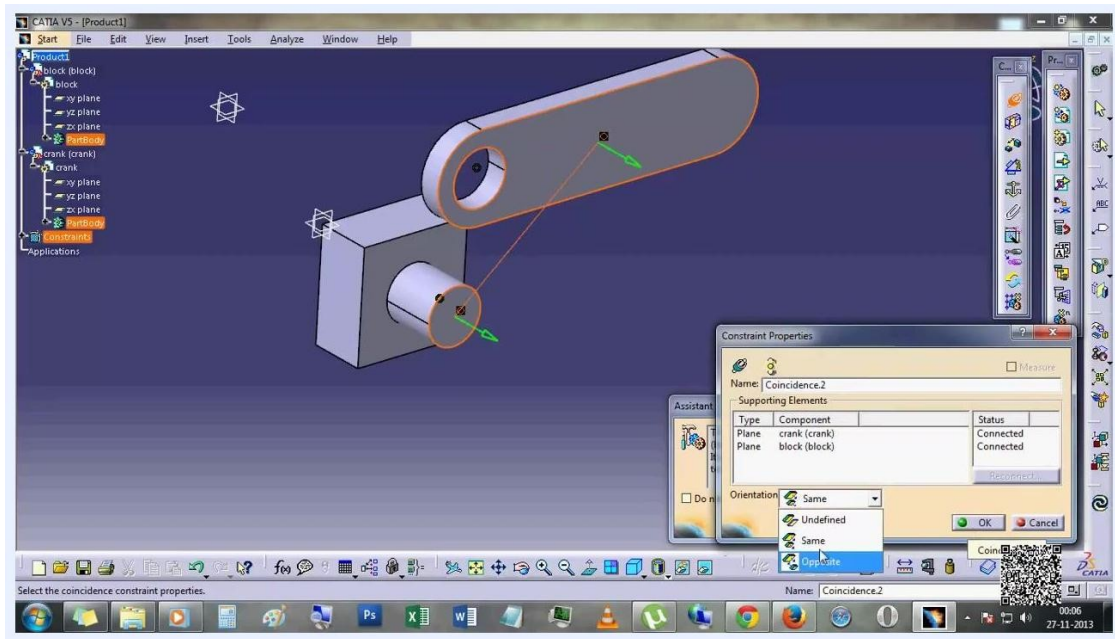
3D view showing the solid block and crank arm, with the crank arm's hole visible at the left end

## Assembling the parts

### 14. Position the crank arm

Use the **Manipulation** panel to drag the crank arm along the Z axis or rotate it as needed for alignment. The crank arm is highlighted in orange to indicate it is the active component being positioned.

Make sure the crank arm's hole aligns with the block's protrusion.

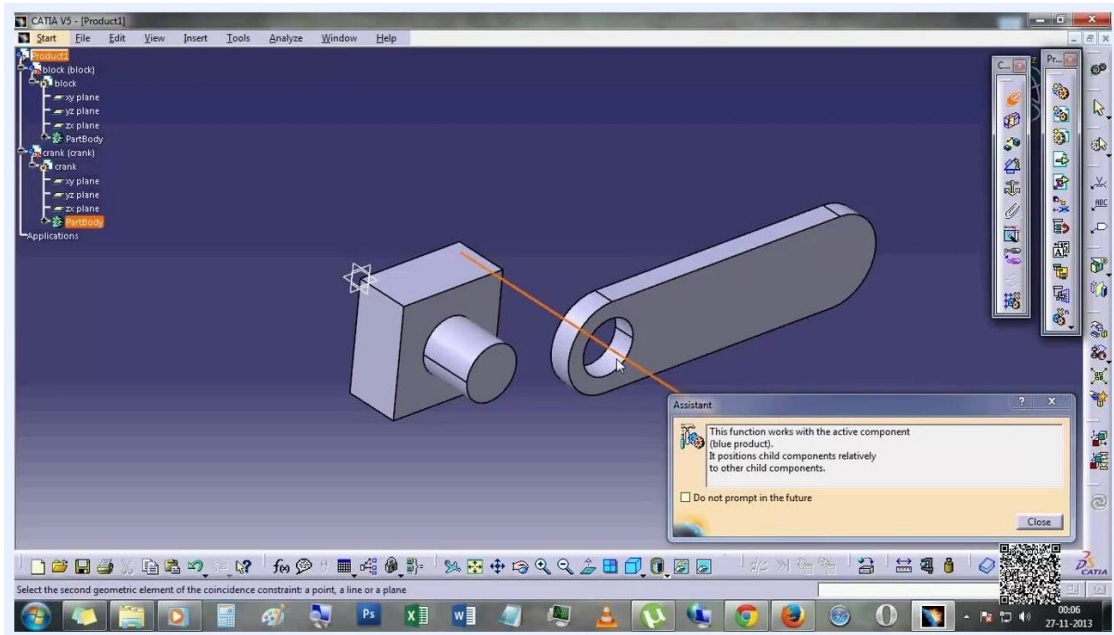


Crank arm highlighted with the Manipulation panel open, being positioned for assembly

## 15. Apply a coincidence constraint

Enter the Assembly Design workbench. Select the cylindrical face of the block's protrusion and the inner cylindrical face of the crank arm's hole, then apply a **Coincidence** constraint to align the two faces.

An **Assistant** dialog explains: "This function works with the active component (blue product). It positions child components relatively to other child components." Click **Close** to dismiss it.

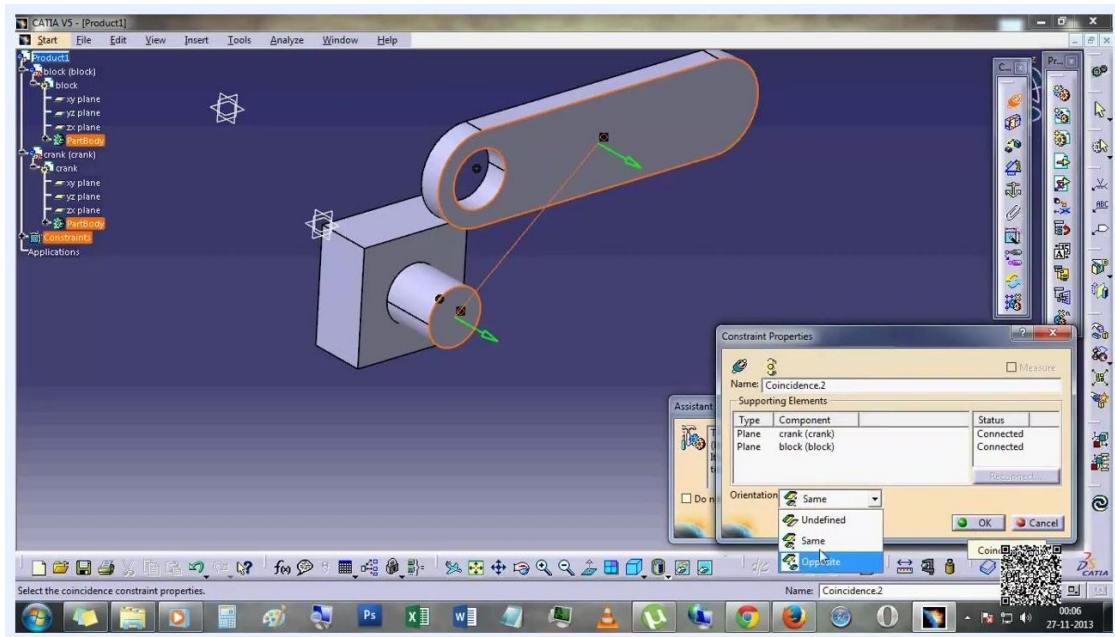


Assembly workspace with block and crank arm separated, orange selection lines, and the Assistant dialog visible

## 16. Set coincidence constraint properties

The **Constraint Properties** dialog appears for **Coincidence.2**, showing Supporting Elements of type Component, with **Plane: crank (crank)** and **block (block)**, and **Status: Connected**.

Set **Orientation** to **Opposite** if needed for correct alignment, then click **OK** to apply the constraint.



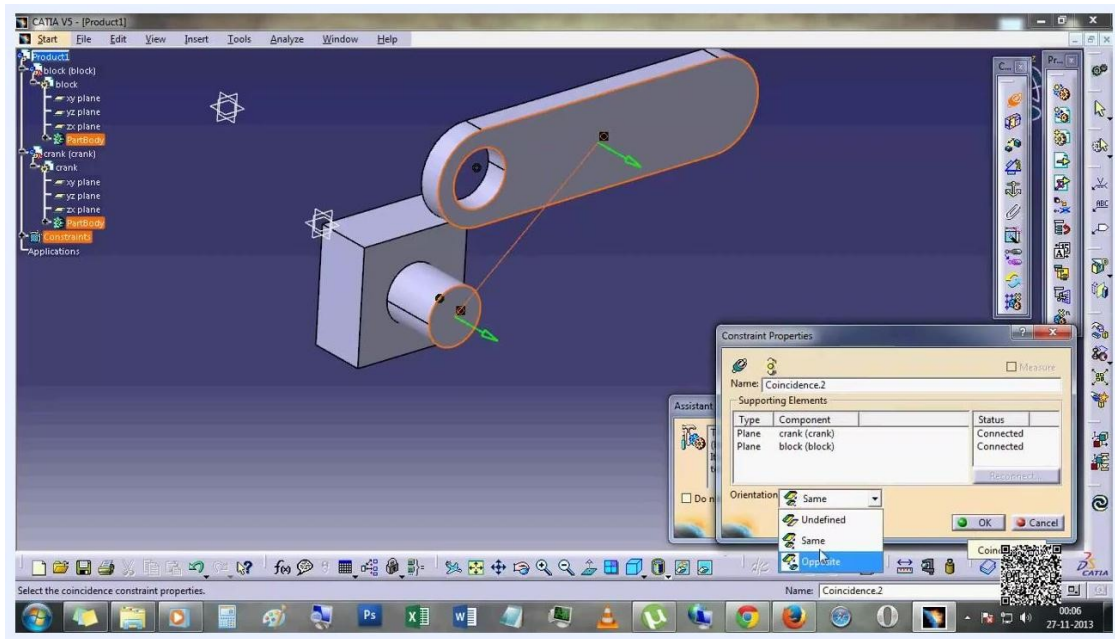
Constraint Properties dialog open for Coincidence.2, orientation set to Opposite

## 17. Verify the assembly and fix the block

Confirm the crank arm is now assembled onto the block, with its hole fitting over the block's cylindrical protrusion. In the constraints tree, verify:

- **Coincidence.1** (crank, block)
- **Coincidence.2** (crank, block)
- **Fix.3** (block) — fixes the block in space to prevent movement

The assembly is now ready for animation.

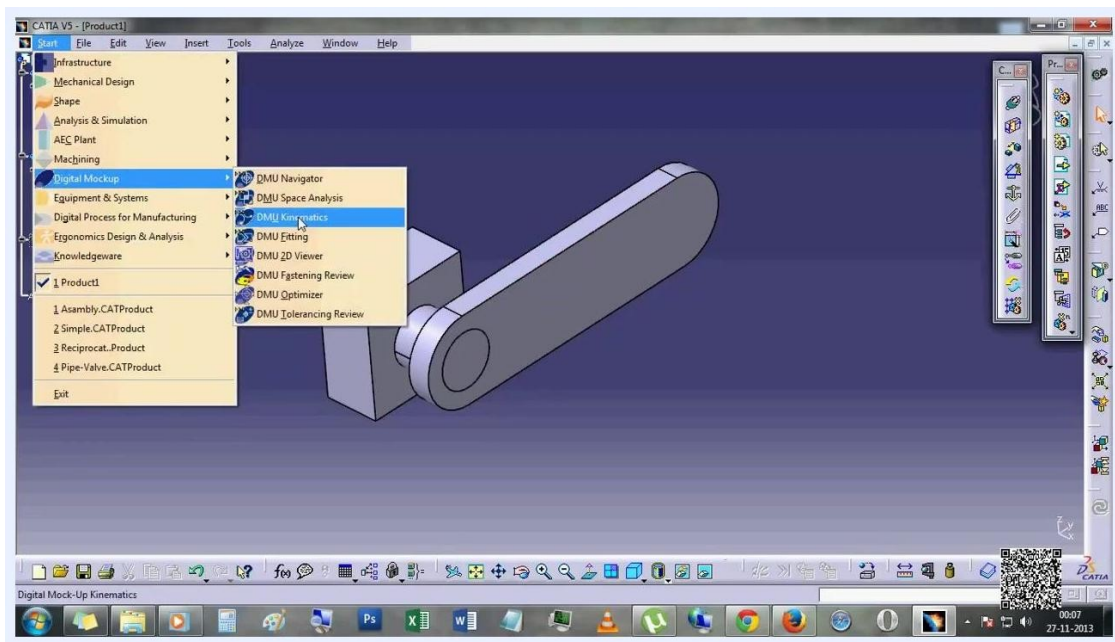


**Final assembled view with the constraints tree showing Coincidence and Fix constraints, block and crank arm properly aligned**

# Setting up DMU kinematics

## 18. Switch to the DMU Kinematics workbench

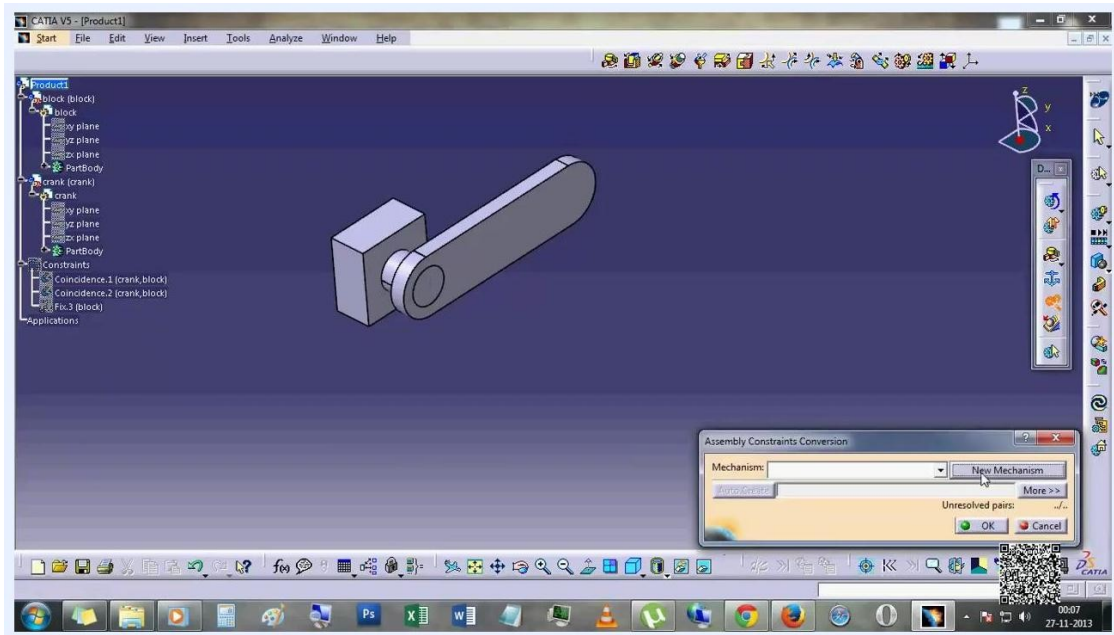
Open the **Start** menu from the top left and navigate to **Digital Mockup > DMU Kinematics**. Select **DMU Kinematics** to enter the kinematic simulation environment.



Start menu open with Digital Mockup > DMU Kinematics highlighted

## 19. Start the assembly constraints conversion

The workspace displays the assembly with the **Assembly Constraints Conversion** dialog open at the bottom right. In the dialog, the **Mechanism** dropdown is set to **New Mechanism**, and the dialog is ready for mechanism creation.

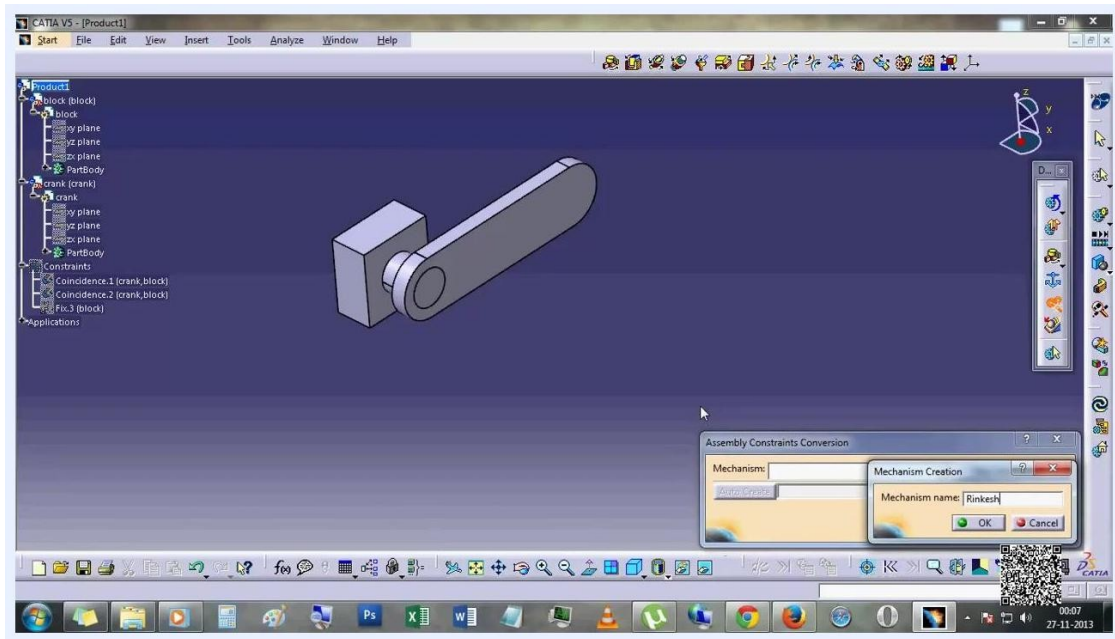


**Assembly Constraints Conversion** dialog open with **Mechanism** set to **New Mechanism**

## 20. Create and name the mechanism

In the **Assembly Constraints Conversion** dialog, click to create a new mechanism. A **Mechanism Creation** dialog appears, prompting you for a name.

Enter the desired mechanism name and click **OK** to confirm. The name then appears in the dialog.

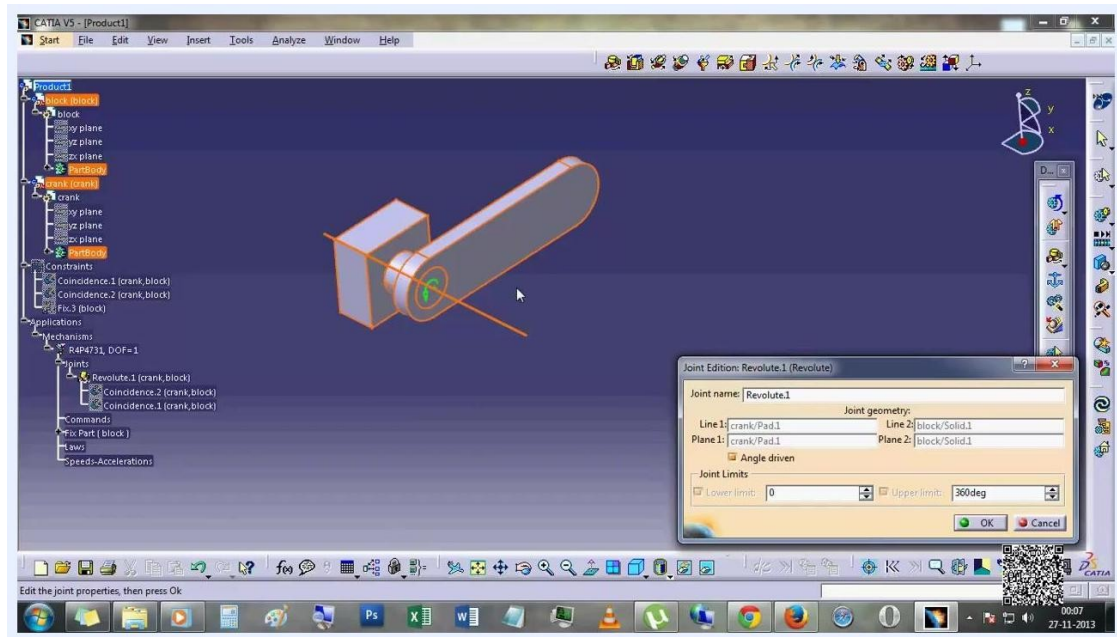


Mechanism Creation dialog open with the mechanism name being entered

## 21. Verify mechanism creation

Check that the mechanism is now listed under **Applications** in the tree on the left, for example as "DOF=1" (Degree of Freedom = 1). The mechanism contains joints (such as **Revolute.1 (crank, block)**), commands, a fixed part (block), and any laws or speeds-accelerations.

The assembly remains unchanged visually, confirming successful mechanism creation.

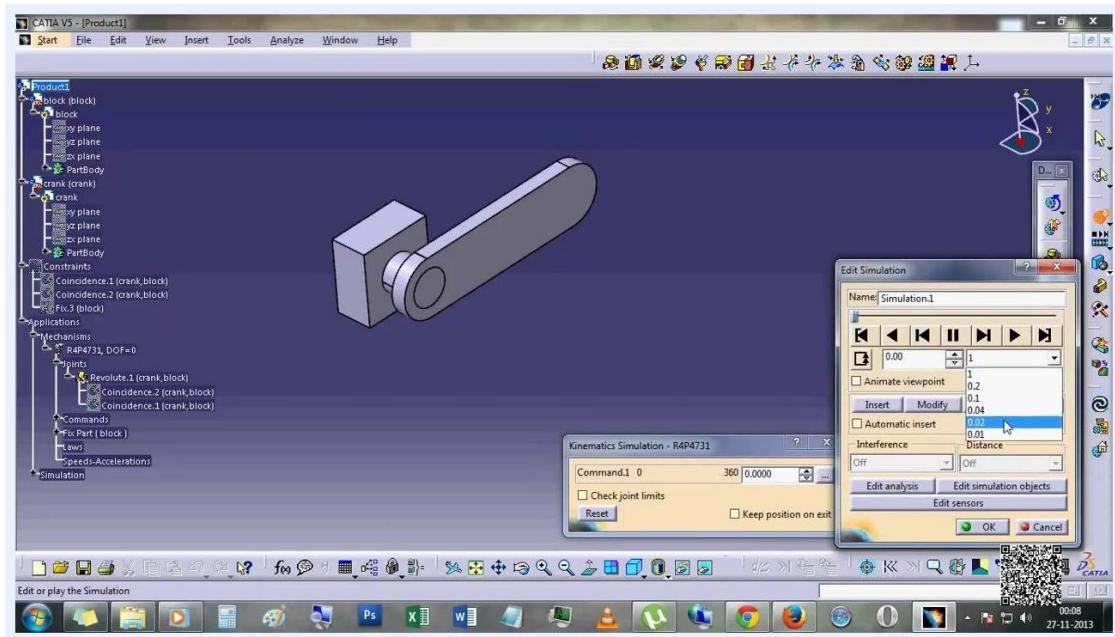


Mechanism listed under Applications, tree expanded to show joints and commands

## 22. Edit the revolute joint properties

In the **Joint Edition: Revolute.1** dialog, set the joint geometry: **Line 1: crank/Pad.1**, **Line 2: block/Solid.1**, **Plane 1: crank/Pad.1**, **Plane 2: block/Solid.1**.

Check **Angle driven** to control the rotation, and set joint limits to **Lower limit: 0°** and **Upper limit: 360°**. Click **OK** to confirm.

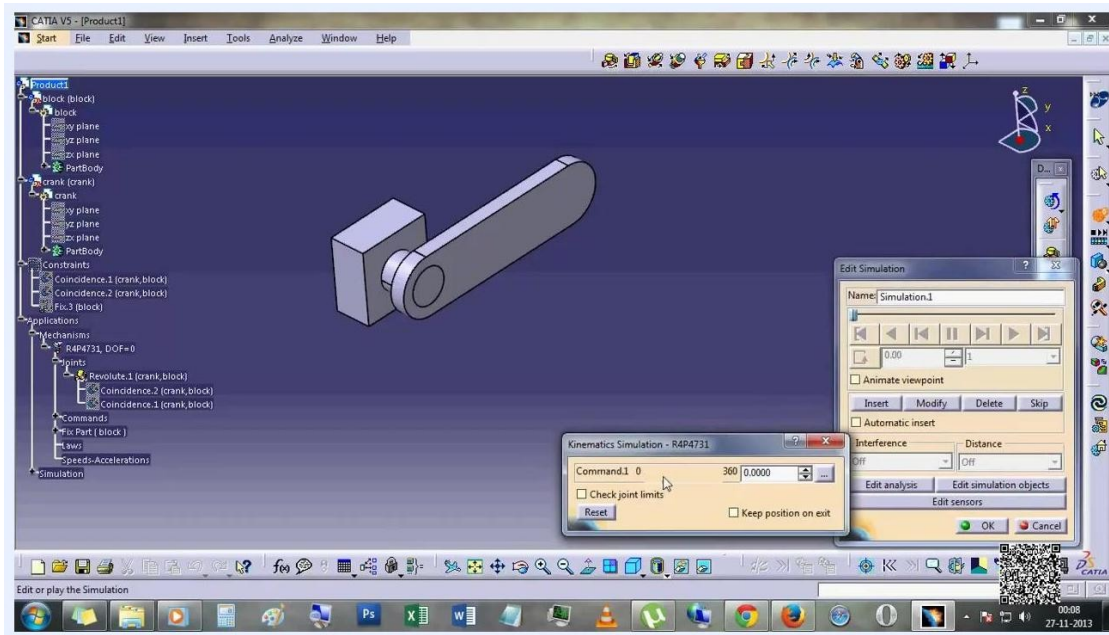


Joint Edition dialog with Revolute.1 properties set, Angle driven checked, limits 0-360 degrees

## 23. Open the kinematics simulation settings

The **Kinematics Simulation** dialog appears, showing **Command.1** ranging from 0 to 360, with an option to check joint limits and reset.

The **Edit Simulation** dialog also opens, letting you name the simulation (for example, "Simulation.1"), use playback controls, insert or modify steps, enable **Automatic insert**, and set interference checking.

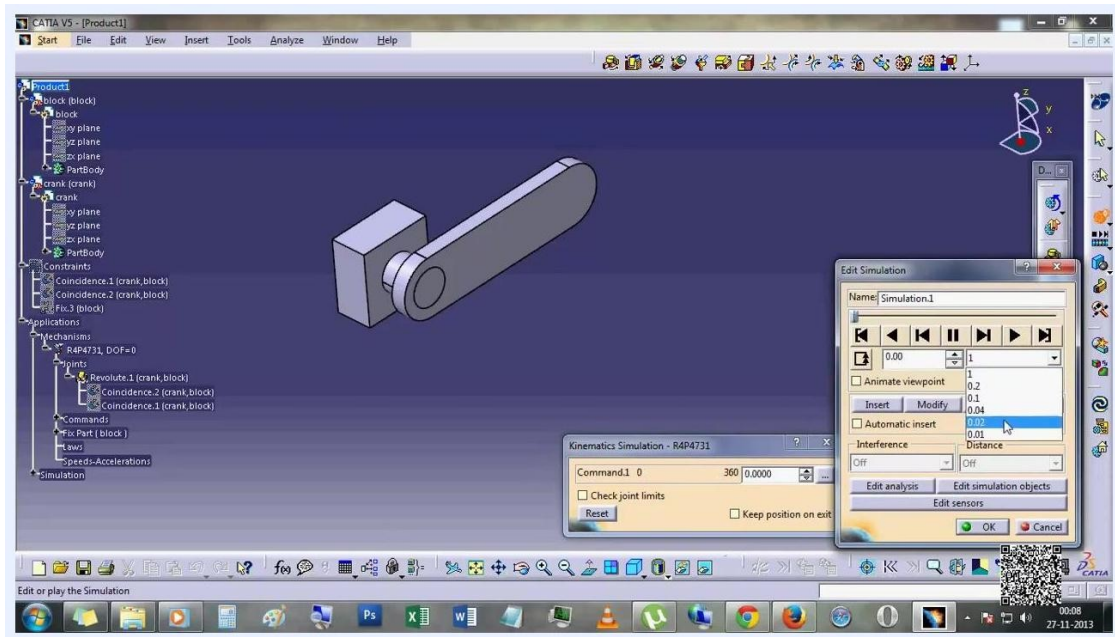


Kinematics Simulation and Edit Simulation dialogs open, showing simulation controls and command range

## 24. Set the simulation step size

In the **Edit Simulation** dialog, use the dropdown to select a step size value (for example, 0.02). This determines the increment for each simulation step.

Make sure **Automatic insert** is checked if you want steps added automatically.



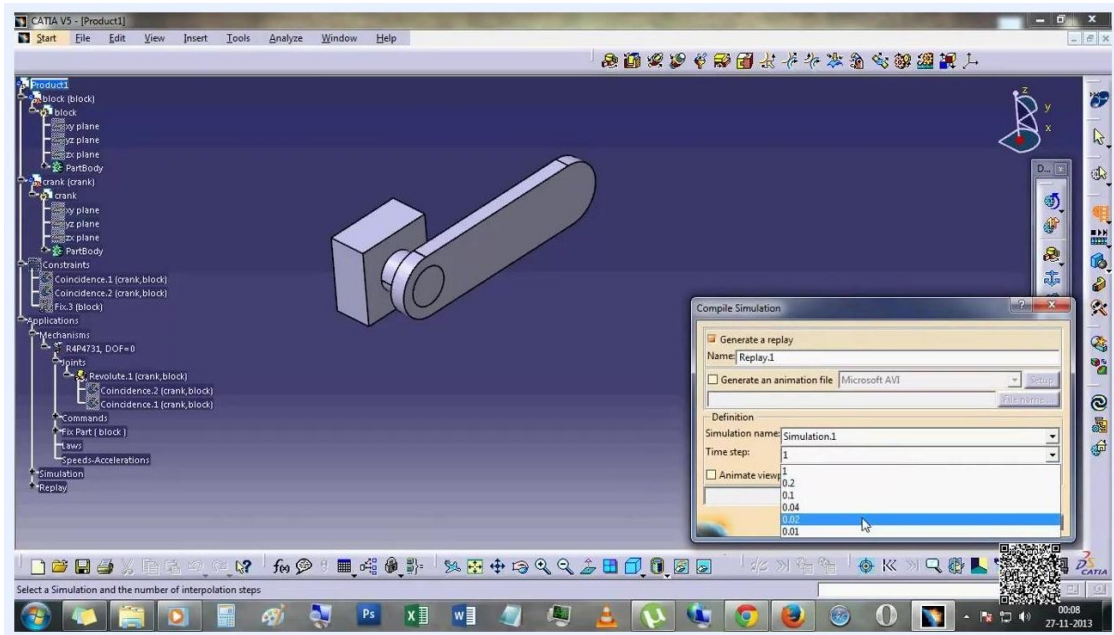
Edit Simulation dialog with the step size dropdown expanded, 0.02 selected, Automatic insert checked

## Compiling and playing the simulation

### 25. Compile the simulation

In the **Compile Simulation** dialog, check **Generate a replay** and enter the replay name as [Replay.1](#). Optionally, check **Generate an animation file** and select a format (such as Microsoft AVI) if you want to export the animation.

Under **Definition**, confirm **Simulation name** is set to [Simulation.1](#), and set the **Time step** value (for example, 0.02). Optionally, check **Animate viewpoint** if you want the camera to move during the simulation.

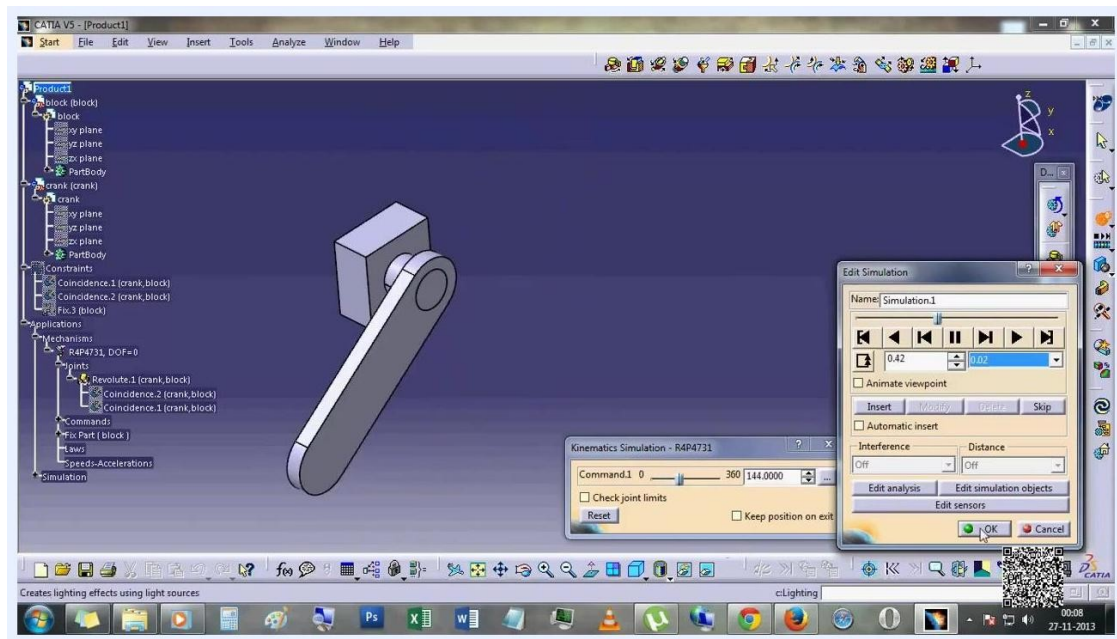


**Compile Simulation** dialog open with **Replay.1** as the name, **Simulation.1** selected, and time step set to 0.02

## 26. Play the simulation replay

Once the simulation is compiled, a **Player** window appears at the bottom right, and the assembly is shown in the main workspace, ready for replay. The replay ([Replay.1](#)) is now listed under the **Simulation** section in the tree.

Use the player controls to start the replay and observe the mechanism's motion.

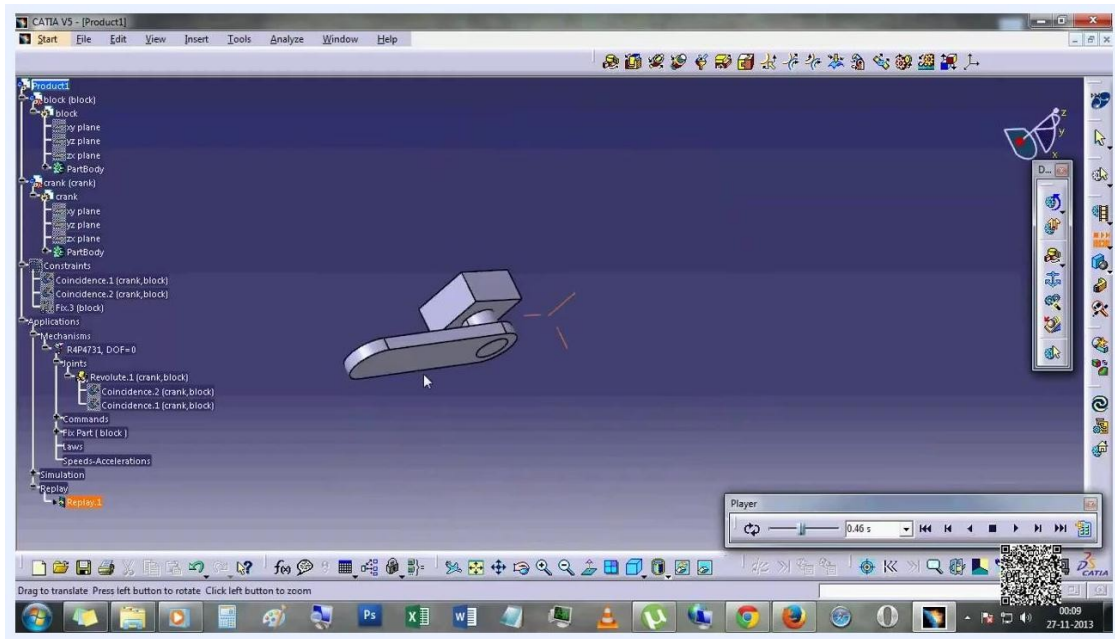


Simulation replay ready, with the Player window visible and Replay.1 listed in the tree

## 27. Interact with the simulation view

Rotate, zoom, or pan the 3D view during or after the simulation to inspect the mechanism from different angles. The simulation continues to play, showing the full range of motion defined by the constraints and commands.

The Player window displays the current simulation time, for example 0.46s.



**Simulation view rotated to show the crank in a different position, Player window showing 0.46s**

## Summary

You have now learned how to make an animation in CATIA V5 by building a block and crank, assembling them with coincidence constraints, converting the assembly into a kinematic mechanism with a revolute joint driven from 0 to 360 degrees, and compiling a replay to visualize the crank's rotation.