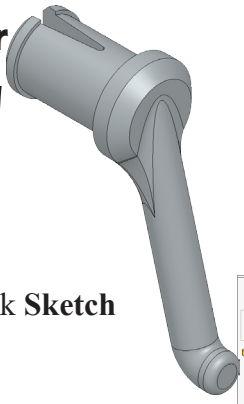
Chapter 12

Bike and Trailer
Kickstand



A. Revolve.

Step 1. Click File Menu > New, click **Part Metric** and OK.

Step 2. Click **Front Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 1**.

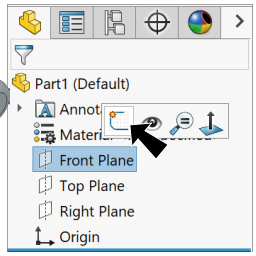


Fig. 1

Step 3. Click **Line** **(L)** on the Sketch toolbar.

Step 4. Sketch **8 lines starting from Origin** , **Fig. 2**.

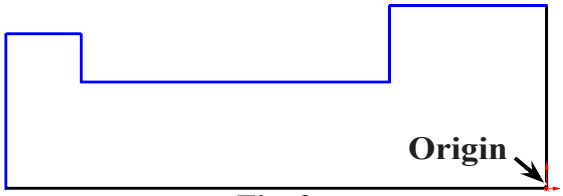


Fig. 2

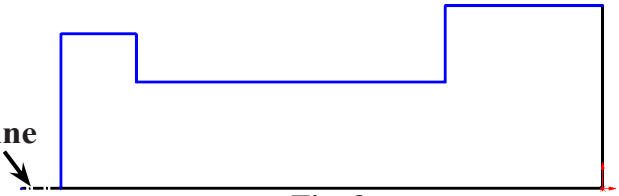


Fig. 3

Step 5. Click **Centerline** in the **Line flyout** on the Sketch toolbar.

Step 6. Sketch a **short horizontal centerline out from left endpoint of horizontal line**, **Fig. 3**.

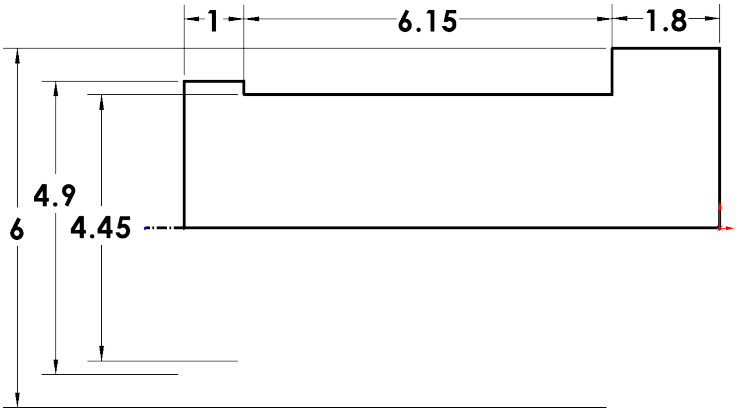


Fig. 4

Step 5. Click **Smart Dimension** **(S)** on the Sketch toolbar.

Step 6. Add dimensions, **Fig. 4**. **Double distance the diameters.** To double distance dimension, click centerline and then top horizontal line, move the cursor below centerline and click. Key-in the diameter in the Modify box and press ENTER.

Step 7. Click **Features** on the Command Manager toolbar.

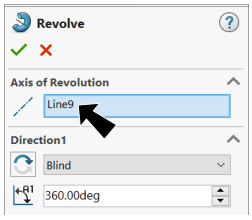


Fig. 5

Step 8. Click **Revolved Boss/Base** on the Features toolbar.

Step 9. In the Revolve Property Manger set:

under Axis of Revolution , **Fig. 5**
construction line auto-selected
click OK .

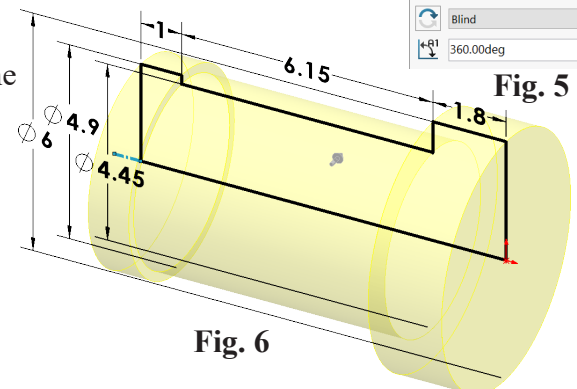


Fig. 6

B. Save as "KICKSTAND".

Step 1. Click File Menu > Save As.

Step 2. Key-in **KICKSTAND** for the filename and press ENTER.

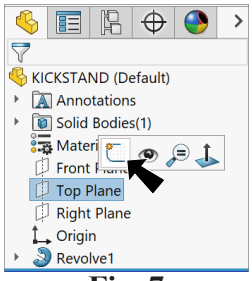


Fig. 7

C. Cut Extrude.

Step 1. Click **Top Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 7**.

Step 2. Click **Normal To** on the Standard Views toolbar. (**Ctrl-8**

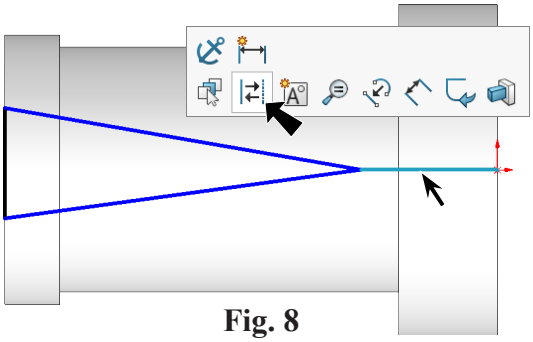


Fig. 8

Step 3. Click **Line** (**L**) on the Sketch toolbar.

Step 4. Use the Inferencing line, the dotted line that appear as you sketch, start a line out to left of **Origin** and sketch the 4 lines ending up back at Origin. **Right click** just after last endpoint at Origin and click **Construction Geometry** on the context toolbar, **Fig. 8**.

Step 5. Drag a selection to **left to cross angled lines and centerline**. Click **Make Symmetic** on the context toolbar, **Fig. 9**.

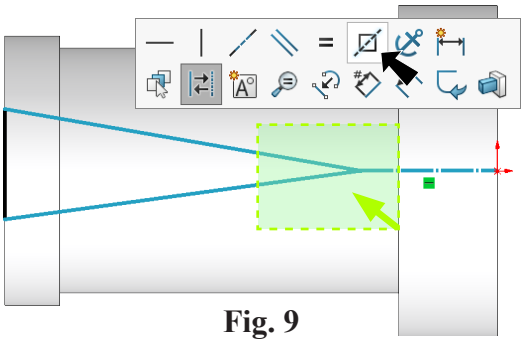


Fig. 9

Step 6. Click **Smart Dimension** (**S**) on the Sketch toolbar.

Step 7. Add dimensions, **Fig. 10**.

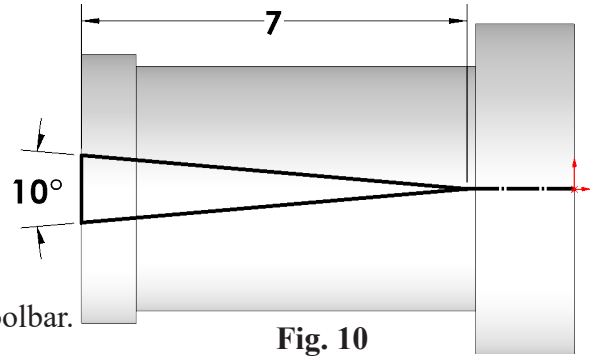


Fig. 10

Step 8. Click **Isometric** on the Standard Views toolbar.

Step 9. Click **Features** on the Command Manager toolbar and **Extruded Cut** on the Features toolbar.

Step 10. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 11**
End Condition **Through All - Both**
click OK .

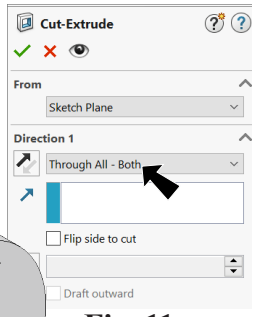


Fig. 11

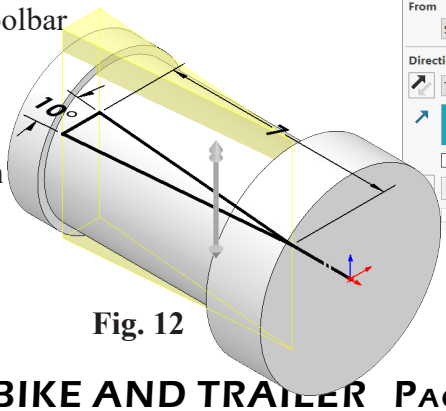


Fig. 12

D. Sweep.

Step 1. Click **Front** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 13**.

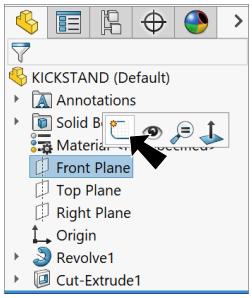


Fig. 13

Step 2. Click **Normal To** on the Standard Views toolbar. **(Ctrl-8)**

Step 3. Click **Line** **(L)** on the Sketch toolbar.

Step 4. Sketch **line at angle above and to left of Origin** **and horizontal line off of bottom endpoint of angled line**, **Fig. 14**.

Step 5. Click **Smart Dimension** (S) on the Sketch toolbar.

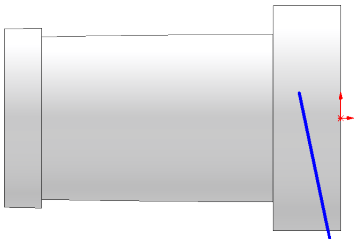


Fig. 14

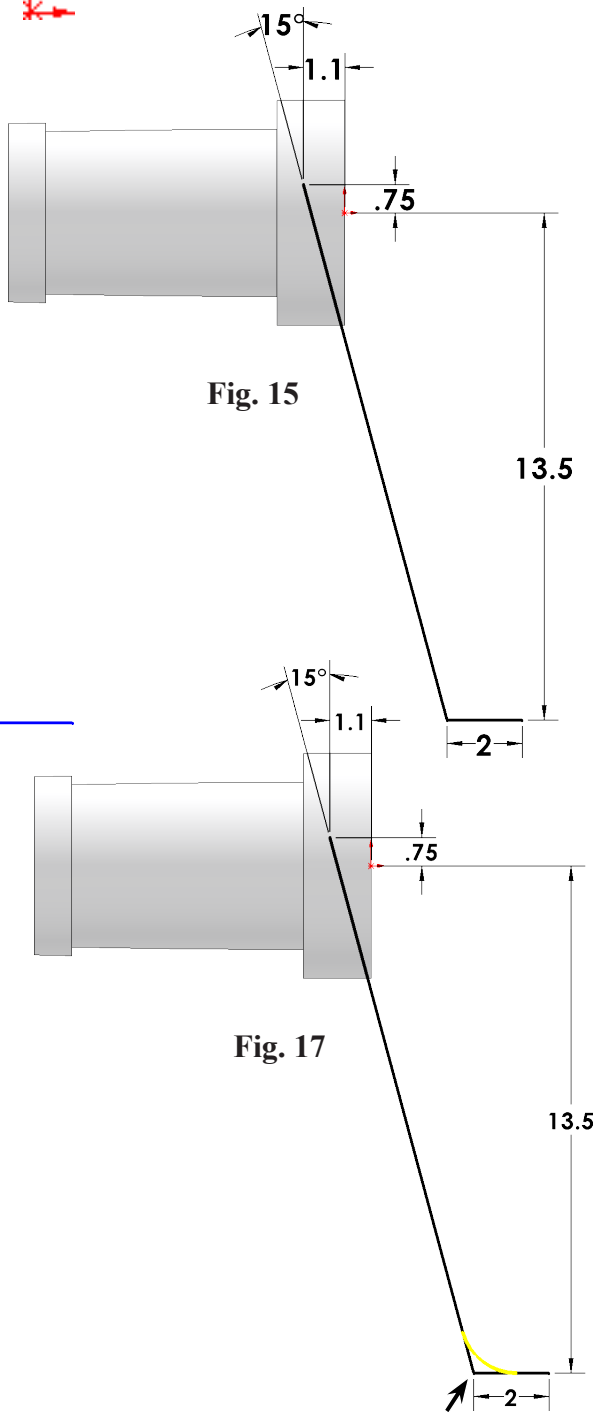


Fig. 15

Step 6. Add dimensions, **Fig. 15**. To dimension angle to imaginary line, click line and top endpoint of line, then click the **top vertical crosshair** and place dimension.

Step 7. Click **Sketch Fillet** on the Sketch toolbar.

Step 8. In the Sketch Fillet Property Manager set:
under Fillet Parameters, **Fig. 16**
Radius **1.5**
click **intersection of lines**, **Fig. 17**
click OK **twice**.

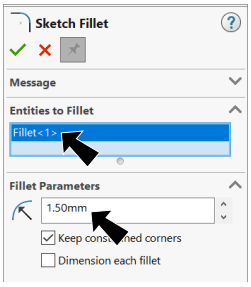


Fig. 16

Fig. 17

Step 9. Click **Features** Features on the Command Manager toolbar.

Step 10. Click **Swept Boss/Base** Swept Boss/Base on the Features toolbar.

Step 11. In the Swept Boss/Base Property Manager:
under Profile and Path, **Fig. 18**
select **Circular Profile**
click **sketch for Path**
Diameter **2.4**
click OK .

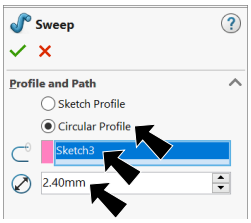


Fig. 18

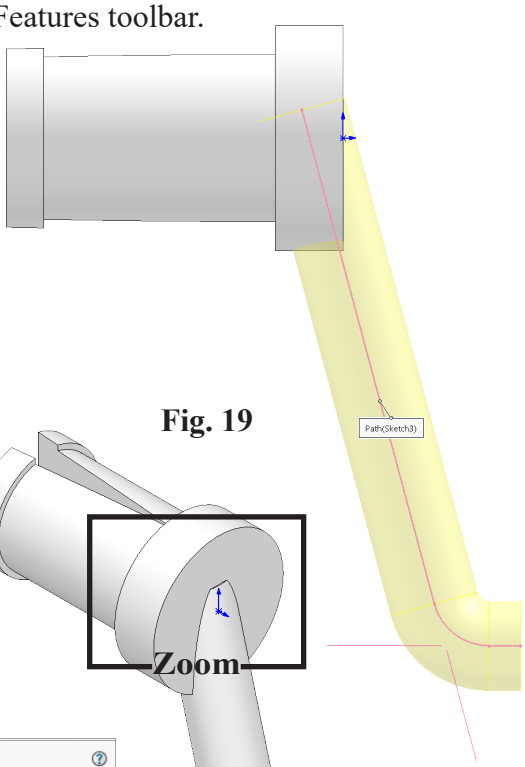


Fig. 19

Step 12. Save (**Ctrl-S**).

E. Delete Face.

Step 1. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 2. Zoom in on the top of the Sweep, **Fig. 20**.

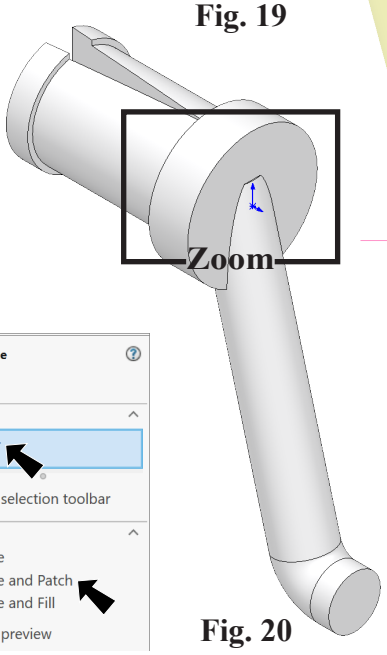


Fig. 20

Step 3. Click Insert Menu > Face > Delete.

Step 4. In the Delete Face Property Manager:
under Selections, **Fig. 21**
click **top face of Sweep**, **Fig. 22**
under Options
Delete and Patch
click OK .

Fig. 21

Step 5. Save (**Ctrl-S**).

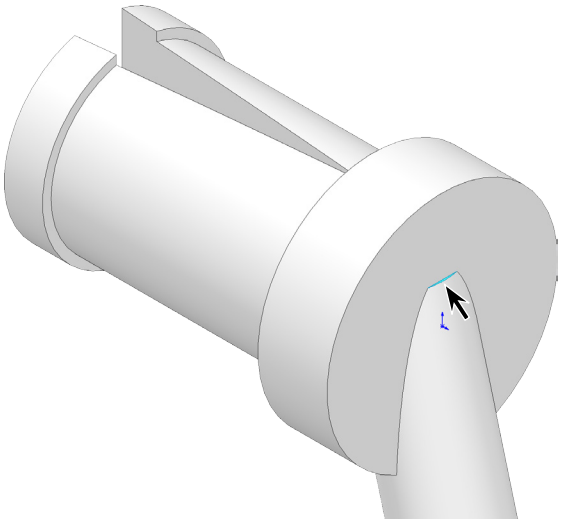


Fig. 22

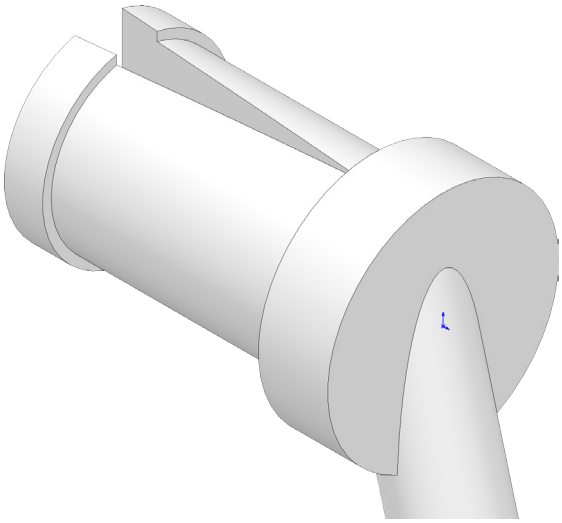


Fig. 23

F. Fillets.

Step 1. Rotate view to back side cut, **Fig. 25**. To rotate view, in **Isometric** , **Shift-Ctrl click the Y axis of the Reference Triad** **(**bottom left corner of graphics area).

Step 2. Click **Fillet** Fillet on the Features toolbar.

Step 3. In the Fillet Property Manager set:
select **FilletXpert**, **Fig. 24**

① **Radius** **.2**
click **vertical edge of cut**, **Fig. 25**
click **Apply**

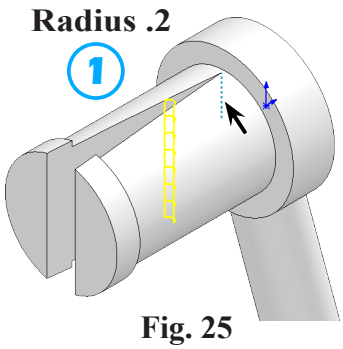


Fig. 25

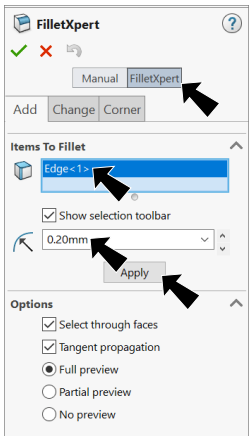


Fig. 24

Rotate view up to view top edge of Sweep, use **Up Arrow key** **4 times**.

② **Radius** **4**
click **top edge of Sweep at Revolve**, **Fig. 26**
click **Apply**

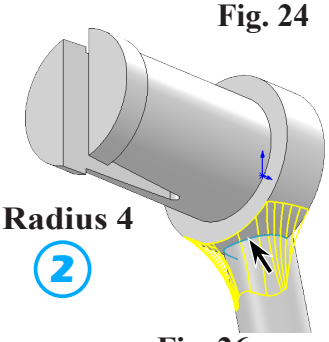


Fig. 26

Click **Isometric** on the Standard Views toolbar. **(Ctrl-7)**

③ **Radius** **1**
click **edge of Sweep at side face of Revolve**, **Fig. 27**
click **Apply**

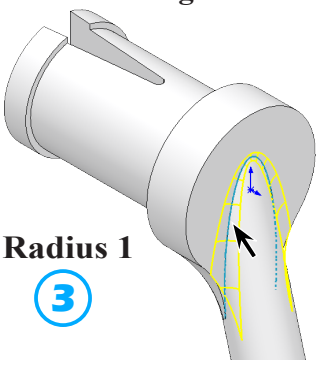


Fig. 27

④ **Radius** **.5**
click **bottom circular edge of Sweep**, **Fig. 28**
click OK .

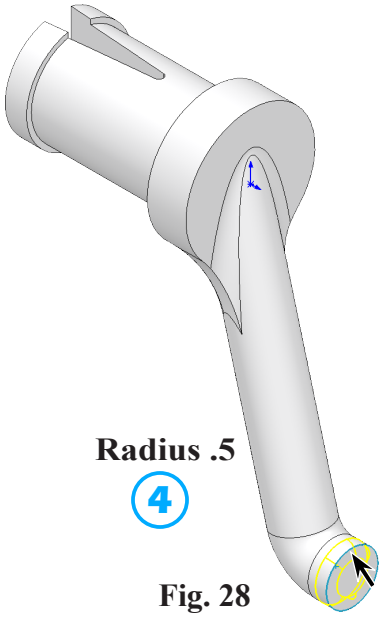


Fig. 28

Step 4. Save **(Ctrl-S)**.

G. Chamfer1.

Step 1. Click **Chamfer** 

in the **Fillet flyout** 

on the Features toolbar.

Step 2. In the Chamfer Property Manager set:
under Chamfer Type, **Fig. 29**
select **Angle Distance** 
under Chamfer Parameters
Distance .8
Angle 45º
click **top outside circular edge of Revolve**, **Fig. 30**
click OK .

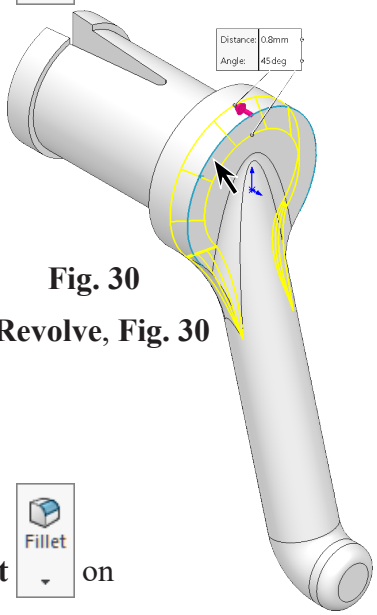


Fig. 30

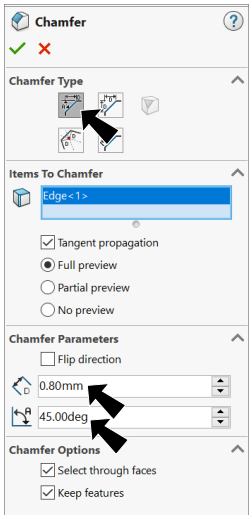
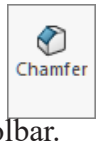


Fig. 29

H. Chamfer2.

Step 1. Click **Chamfer** 

in the **Fillet flyout**

on the Features toolbar.

Step 2. In the Chamfer Property Manager set:
under Chamfer Type, **Fig. 31**
select **Angle Distance** 
under Chamfer Parameters
Distance .45
Angle 45º
click **rear circular edges of Revolve**, **Fig. 32**
click OK .

Step 3. Save  **(Ctrl-S)**.

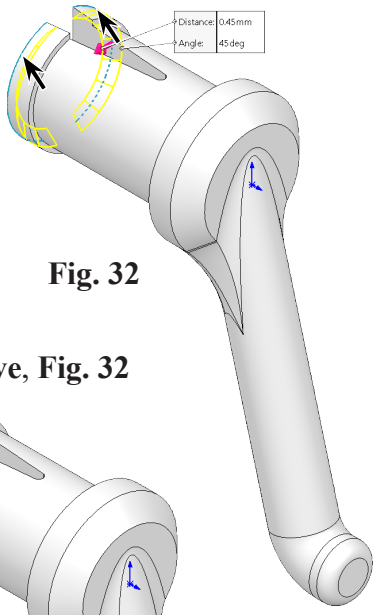


Fig. 32

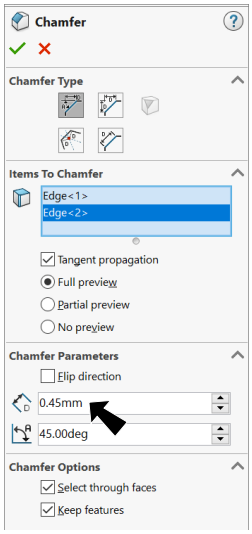


Fig. 31

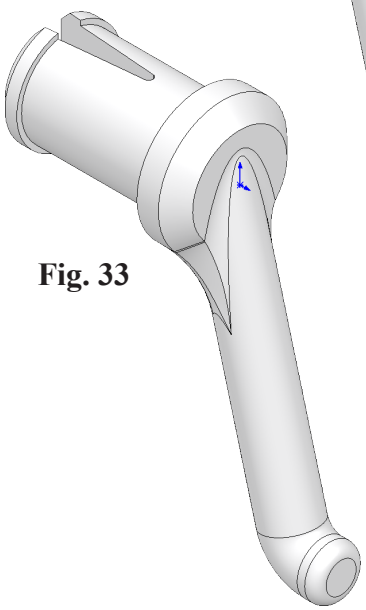


Fig. 33

I. Appearance: Chrome.

Step 1. Click the part to select part, click **Appearances Callout**  on the context toolbar and click **KICKSTAND**  , **Fig. 34**.

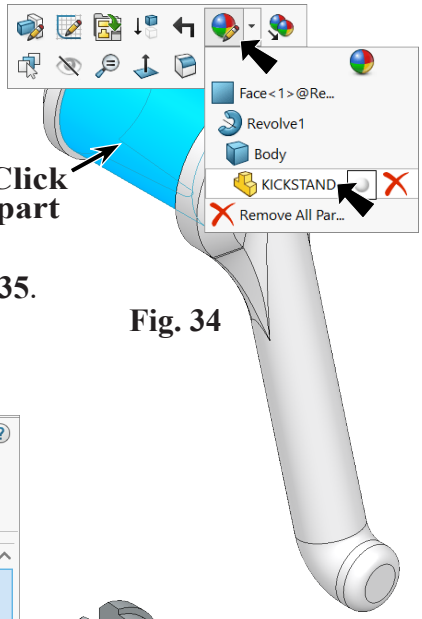


Fig. 34

Step 2. In the Appearances Task pane, expand **Metal** and click **Chrome** and in the lower pane select **chromium plate**, **Fig. 35**.

Step 3. In the Appearances Property Manager click OK  .

Step 4. Save  **(Ctrl-S)**.

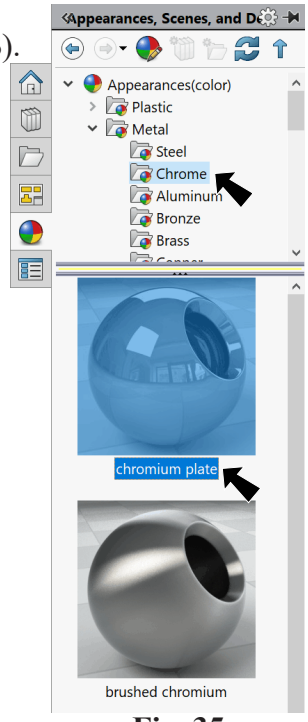


Fig. 35

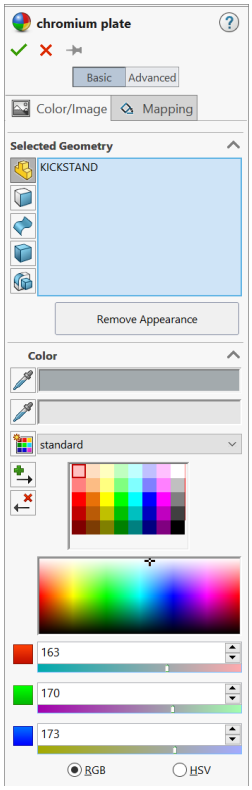


Fig. 36

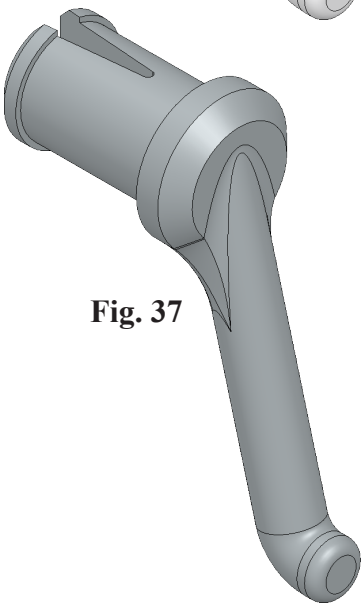
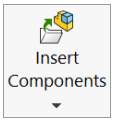


Fig. 37

J. Open Bike Assembly File and Insert Kickstand.

Step 1. Open your **BIKE ASSEMBLY** file.

Step 2. Click **Isometric**  on the Standard Views toolbar.

Step 3. Click **Insert Components**  on the Assembly toolbar.

Step 4. Click **KICKSTAND** file and click Open from the Open dialog box.

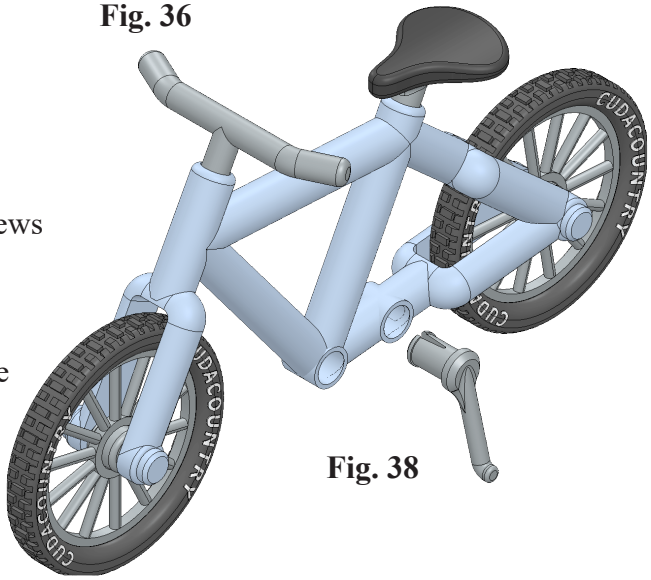


Fig. 38

Step 5. Click to place Kickstand as positioned in **Fig. 38**.

K. Mate: Kickstand.

Step 1. Click **Mate** 

on the Assembly toolbar.

Step 2. Click a **cylindrical face Kickstand** and a **cylindrical face of Kickstand hole in Frame**, **Fig. 39**.

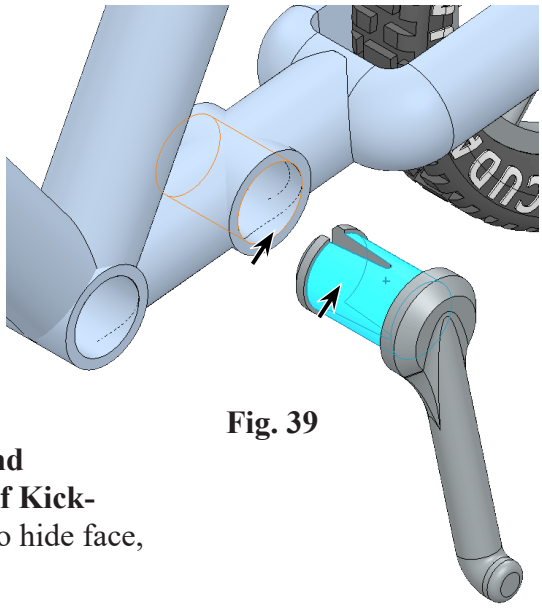


Fig. 39

Step 3. Click Add/Finish Mate  to add a **Concentric** mate.

Step 4. Click **side face of Extrude in Frame at Kickstand hole** and **hide outside cylindrical Revolve face of Kickstand**, click **inside face of Kickstand**, **Fig. 40**. To hide face, hover cursor over face and press **Alt key**.

Step 5. Click Add/Finish Mate  to add a **Coincident** mate.

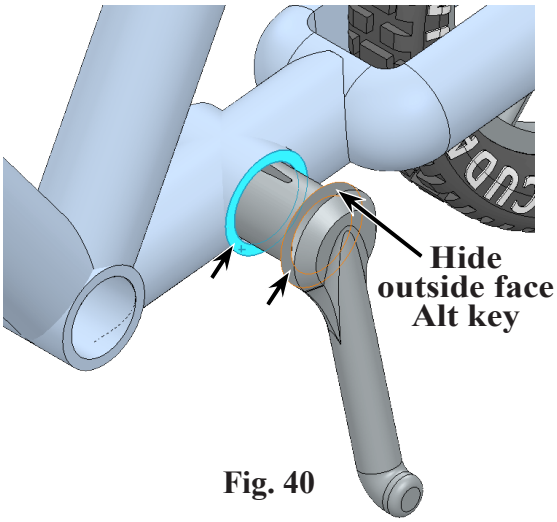


Fig. 40

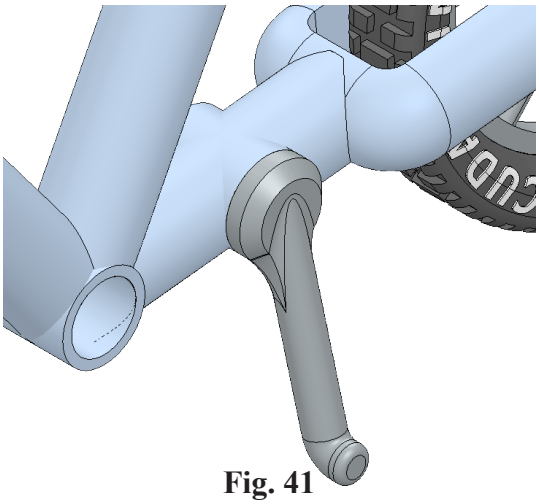


Fig. 41

Step 6. Click **Right** on the Standard Views toolbar. (**Ctrl-4**)

Step 7. Expand the flyout Feature Manager design tree and click **Top Plane** then, expand **KICKSTAND** and click **Front Plane**, **Fig. 42**.

Step 8. In the Mate Property Manager set:

click **Advanced tab** Advanced, **Fig. 43**

under Mate Types

select **Angle Mate**

Angle 77º

Maximum Valve **155º**

Minimum Valve **77º**

click OK and click Cancel.

Step 9. Now grab Kickstand and rotate.

Step 10. Save (**Ctrl-S**).

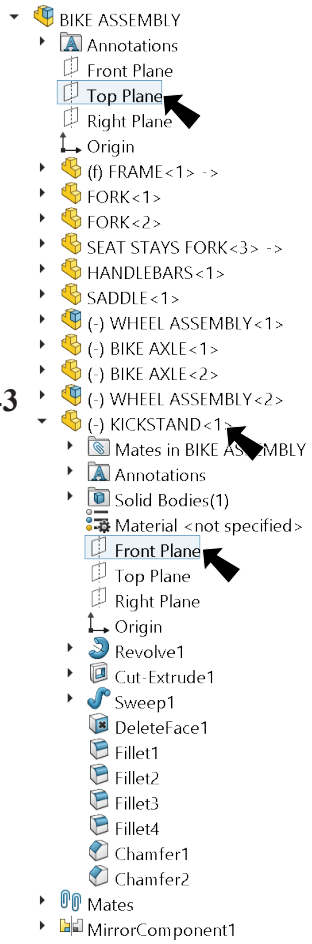


Fig. 42

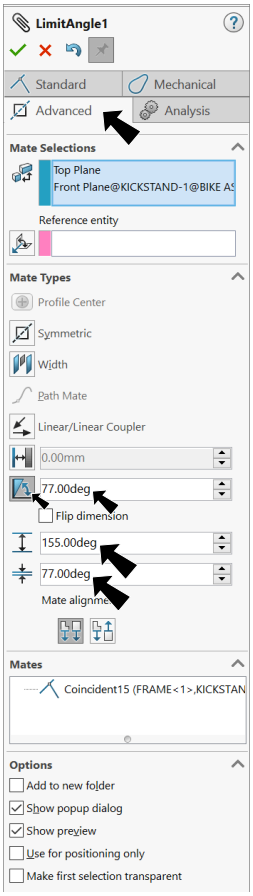


Fig. 43

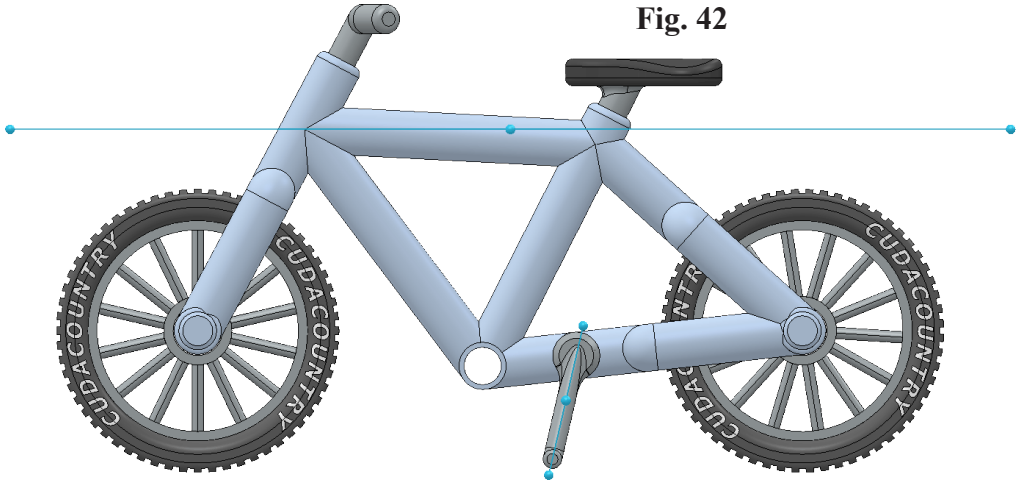


Fig. 44