F1 in Schools Tutorial 4
A Step by Step Guide
To
Designing an
F1 Car
In
SolidWorks

There are 7 Achievement Points to Collect During This Tutorial!!

Requirements: SolidWorks Student Edition or SolidWorks Design Kit

You are advised to complete Bloodhound Class 1&2 and also F1 Class 1 tutorials before attempting one.
Information for F1 in Schools Coordinator:

Welcome to our new range of F1 in Schools (SolidWorks) Tutorials!
In writing these tutorials, we have tried to look at this project from your perspective and in the following ways:

- You are busy subject teachers whose main priority is your core-curriculum area.
- You know little about SolidWorks and know it can be a HUGE undertaking to know all there is to know about any CAD package.
- You want to feel confident to answer student questions and will not undertake these tutorials in front of a class until you are ready to do so.

If the above scenario sounds familiar, we are relieved! It means we have understood your needs and have aimed these tutorials in exactly the right direction. We hope the above three issues have been resolved as follows:

- We know how busy you are! These tutorials have been written with the hope that you can simply hand them out / give yourself some space / let the students explore and discover for themselves / making progress at YOUR pace.
- We have aimed these tutorials at those with no CAD experience at all. Secondly, neither you or your students need to know all there is to know about SolidWorks for the following reasons:
  1. There simply is not enough time to do so.
  2. You don’t need to.
  3. Both you and your students would die of boredom and feel you were either achieving nothing or were achieving far too slowly to remain interested.
- We have reduced each tutorial down to a manageable chunk for both you and your students to read / attempt / attempt again / attempt again with your own ideas rather than ours.

Summary and Suggested Approach

As a suggested starting point (and without wanting to teach you how to suck eggs) we suggest the following:

- The whole group work through the booklets, regardless of chosen areas of responsibility in their F1 in Schools team. This will surprise you when you hear students wishing to change their roles, having found the software easier or harder than they anticipated! The ACHIEVEMENT POINTS can be used by you as a reward system.
- Save / repeat / save again / repeat again. This should be repeated until the students are correcting their own errors and drawing their own ideas rather than ours. You may then wish to assign the role of Team Design Engineer having seen who is most capable.

As with all of our support materials, we welcome your feedback. This is the only way we know we are meeting your needs as F1 in Schools coordinators.

With regards,
Don Sankey
F1 in Schools UAE
For Your Information
We will now show you how to draw an F1 Class car using the BALSA-WOOD block which you have already drawn in F1-Class Tutorial 1.

For Your Information
We are assuming you have drawn a Bloodhound block and car and an F1 block in our previous tutorials. This car is basically the same procedure (apart from adding wings) and will assume you have now had previous SolidWorks experience.

1. **OPEN THE F1 BLOCK** which you have drawn from the F1 Tutorial 1 booklet.

2. **FEATURES TAB / EXTRUDED CUT TOOL / FRONT PLANE / VIEW FRONT / DISPLAY WIREFRAME** your screen should look like the one below

3. **SPLINE TOOL** / draw a shape similar to the one below / **ESCAPE**
4. **LINE TOOL / CLOSE THE SKETCH** your screen should look like the one below

![Image of a sketch with a line tool used]

5. **VIEW ISOMETRIC / ACCEPT SKETCH / DIRECTION 1 & 2 THROUGH-ALL / TICK OK / DISPLAY SHADED** your screen should look like the one below

![Image of an isometric view with shading]

6. **FEATURES TAB / EXTRUDED CUT TOOL / TOP PLANE / VIEW TOP / DISPLAY WIREFRAME** your screen should look like the one below

![Image of a wireframe view of the car]

*You have shaped the front of your car!* Stop and save your work! We will now shape the top or plan view of the car.
7. **LINE TOOL / CREATE THE LINES BELOW / SMART DIMENSION / ADD DIMENSIONS AS BELOW**

8. **LINE TOOL / SPLINE TOOL** draw a shape similar to the one below
   - Join straight line to spline at these points

9. **LINE TOOL / CLOSE THE SKETCH** your screen should look like the one below

10. **LINE TOOL / FOR CONSTRUCTION / CREATE CENTRE LINE** as below
11. **MIRROR ENTRIES / MIRROR LINES AND SPLINE**
Your screen should look like the one below.

Refer to Bloodhound Car tutorial Steps 25 & 26

12. **TICK TO COMPLETE / ACCEPT SKETCH / VIEW ISOMETRIC**
as below

Be sure the extrusion arrow is facing ‘up’ and will go ‘through-all’

13. **TICK OK TO EXTRUDE / DISPLAY SHAPED WITH EDGES**
as below

You have **SHAPED THE TOP OF YOUR CAR**!

We will now shape the back or left view of the car

STOP AND SAVE YOUR WORK!

**SAVE YOUR WORK** / open the block again and try repeating everything you have done so far ................without looking at your tutorial pages!
14. **VIEW LEFT / EXTRUDED CUTTOOL / SELECT MIDDLE SECTION OF FACE** as shown below **NOT inside the circle!**

15. **CIRCLE TOOL / DRAW ‘OUTER CIRCLE’** as shown below

   1. Click centre of circle
   2. Click on vertical line to finish circle

16. **SELECT NEW CIRCLE / SELECT VERTICAL LINE USED ABOVE / CREATE A TANGENT BETWEEN THEM BOTH**

   - Create a tangent between this circle and this vertical line

Refer to Bloodhound Car tutorial Step 23
17. **LINE TOOL** draw a shape similar to the one below **USING 6 STRAIGHT LINES** be sure to connect to the origin.

18. **ESCAPE / SELECT THE VERTICAL CENTRE-LINE / MAKE IT A CONSTRUCTION LINE**

19. **TRIM ENTITIES TOOL / REMOVE UNWANTED PARTS OF OUTER CIRCLE** your screen should look ........like the one below.

20. **MIRROR ENTITIES / MIRROR LINES AND SPLINE** as below.

See step 11 above, also refer to Bloodhound Cart tutorial Steps 25 & 26.

![Image of a 3D model with a shape and a message that reads: You have SHAPED THE BACK OF YOUR CAR!]

We will now round some of the sharp edges.

STOP AND SAVE YOUR WORK!

SAVE YOUR WORK / open the block again and try repeating everything you have done so far……….without looking at your tutorial pages!

22. **FILLET TOOL / FULL ROUND FILLET / VIEW RIGHT** so that your screen looks like the one below.

![Image of a 3D model with a sequence of numbers and arrows indicating mouse clicks]

7 - tick ok to finish

23. **FOLLOW SEQUENCE OF MOUSE-CLICKS ABOVE / VIEW ISOMETRIC** see result below / compare to car in step 21 above.
24. **FILLET TOOL / CONSTANT RADIUS / SET TO 30mm / SELECT EDGES BELOW**

**TICK OK** as shown below

**ROTATE USING ARROW KEYS ON KEYBOARD / RETURN TO ISOMETRIC VIEW**

25. **FILLET TOOL / CONSTANT RADIUS / FILLET EDGES AS FOLLOWS** be sure to do both sides of your car!

3mm radius

8mm radius

8mm radius

5mm radius

3mm radius

Isometric / Shaded / result as above

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You have ROUNDED OFF ALL EDGES!

**We will now add the rear wing**

STOP AND SAVE YOUR WORK!
26. **VIEW FRONT / SHADED WITH EDGES / EXTRUDED BOSS-BASE / FRONT PLANE / CREATE 2 CIRCLES** as below

Use ZOOM tool or roll middle mouse-wheel to zoom in

27. **EXIT FROM SMART DIMENSION TOOL / CREATE A TANGENT BETWEEN THE BACK OF THE CAR AND THE 6mm CIRCLE**

See step 16 above and Bloodhound Car tutorial Step 23

28. **ADD THE CONSTRUCTION LINE ABOVE / CREATE A TANGENT BETWEEN IT AND THE SMALLER CIRCLE**

29. **CREATE TANGENTS BETWEEN BOTH CIRCLES / TRIM AWAY UNWANTED LINES** as below
30. **ZOOM AND INSPECT THE TANGENT POINTS / IF MORE THAN ONE AT EACH POINT** as below………………..**SELECT BOTH AND MERGE**

![Before](image1.jpg) ![After](image2.jpg)

31. **VIEW ISOMETRIC / ACCEPT SKETCH / MAKE DIRECTIONS 162 TO 32.5mm/ CLICK OK TO EXTRUDE** below is the result

![5] You have **CREATED A REAR WING**!

**STOP AND SAVE YOUR WORK!**

We will now add the front wing

32. **VIEW FRONT / SHADED WITH EDGES / EXTRUDED BOSS-BASE / FRONT PLANE / CREATE 2 CIRCLES** as below

**By now you should realize we are repeating much of steps 26-31 above to create the front wing**
33. **CREATE TANGENTS / REMOVE UNWANTED LINES / EXTRUDE** result is below

   ![Image of front wing creation](image1)

   **6** You have **CREATED A FRONT WING!**

   Revise steps 26-31 above to create the front wing

34. **ADD A 2mm RADIUS TO BODY & WING INTERSECTIONS** as below

   ![Image of added radius](image2)

   Repeat steps 38-51 of Bloodhound Tutorial to add holes for wheels

35. **ISOMETRIC / SHADED** result is below

   ![Image of isometric view](image3)

   **7** You have **CREATED AN F1 Class CAR!**

   STOP AND SAVE YOUR WORK!

SAVE YOUR WORK / start a new drawing and try repeating everything you have done so far.................without looking at your tutorial pages!