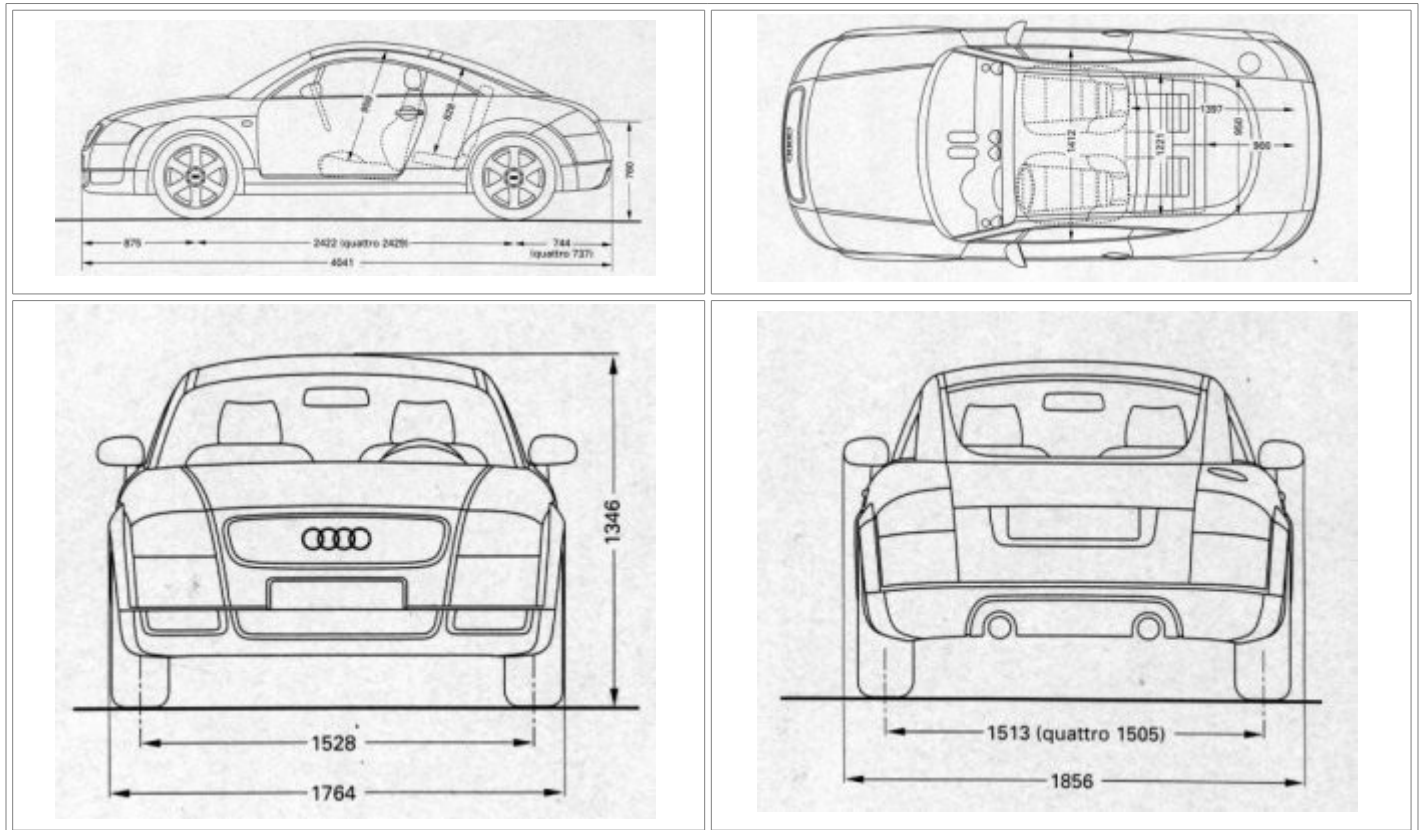


There is no secret to modelling a car in 3d, but you will need to have some drawings or references images. These images will be used to help us place the main character lines of the car. Here we are going to reconstruct an existing car, so we will use as reference images the technical sketches that one can generally find at the end of product brochures or magazine articles. Photographs, roughs or drawings can also be useful.

To begin, place a background image in each view and adjust their scale so that they are correct relative to one another. There is no secret to modelling a car in 3d, but you will need to have some drawings or references images. These images will be used to help us place the main character lines of the car. Here we are going to reconstruct an existing car, so we will use as reference images the technical sketches that one can generally find at the end of product brochures or magazine articles. Photographs, roughs or drawings can also be useful.

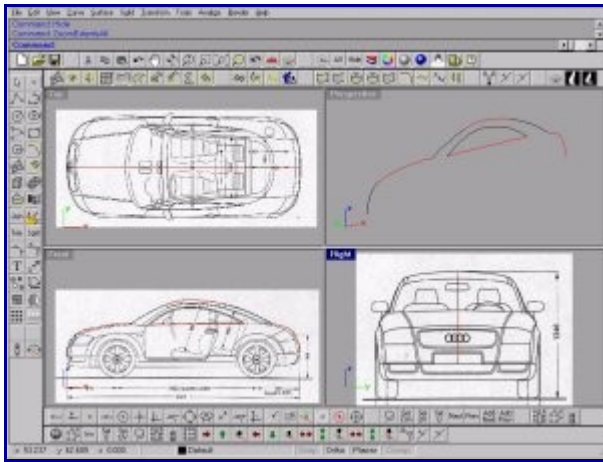
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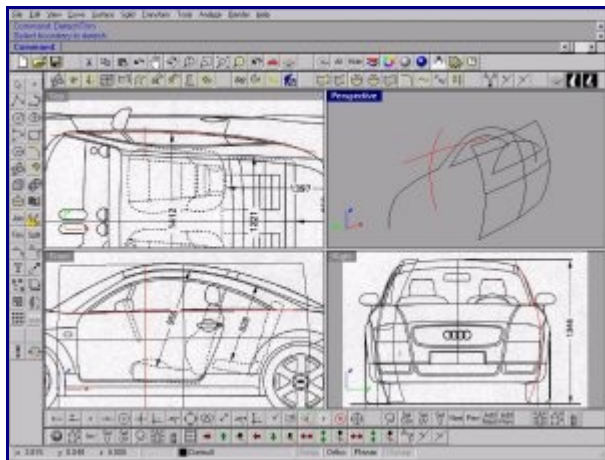


Once the images are in place, we will draw the characteristic curves of the car. Try to make the curves as "clean" as possible, meaning that the number of control points is reduced a minimum that will accurately define the curves. This will help to avoid inflections or waves. The quality of your initial curves will largely determine the quality of your final surfaces. Without beautiful curves you may have problems later with lights and reflections on your car's surfaces during rendering.

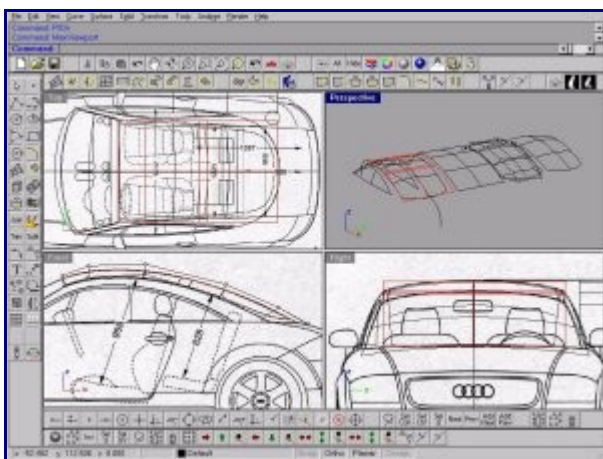
A small but important parenthesis before beginning to model: activate the "Planar" mode in the Rhino status bar in the lower part of your screen.



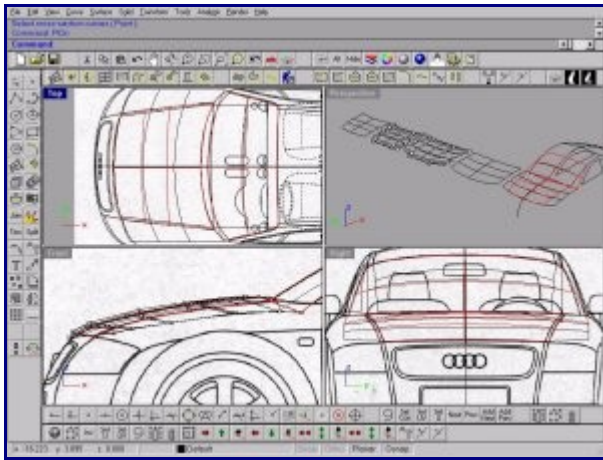
In the front view create curves for the roof, the windshield, the hood, the rear window, and the front and rear bumpers.



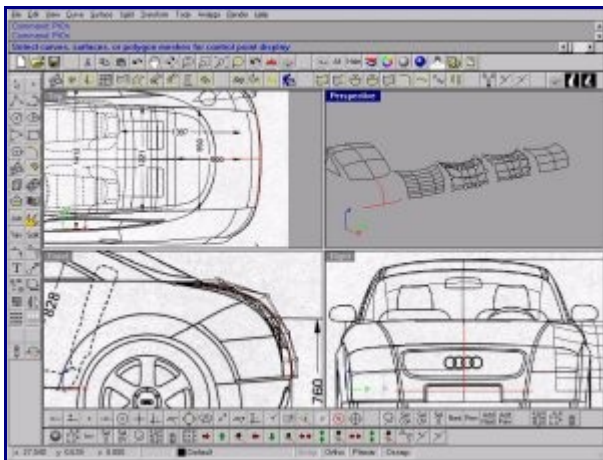
In the right view draw an arc corresponding to the radius of the side window, and in the top view draw the curve of the waist line (belt line). With these two curves create a one rail sweep surface (command:Sweep1). Project the curves of the drip line onto the glass surface and use these projected curves to split (command: Split) the surface.



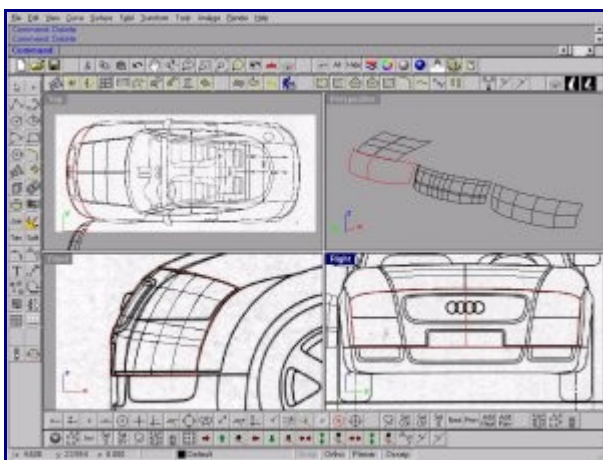
Use the curves of the front view of the roof and of the rear window to create extruded surfaces (command: Extrude; Option 'B' - for both sides). The extrude command having given us a surface of degree 1 with 2 control points, we must reparameterize the surface to degree 3 with 4 control points(command: ChangeDegreeSrf). We can now edit the surface by its control points to curve the roof and the rear window, using the background images in the three views as references



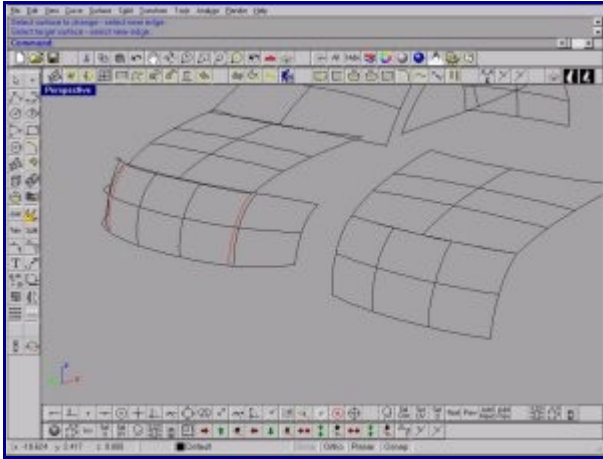
For the windshield another one rail sweep will do the job (command: Sweep1) with the curve that you drew in the front view and the edge of the surface of the roof that you made in the previous step. Edit its control points to widen it. Use the same method to form the hood.



For the rear part create a curve in the top view representing the end of the boot, then create a "sweep one rail" surface (command: Sweep1) between the edge of the rear window and this curve. If the resulting surface has a lot of control points, use RebuildSrf to reduce the number of points. Edit the surface points to obtain the correct form

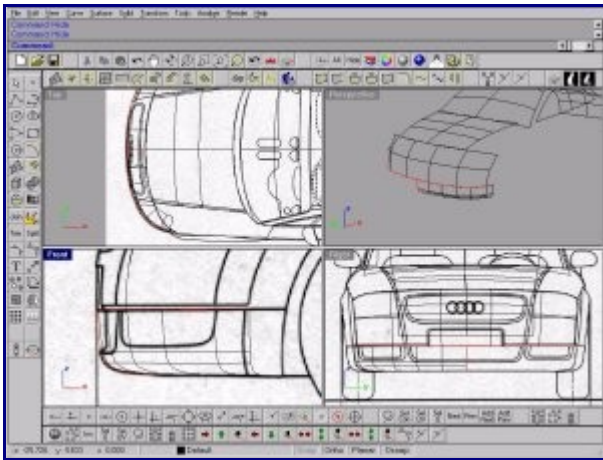


In the front view create curves for the roof, the windshield, the hood, the rear window,

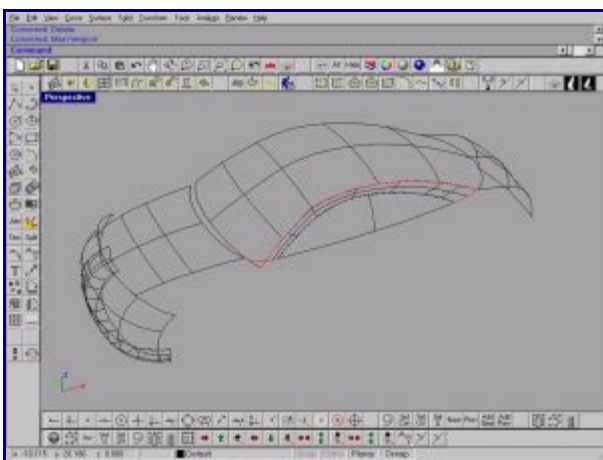


You will notice that the surface of the front end we have just created, and the surface of the hood do not meet exactly. To make the edges meet we are going to use Rhino's surface matching tool (command: MatchSrf). Make a copy of the the front end surface, hide the copy, extract 2 isoparms in the U direction of the remaining surface snapping to the edges of the hood (command: ExtractIsoparm). Click the surface, type "U" to choose the U direction, Activate the "end" osnap, and finally click the two front corners of the hood. Split the front end surface with these two curves. (Another way would be to use the SplitEdge command on the untrimmed front end surface. Use the end Osnap to split the top edge of the surface at the edges of the hood, then proceed with MatchSrf as follows. This makes it unnecessary to copy the surface as above). Click on Surface>Edit tools> Match (command: MatchSrf), click the edge of the hood that you want to modify, the edge of the front end, using the 'position' option in the Matchsrf dialog. Delete the trimmed front end surface and Show the copy you hid earlier.

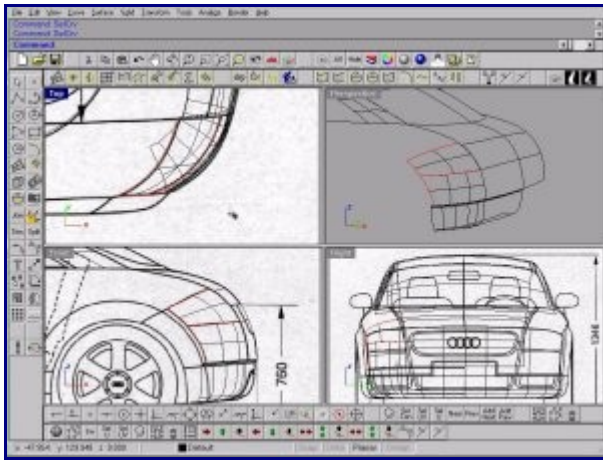
In this case we want to match for position only, but this is also a very useful tool to use when you want to match your surfaces for tangency(G1) or for curvature(G2).



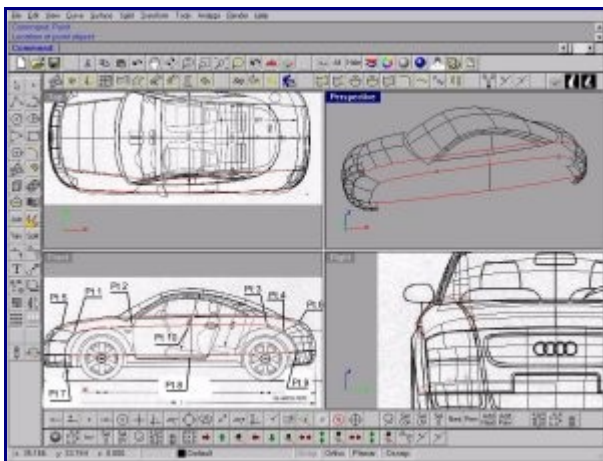
For the lower part of the front end build a "sweep one rail" between the lower edge of the front end surface created earlier and the profile curve that you created in the front view at the beginning of this tutorial.



Lets move on to the side surfaces. For the A-pillar and the drip channel, we'll create two cross section curves: one between the lower edges of the side glass and the lower edges of the windshield and then one between the lower wdgges of the side glass and that of the rear window using the curve blending tool.(command: Blend) Make a "sweep two rails" by using these curves as "cross sections", and the upper edge of the side glass and the edge of the roof/windshiels surface as rails.

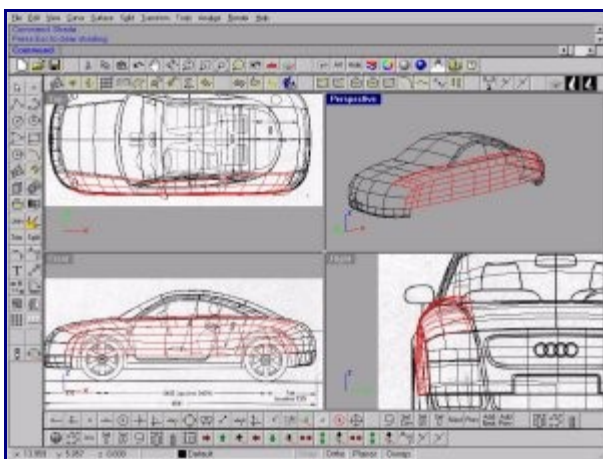


We'll begin the constructing the body side at the rear. Using the images in the top view and in the front view, draw curves delimiting the rear light and the lower part under the light. Create the surfaces with Sweep2.

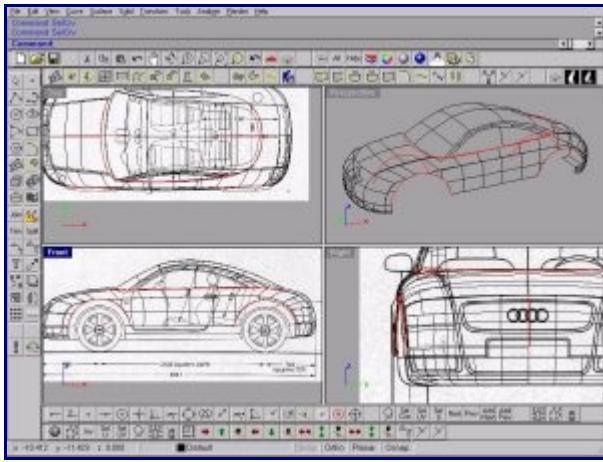


Now comes one of the more delicate sections and also a most important one because when rendered it has to beautifully reflect the light falling on it: the upper body side and accent line of the vehicle. To construct the body side, we are going to begin by creating the bodyside section curves in the right view, then we'll generate some curves which will be guide lines for our swept surfaces. For the first line, create a curve going from the edge of the headlight (point 1) passing through point 2 (see image), through the upper end of the bodyside section curve (point 10), through point 3, and by the end of the rear light (point 4). Use the Match command on this curve match it for tangency with the outer edge of the headlight. Do the same for the rear. Lightly edit the curve points to smooth any unwanted inflections. For the second line make a blend curve (command: blend) between the edge of the hood and the edge of the rear trunk lid. Edit this curve in so that it passes through the upper end of the upper bodyside curve. The third curve should pass from the lower corner of the headlight (point 7), through the lower end of the bodyside section (point B), and to point 9.

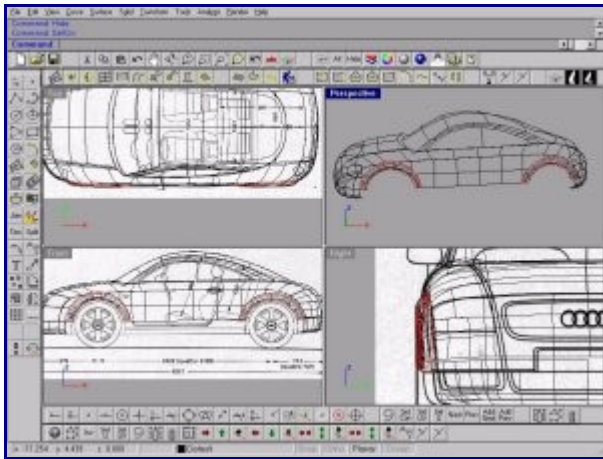
Here it is useful to turn the perspective view so as to see curves end on to evaluate them and to discern bumps.



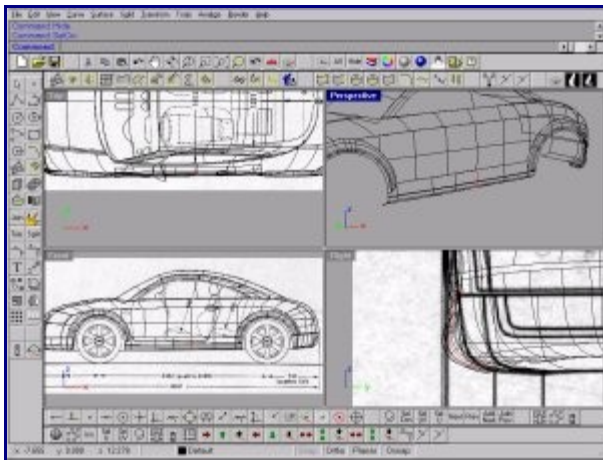
Now all that remains is to create surfaces with two rail sweeps.



Create the top edge of the wheel arches, create the curve of the belt line at the bottom of the side glass. to create these curves flat using the existing geometry as reference as well as the images you can use the 'project to cplane' option in the Osnap box Project the three curves onto the side surfaces of the body (command: Project) and Split surfaces with projected curves.

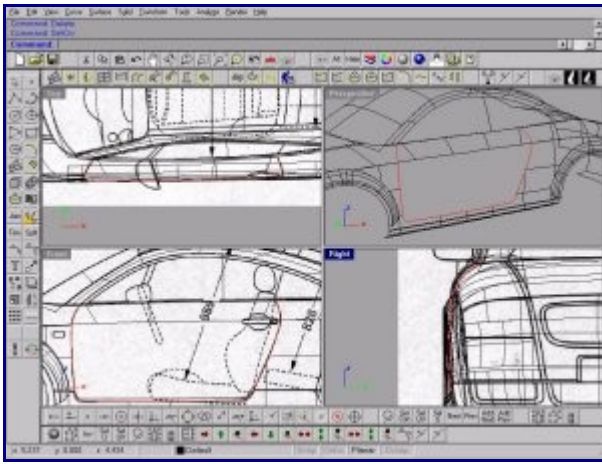


In the side view draw the front and rear wheel openings . Edit the curves, referring to background images, and then draw the wheel opening section curves. Use the Sweep2 command to create surfaces.

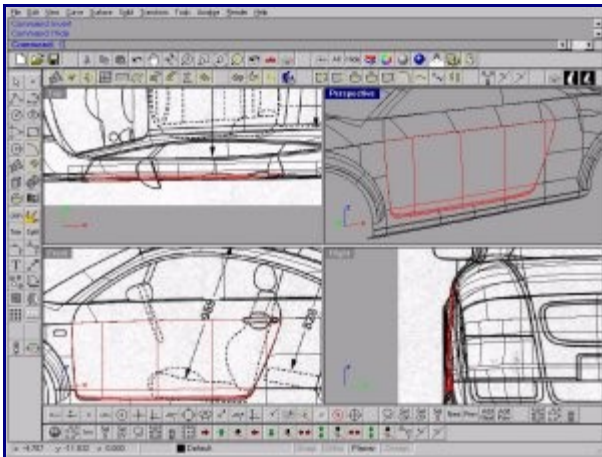


Now lets attach the bottom of the side sill (rocker panel). Draw its section curve in the right view . Create a Sweep1 with the section curve and the lower edge of the body side. (((image15))) We'll need to enlarge this surface slightly to be able to intersect it with wheel arches. To do that that we'll to use the "extend surface" tool (command: ExtendSrf). Click on the icon "extend surface", click on the vertical edge of the surface that we want to enlarge, enter a length. Now get a curve of intersection between the rocker panel and the wheel arch surfaces with the IntersectCrv command. Split the surfaces with curves of intersection. .

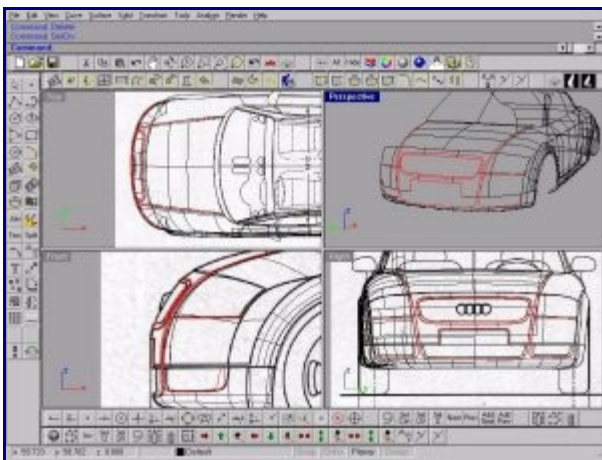
Tip: sometimes when you try to split a surface with a curve it will not work. Often the reason is that the curve does not extend to the edge of the surface and Rhino does not know to automatically extrapolate the length of the curve to be able to cut the surface. On the other hand there is a tool "extend curve on surface" (command:ExtendCrvOnSrf) which can help in these cases.



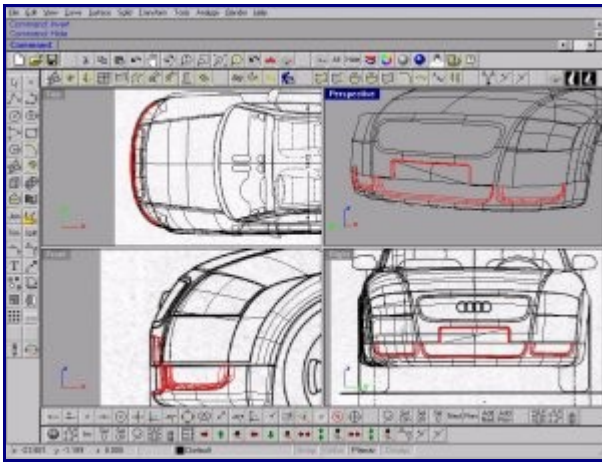
To finish off the side surfaces, we'll create the door and its small chamfer in the lower portion of the rocker panel. Draw the curve for the shut lines of the door in the front view, and project this curve onto the different surfaces of the body sides. Make a copy of body side surfaces. Split the copy of the body side, the rocker panel and the upper body side with the projected curve. Delete the internal part of the door.



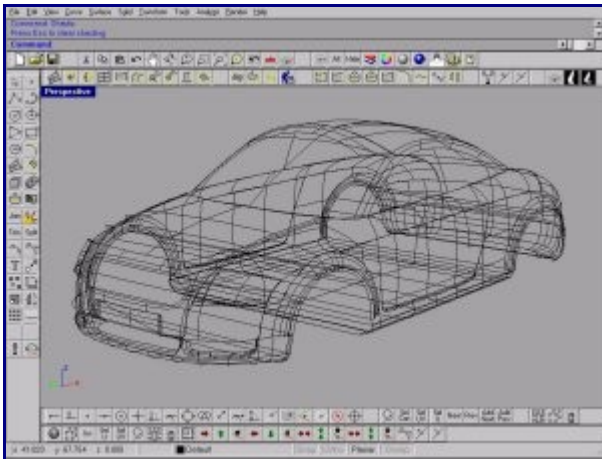
Use ExtendSrf to extend the lower part of the side surface to be able to create the door. In the front view draw the curve of the lower part of the door, project this curve on the enlarged surface, split the door with this curve of projection. Delete the extra parts of the body side. Now create a lofted surface (command: Loft) between the two lower door curves to create the chamfer.



Finally, we'll to add a few details to the front end. In the right view, draw the characteristic curves of the main parts, headlights, the front grill, air intake etc. Project all these curves on the different surfaces of the front end. Split surfaces with the projected curves.



For the air intake and the license plate create ruled surfaces with the Extrude command, "T" option for Tapered, enter a value of angle, a distance and Enter. Create the surface of the license plate with a patch surface (command:Patch)



Make sure the surfaces are symmetrical and finally create a surface lofted surface going joining the wheel opening on the the left to "close" the volume for the rendering.



