CATIA V5 Surface-modeling
(Tutorial 8- Rebuild Audi R8)
Design Intent

PictureSource: www.audi.com/r8

Hard fillet

Fillet disappears

Grab photos from internet (in different views)

A- 2
Wheelbase = 2650
Length = 4431
Width, Max w/o mirrors = 1904
Height = 1249
Tread Width, Front = 1632
Tread Width, Rear = 1595

Front Wheel Size (in) = 19 x 8.5
Rear Wheel Size (in) = 19x 11.0
Front Tire Size = P235/ 35R19
Rear Tire Size = P305 / 30R19
Tutorial 8A
– Insert 2d pictures and reposition them on offset planes
– Create 3D control curves

Tutorial 8B,C, D
– Create the front body of the master model
– Create the middle body of the master model
– Create the rear body of the master model
– Create parting surfaces

Tutorial 8E
– Split the finished (master) model into separate parts
– Build more details on each part

Tutorial 8F
– Reassemble them together

Please be reminded that this series of tutorials is designed to demonstrate a design approach with CATIA, rather than the command itself.
Tutorial 8A

- Create a new project folder (e.g. C:\Car_R8)

Before Start:
http://models.audiusa.com/r8
- Crop the picture (972.jpg) into two jpeg files in a square size (just extracting four views: front, left, top & back)
- Save the files into the project folder

- Start CATIA
- File/New/ Part
- DO NOT SELECT “Hybrid Design”
- Switch Workbench to Generative Shape Design
- Insert a geometrical set “reference”
- Create 4 offset planes
Tutorial 8A

- Create 4 Extruded Surfaces on offset planes
  - (4431mm x 1249mm, start from origin)
  - (2000mm x 1249mm, symmetric)
  - (2000mm x 1249mm, symmetric)
  - (2000mm x 4431mm, start from origin)

- Apply any material onto each surface, then change the texture to our prepared jpeg files (pic1.jpg or pic2.jpg)

- Scale & Position the image to match the surface's size

- Make them semi-transparent

- Set the Geometrical set “Reference” to “Unpickable”
Tutorial 8A

- Switch workbench to “Shape/ Freestyle”
- Insert a NEW geometrical set “control_curves”
- Set “Lock Privileged Plane Orientation Parallel to Screen” on compass
- Create some 3d curves (left side only)
- No curve blending or trimming
- Thicken the curves and change color to PINK

Just create the left

Use minimum number of control points to create a spline
Tutorial 8A

Total
19 curves

A- 8
Front Body
(master)

Tutorial 8B

- Switch workbench to “Generative Shape Design”

- **Insert a NEW geometrical set “Front_body”**

- Make a point on curve
- Make an point on the neighbor curve
- Connect curve (curvature continuous, trim elements)
- Adjust the points to get a smooth trimmed curve

- Complete the above steps to make two more trimmed curves (as shown)

- Create an offset plane (Reference YZ plane, Offset 1495mm)
- Split the trimmed curve into two
Tutorial 8B

Front Body (master)

- Create an offset plane from the bottom (Reference xy plane, Offset 232mm)
- Split the curve by the plane (to remove the bottom portion)
- Split another curve (to remove the bottom portion)

- Mirror the curve
- Create a 3d spline (linking 3 endpoints)
- Create another 3d spline

- Create a multi-sections surface
Tutorial 8B

Front Body (master)

• Create a sketch
  (on XZ plane, right view)
  (three arcs, tangency continuous)

• Create another sketch (YZ plane, front view)
  – Draw a spline

• Create a Combined curve
Tutorial 8B

- Create a Extremum Point on top of combined curve
- Create a plane
  (Reference: Yz plane, Point: Extremum point)

- Create a point on 3d curve ★
- Create a point on 3d curve ★
- Create a Connect curve (trim elements)

- Create a sketch on plane (a line, an arc, then fillet)
- Create another sketch on the offset plane (an arc)
- Create a multi-sections surface
  (Coupling Control (optional))
Tutorial 8B

- Create an extruded surface from a 3d curve (Direction: xy plane; dimension: 50mm)

- Create a Swept surface
  - Profile type: Circle
  - Subtype: 2 guides and tangency surface

- Create a Blend Surface
  - Define first curve, first support, second curve
  - Select “Curvature Continuity” for first support

- Join the Swept surface & the Blend Surface
Tutorial 8B

- Create a sketch on XZ plane
- Project the sketch on the Join Surface (Direction: XZ plane)
- Split the surface by the projected curve
- Create an offset plane (Reference: Xy plane, Point: endpoint △)
- Create a point on the combined curve
- Create another point on the projected curve
- Create two split curves
- Create a blend surface
Tutorial 8B

- Create a Connect curve (Curvature Continuous at both ends)
- Create a point on the edge
- Create a boundary curve
- Create a multi-sections surface (2 sections, 2 tangent faces, 1 guide)
- Create a Parallel Curve (offset 70mm, upward)
Tutorial 8B

- Project the parallel curve on the multi-sections surface
- Split the surface by the projected curve

- Create a Fill Surface (Curvature continuous) (Check the resultant surface; if not smooth, modify the corresponding curves/sketches)

- Create an offset plane
  - Reference: Yz plane,
  - Offset = 1500mm
Tutorial 8B

- Join surfaces

- Split the join surface into Two (by the offset plane) (Keep both sides)

- Split the resultant curve into Two (by the offset plane)

- Create a line (point – point)
Tutorial 8B

- Create a swept surface
  - Profile: Line
  - Guide Curve: Split Curve
  - Surface: Multi-sections Surface

- Create a boundary curve

- Create a swept surface
  - Profile: Line
  - Guide Curve: Boundary Curve
  - Surface: Split Surface

- Create a blend surface
  - tangent continuous on both sides
  - tension 0.8, 1.0
Tutorial 8B

- Create surface-surface fillets (R25mm) twice

- Extract two edges (tangency continuity)

- Split the fillet surface into THREE
Tutorial 8B

• Create a sketch (on Yz plane)
  – Draw a straight line

• Project the sketch onto the two split surfaces

• Create a connect curve
  (Tangency Continuity on both ends)
Tutorial 8B

• Create a sketch (on Xy plane)
  – Draw a straight line

• Project the sketch onto the middle split surface
• Split the surface by the projected curve

• Create a connect curve
  – Curvature Continuity at both ends
  – Tension 0.5 at both ends

• Create a multi-sections surfaces
  – 3 sections & 2 guides
  – Tangent to surfaces
Tutorial 8B

- Split surface by XZ plane
- Join surfaces
- Create a new plane (offset 20mm from the existing plane)
- Create a boundary curve
- Project it onto the offset plane
- Parallel curve by 20mm (outward)
- Create a blend surface
Tutorial 8B

- Create a sketch on XZ plane
  - Draw an arc

- Create a Swept surface
- Create a shape Fillet (R10mm)

- Create a point on the boundary
- Create a plane at the point

- Create an intersection curve
- Create a connect curve
Tutorial 8B

- Create a multi-sections surface
  - 2 Sections & 2 Guides
  - Tangent to surfaces

- Split the Fillet surface by the intersection curve
Tutorial 8B

- Create a sketch on Yz plane
  - Create 3 projected curves,
  - Create a spline curve
  - Create a fillet R25mm
  - Trim curves to form a closed profile

- Create an extruded surface (750mm)

After trimming, a closed profile is formed
Tutorial 8B

- **Insert a new geometrical set (name it as “parting _surface”)**

- Create a sketch on YZ plane
- Create an extruded surface (350mm)
- Split surface (by the extruded surface)

- Create a sketch on YZ plane
- Create an extruded surface (860mm)
- Split the surface into Two (keep both sides)
Tutorial 8B

- **Right-click Geometrical set “Front Body”**
- **Select “Define in Work Object”**

- Create a boundary curve
- Create a swept surface
  - Profile Type = Linear
  - Subtype = with draft direction
  - Guide curve = Boundary
  - Draft direction = yz plane
  - Angle = 30 deg
  - Length = 120mm

- Create a boundary curve
- Create a swept surface
  - Profile Type = Linear
  - Subtype = with draft direction
  - Guide curve = Boundary
  - Draft direction = yz plane
  - Angle = 8 deg
  - Length = 100mm
Tutorial 8B

- Create a boundary curve
- Create a swept surface
  - Profile Type = Linear
  - Subtype = with draft direction
  - Guide curve = Boundary
  - Draft direction = yz plane
  - Angle = 10 deg
  - Length = 100mm
- Extrapolate the surface by 100mm (assemble result)
- Split the extended surface by the parting surface
Tutorial 8B

- Mutual Trim the 3 swept surfaces
- Join surfaces

- Edge fillet 35mm
- Edge fillet 100mm
- Edge fillet 5mm
Tutorial 8B

- Create a sketch on YZ plane
- Project the sketch onto surface
- Split surface by the projected sketch

- Check the finished model with the reference pictures
- Modify the model if needed
- Save file “R8_master_a.catpart”
Tutorial 8C

Middle Body (master)

- Insert a New geometrical set “middle_body”
- Create a symmetry 3d curve
- Create two 3d spline curves
- Create a multi-sections surface (3 sections, 2 guides)

- Extrapolate a curve (900mm, curvature, assemble result)

Extrapolate the curve by ~900mm
Long enough to have a cross here

Spline curve
Middle Body (master)

Tutorial 8C

- Join two surfaces
- Hide the 3d curve
- Create a boundary curve on the edge
- Create a blend surface (2 curves, no supports)

- Create a extremum point (direction: xz plane)
- Create a plane at the point
  - Parallel through point
  - Reference: YZ plane
  - Point: Extremum point

- Create a sketch on the plane (Draw an arc)
- Create a swept surface (profile, guided curve)
Middle Body (master)

Tutorial 8C

- Create offset surface (15mm, inward)

- Project 3D curve on the offset surface (Direction: xz direction)

- Split surface by the projected curve
Tutorial 8C

- Create a plane at the endpoint of the projected curve. (Normal to curve)

- Split the 3d curve by the plane (into 2)

- Create a blend surface
  (2 curves, 2 supports, tangency continuity, tension 0.8, 0.5)

- Create a swept surface
Tutorial 8C

• Right-Click Geometrical set “parting_surface”, select “Define in work object”

• Create a sketch on XZ plane (draw a spline)
  • Create an extruded surface (1500mm)

• Right-Click Geometrical set “middle_body”, select “Define in work object”

• Split the offset swept surface by the extruded surface

• Create an Extruded Surface (Direction: Xz plane, L=200mm)
Tutorial 8C

- Create a sketch on XY plane (Draw a spline)
- Project it on the extruded surface

- Create a swept surface
  (Profile: Projected curve, Guide: Sketch)

- Project 3d onto this swept surface
- Split surface by the projected curve
- Split surface by the extruded surface in the geometrical set “parting_surface”
Tutorial 8C

- Split the extruded surface (by 2 cutting surfaces)

- Split join surface into 2 (by the parting surface)

- Create an offset plane (Reference: Yz plane, offset 2015mm)
Tutorial 8C

• Split surface into 2 by the offset plane

• Create a sketch on Xz plane (Draw a spline)
  • Project sketch on the split surface
  • Split surface by projected sketch

• Create a Translate Surface
  – Element: Split surface
  – Direction: XZ plane
  – Distance: -60mm
Tutorial 8C

• Create a blend surface
  – First curve First support, curvature continuity, tension = 0.6
  – Second curve Second support, point continuity, tension = 1

• Create a sketch on Xz plane (Draw a spline)
• Project sketch onto the blend surface
• Split the surface by projected sketch
Tutorial 8C

• Create a connect curve (tangent, tangent)

• Create a fill surface
  – 4 curves, 3 supports
  – Tangent Continuity

• Join surfaces (4 surfaces)
Tutorial 8C

- Create an offset plane
  (Reference xy plane, Offset 520mm)

- Split surface

- Make the geometrical set “front_body” visible

- Create a connect curve (tangent continuity at point ▲; point continuity at point ★)
- Create 2 boundary curves
- Create a multi-sections surface
  - Section: Boundary Curve#1, Tangent to Surface
  - Section: Boundary Curve#2, No Tangent Support
  - Guide: Boundary Curve#3, Tangent to Surface
  - Guide: Connect Curve

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Tutorial 8C

• Create a sketch on xz plane (Draw a spline)
• Project it onto the surface
• Split surface

• Create a sketch on xz plane (Draw a spline)
• Project it on the old split surface (which should be located before “Translate surface”, page 38)
• Split surface by the projected curve
Tutorial 8C

• Create a connect curve
  – First Support: tangency, tension 2.9
  – Second Support: tangency, tension 0.5

• Create a multi-sections surface
  – 4 curves, 3 supports
  – Tangent Continuity
Tutorial 8C

- Join Surfaces (Total 4)

- Split the surface into 2 (by parting surface)

- Create Shape Fillet (Surface-surface, R25mm)
- Create Shape Fillet (Surface-surface, R20mm)
Tutorial 8C

- Right-Click the Geometrical set “front_body”, Select “Define in work object”

- Create a sketch on Xy plane
  - Draw a symmetric arc
  - Draw a line
  - Draw a connect curve

- Create an extruded surface (1000mm)
- Split surface by the extruded surface
- Save file “R8_master_a.catpart”
Tutorial 8D

- Insert a New geometrical set “back_body”

- Create a symmetry curve
- Extrapolate the 3d curve (select “assemble result”)
- Create a multi-sections surface (3 sections)
- Split the old multi-sections surface by XZ plane

- Create Two Isoparametric curves on the multi-sections surface
Tutorial 8D

• Split the multi-sections surface by 2 iso curves & XZ plane

• Create isoparametric curve
• Split surface by this iso curve

• Create a blend surface (curvature continuous on both sides, tension 0.8)
Back body
(master)

- Create a point on 3D curve
- Create a plane at the point
- Split the old blend surface by the plane

- Create a Sketch on XZ plane (Draw a spline)
- Project sketch
- Split surface by projected sketch
Tutorial 8D

- Project the same sketch onto the split surface
  - Direction = XZ plane

- Create a connect curve (tangent continuous on both ends)

- Create a multi-sections surface
  - 2 sections (1 tangent support)
  - 2 guides (2 tangent supports)
Tutorial 8D

- Create a sketch on Xz plane (Draw a spline)
- Project Sketch on the split surface

- Create an offset plane (Yz plane, 3100mm)
- Split surface by projected sketch & offset plane

- Create a blend surface (curvature continuous)
Tutorial 8D

- Join two surfaces
- Create a boundary curve

- Create a point on the boundary curve
- Split the curve by the point

- Create a blend surface (curvature continuous)
- Create a fill surface (curvature continuous)
Tutorial 8D

• Show the multi-sections surface (1st surface in this geometrical set)
• Show the two isoparametric curves
• Split the surface by these two curves

• Create a point on 3D curve
• Create a point on another 3D curve

• Create a connect curve between the two 3d curves (select “trim elements”)
Tutorial 8D

- Select an edge of the Join Surface (tip: move the mouse cursor on it, then press " " key on the keyboard, so that we can select it on a selection list)

- Create a Boundary curve

- Create a Fill surface
  5 Curves / but 4 Supports

- Hide the Join Surface
Tutorial 8D

- Create a sketch (3 arcs, Dia355mm, 3649mm)

- **Create an offset plane at the back** (Yz plane, 5500mm)

- Create a sketch (Draw a spline, 3 points)

- Create a combined curve (from the above 2 sketches)

- Create a extremum point on the combined curve

- Create a plane at the point
• Create a sketch on the plane
  (Draw a line (15mm), arc, fillet R30mm)

Intersection point (coincident with the endpoint of the arc)
Coincident with the point
Tutorial 8D

- Create a sketch on Xz plane (Draw a spline)
- Project sketch
- Split the surface by projected sketch

- Create 2 points on the combined curve (as shown)
- Create another point on the projected curve (as shown)

The spline must lie before the endpoint of the connect curve

Make two points on this combined curve

Make a point on this projected curve

Written by Dickson Sham
Tutorial 8D

• Create a split curve by two points
• Create another split curve by one point
• Create a blend surface (Curvature continuous on one end, point continuous on other end)

• Create a symmetry curve
• Create a multi-sections surface (3 sections)
• Split the surface by XZ plane
Tutorial 8D

- Create an offset surface (20mm, **outward**)

- **Right-Click Geometrical set “parting_surface”, then select “Define in work object”**

- Create a sketch on XZ plane (Draw a line)

- Create an extruded surface (1500mm)
Tutorial 8D

- Right-Click geometrical set “back-body”, then select “Define in work object”

- Create an offset plane (450mm from XY plane; “Move” the plane near the rear surfaces)

- Create a sketch on XZ plane (Draw a line)
- Create an extruded surface (1500mm)

- Split the offset surface (by the plane & the extruded surface)
Tutorial 8D

- Split surface by the Extruded Surface

- Split the 3d curve (by a plane & an extruded surface)
- Split the combined curve ((by a plane & an extruded surface)

- Create a isoparametric curve
Tutorial 8D

- Create a 3d spline curve (3 points, tangent to the surface edge)

- Similarly, Create another 3d spline curve (3 points, tangent to the surface edge)

- Split surface by the iso curve

- Create a multi-sections surface
  - 3 Sections, 1 tangent support
  - 2 Guides
Tutorial 8D

- Join 2 surfaces
- Create a shape (surface-surface) fillet (R35mm)
- Create a connect curve (tangent continuous on both sides)
- Create a boundary curve
- Create a point on the curve
- Create a plane at the point
- Split the fillet surface by the plane
Tutorial 8D

• Create another boundary curve
• Create a multi-sections surface
  – 2 sections, 1 tangent support
  – 2 guides, 1 tangent support

• Create a connect curve (curvature continuous on both sides)
• Split the curve/edge by this connect curve
• Show the combined curve
Tutorial 8D

- Create a multi-sections surface
  - 3 Sections, 2 tangent supports
  - 1 guide

- Create a parallel curve (~80mm offset from the sketch on XZ plane)
- Project curve onto the multi-sections surface
- Split surface

- Create a fill surface (curvature continuity)
- Create a fill surface (curvature continuity)
Tutorial 8D

- Join surfaces (as shown)
- Split the surface into 2 (by a parting surface)
- Join (top) surfaces (as shown)
- Create a shape fillet (surface-surface) (R25mm)
Tutorial 8D

- Join surfaces
- Create a boundary curve

- Create a line (625mm, from end point of the 3d curve; direction: Xz plane)

- Create a swept surface
  - Profile Type: Circular
  - Subtype: Two guides & radius
  - Select the boundary curve as guide1
  - Select the line as guide 2
  - Radius =450mm
  - Select the line as the spine
Tutorial 8D

- Create a connect curve
- Create a fill surface
  (3 edges, 1 tangent support)

- Join two surfaces

- Create an offset surface (10mm)
- Create an offset surface (-10mm)
- Split Upper Join surface by the upper offset surface
- Split Lower Join surface by the lower offset surface

- Create a boundary curve
- Create a boundary curve
- Create a blend surface
  (tangent continuous on both sides)
Tutorial 8D

- Create a split curve
- Create a blend surface (curvature continuous, tangent borders – none)
- Create a point on curve
- Create a point on curve
- Create a spline (on surface, tangent)
- Split surface by the spline
- Join surfaces
- Create a boundary curve
- Create a swept surface
  - Profile type = linear
  - Subtype = with reference surface
  - Angle = 45deg
  - Length = 30mm
Tutorial 8D

• Create another boundary curve
• Create an extruded surface (170mm, direction: Yz plane)
• Show the old split surface
• Create an offset surface (20mm inward)
• Create a sketch on the back offset plane (Draw a line)
• Project sketch onto the offset surface
• Split surface
Tutorial 8D

- Translate the Untrimmed offset surface (75mm inward)
- Create a sketch on the back offset plane (Draw a line)
- Project sketch onto the new surface
- Split surface

- Create a blend surface
  - Point continuous on one side, tangent continuous on other side
  - Trim support (Join them together)
Tutorial 8D

- Split surface by the old parting surface (which is in geometrical set “parting_surface”)

- Mutual trim surfaces

- Edge variable fillet (30mm, 15mm)

- Shape Fillet (Surface-surface 10mm)
  - Shape Fillet (Surface-surface 10mm)
Tutorial 8D

- Create a sketch on the back offset plane (Draw 2 lines)
- Project sketch
- Split surface by projected curve

- Create a sketch on XZ plane (Draw a line)
- Create an extruded surface (230mm)

End point coincident with the parting line/surface
Tutorial 8D

- Create a Blend surface
  - First curve, first support, Curvature continuous, “Trim support”
  - Second curve

- Create an extrude surface (230mm, Direction: Yz plane)

- Mutual trim surfaces

- Join surfaces

- Edge fillet 15mm

- Edge fillet 10mm
Tutorial 8D

- Create a plane at an endpoint (Reference: YZ plane)
- Create a sketch on the plane

- Create another plane at an endpoint (Reference: YZ plane)
- Create a sketch

- Create a multi-sections surface (select “vertices coupling”)

- Create an edge fillet (20mm)
- Create a Shape fillet (surface-surface 20mm)
Tutorial 8D

• Create a parallel curve
  (Reference curve: 3d spline; Offset: 10mm)

• Create an extruded surface
  – Profile: the parallel curve
  – Direction: XY plane
  – Limit 1 = 100mm; Limit 2 = 100mm

• Create a sketch on the back offset plane

• Extrude the sketch (1500mm)
• Create a Shape fillet (surface-surface, 5mm)
• Create a Shape fillet (surface-surface, 15mm)
Parting Surfaces
(master)

Tutorial 8D

Right Click Geometrical set “parting_surface”, select “Define in work object”

(Continue to make the rest…)

• Create a sketch on XZ plane
  – Project two 3d curve onto the plane
  – Project the old sketch onto the plane
  – Draw a spline
  – Create two fillets
  – Create a centreline, then quick-trim

• Create an extruded surface (1800mm)
Parting Surfaces (master)

Tutorial 8D

again

• Create a sketch on XY plane
• Create an extruded surface

• Create a sketch on XY plane
• Create an extruded surface

• Create a sketch on the offset plane at back
• Create an extruded surface

• Create a sketch on the offset plane at back
• Create an extruded surface
Parting Surfaces
(master)

- Create a sketch on XY plane
- Create an extruded surface

- Create an extruded surface
  - Profile: 3d curve
  - Direction: XZ plane

- (There should be 10 parting surfaces in the geometrical set “parting_surface”)

- Save file “R8_master_a.catpart”
Tutorial 8E

- **Start a new part file**

- Copy three surfaces from the master model *(Paste Special, “as result with link”)*
  - Create a join curve (3 edges)
  - Extrapolate the surface from the join curve (850mm)

- Create an offset surface
  (Surface: Extrapolated surface; Offset 3mm)

- Split surfaces (so that there can be a 3mm gap between two surfaces)
Tutorial 8E

- Multi-select three surfaces, then make symmetry

- Create a new geometrical set
- Create a point at endpoint of the edge
- Create a plane (tangent to surface)
- Create a sketch (4 circles)

- Switch to “part design” workbench
- Create a pad (Limit 1= 5mm, Limit 2= 5mm, thickness 1,2 = 3mm)

- Apply material “Tungsten” to Part body
- Apply material “Grey Blue” to geometrical set.1

- **Save File as “R8_frontbody_a.catpart”**
Tutorial 8E

- Start a new part file
- Copy 3 surfaces from the master model
  (Paste Special, “as result with link”)
- Join 2 surfaces
- Create a boundary curve
- Copy the multi-sections surface from the master model
  (Paste Special, “as result with link”)
  (the surface should be the first surface in the master model)
Tutorial 8E

• Split the surface by right plane

• Create an Offset surface (20mm inward)

• Create another Offset surface (20mm inward)
• Create an intersection curve (between the above two offset surfaces)

• Create a swept surface
  - profile: circular
  - subtype: 2 guides & radius
  - radius: 50mm

• Create a symmetry surface
Tutorial 8E

- Switch workbench to “part design”
- Create a sketch on YZ plane
  (Draw a few lines as shown)

- Create a pad (150mm, thickness1,2 =5mm)
- Split the solid by XZ plane
- Create a sketch (a rectangle)
  - Create a pad (5mm)
- Split solid by the two offset surfaces
Tutorial 8E

R8_grille

- Create a new body
- Thick the offset surface (5mm thick, outward)
- Create a sketch on Yz plane
- Pocket (up to last)

- Add Body

- Mirror Body

- Apply material “Tungsten” to “geometrical set.1”

- Apply material “Plastic” to Partbody
- Change parameters (as table) to Black

- Save File as “R8_grille_a.catpart”
Tutorial 8E

- **Start a new part file**
  - Copy two surfaces from the master model (Paste Special, “as result with link”)

- Create a sketch on XZ plane
  - Project sketch on surface

- Create an offset plane (XZ plane, 1300mm)
  - Create a sketch on the offset plane
  - Project sketch on surface

- Create a blend surface (tangent continuous on one side, point continuous on other side)
Tutorial 8E

R8_head light

- Create a variable offset (edge 0mm, edge 15mm, surface-variable)
- Extrapolate the offset surface (upper edge) (100mm, “assemble result”)
- Extrapolate the surface (lower edge) again (100mm, “assemble result”)
- Create a sketch on YZ plane
Tutorial 8E

R8_head light

- Extract curve (from the surface edge)
- Project curve onto extrapolated surface
- Project sketch onto extrapolated surface
- Split surface

- Create a sketch on YZ plane
- Parallel curve (offset 43mm)
- Parallel curve (offset 43mm)

- Project curves (3 times)

- Create 3 extrude surfaces (Length 150mm)
**Tutorial 8E**

- Create a boundary curve
- Create a line (from start point of boundary curve to endpoint of the curve)
- Create a fill surface

- Switch workbench to “Part Design”
- Thick surface (3mm)
- Mirror

**Insert a new body**
- Thick surface (thickness1,2 =8mm)
- Thick surface (thickness1,2 =8mm)
- Thick surface (thickness1,2 =8mm)
- Thick surface (thickness = 3mm)
- Fillet R8mm
- Mirror

- Apply Material “White” to “Part Body”
- Apply Material “Plastic – black” to “Body.2”

**Save File as “R8_headlight_a.catpart”**
Tutorial 8E

R8_door

- Start a new part file
- Copy 3 surfaces & a plane from the master model *(Paste Special, “as result with link”)*
- Create an Offset surface (3mm, parting surface)
- Split surface (by the offset surface)
- Offset plane (3mm, backward)
- Split surface (by offset plane)
- Multi-select the two split surfaces, then Create symmetry
Tutorial 8E

- Insert a new geometrical set
  - Create symmetry of the surface (window)

- Insert a new geometrical set
  - Offset surface (10mm, outward)
  - Extrapolate the offset surface (~120mm)
  - Create a sketch on XZ plane (Draw two lines)
  - Project the curve on the extrapolated surface
  - Split surface

- Create symmetry
Tutorial 8E

- Apply material “Grey blue” to geometrical.set.2
- Apply material “Black” to geometrical.set.3
- Apply material “DS Black” to geometrical.set.4
- Save File as “R8_door_a.catpart”
Tutorial 8E

R8_side cover

- Start a new part file
- Copy two surfaces from the master model (Paste Special, “as result with link”)
- Split surface
- Create a boundary curve
- Create an extruded surface (200mm)
- Create Shape fillet (R10mm)
- Create a symmetry surface
- Apply material “DS black” to geometrical.set.2
- Save File as “R8_sidecover_a.catpart”
Tutorial 8E

**R8_top cover**

- Start a new part file
- Copy three surfaces from the master model (*Paste Special, “as result with link”*)
- Create an offset surface (3mm, forward)
- Split surface by the offset surface
- Split surface by the front parting surface
- Create a boundary curve
- Create a swept surface (90deg, 30mm)
- Create symmetry surfaces
- **Insert a new geometrical set**
  - Split surface
  - Create symmetry
- Apply material “Grey blue” to geometrical set.2
- Apply material “Black” to geometrical set.3
- **Save File as “R8_topcover_a.catpart”**
Tutorial 8E

- Start a new part file
- Copy four surfaces from the master model (Paste Special, “as result with link”)
- Split surface
- Split surface into 2 (Keep both sides)
Tutorial 8E

R8_rear cover

• Create an Offset surface (25mm, downward)
• Create a boundary curve
• Create a boundary curve
• Create a Blend surface
• Join 2 surfaces
• Create a sketch on xy plane
• Project sketch onto the join surface
• Split surface
Tutorial 8E

**R8_rear cover**

- Copy another four surfaces from the master model
  *(Paste Special, “as result with link”)*
- Split surface
- Create Offset surfaces (3mm)
- Split surfaces (so that there can be a 3mm gap between 2 surfaces)
Tutorial 8E

R8_rear cover

- Extrapolate the parting surface (3000mm)
- Create an Offset surface (3mm)
- Split surfaces
- Create symmetry surfaces (except the translated surface)

- **Insert a New Geometrical set**
- Right –click the offset surface ★, select “Change geometrical set…”, select the new one
- Split the surface by a parting surface ▲
- Create a symmetry surface

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Tutorial 8E

- Switch workbench to “Part Design”
- Create a sketch on XZ plane (Draw a straight line)
- Create a Pad (limit1 ~550mm, thick~60mm, totally cover the cut)
- Split by 3 parting surfaces (as shown)
Tutorial 8E

R8_rear cover

- Shell (8mm, one open end)
- Create a sketch on the planar face
- Create a stiffener (16mm thick)
- Create a rectangular pattern
  (12 instances, 60mm spacing)

- Switch workbench to “generative shape design”
- Create a boundary curve (whole boundary of the offset surface)
- Extrapolate the offset surface by 300mm
  (select “assemble result”)

- Switch workbench to “part design”
- Split the solid by the extrapolated surface
- Mirror
R8_rear cover

Tutorial 8E

- **Insert a new body** (Body.2)
- Create a point 🌟
- Create a plane
- Create a sketch on the plane
- Create a pad (Limit 1= 5mm, Limit 2= 5mm, thickness 1,2 = 3mm)

- Switch workbench to “generative shape design”
- Insert a new geometrical set
- Create a split surface & symmetry (as shown)

- Apply material “Grey Blue” to geometrical set.2
- Apply material “Black” to geometrical set.3
- Apply material “Black” to geometrical set.4

- Apply material “plastic black” to Partbody
- Apply material “tungsten” to Body.2

- **Save File as “R8_rearcover_a.catpart”**
Tutorial 8E

**R8_tail light**

- **Start a new part file**
- Copy 3 surfaces from the master model *(Paste Special, “as result with link”)*

- Split surface by parting surface
- Symmetry

**Insert a new geometrical set**
- Create an offset plane 
- Create a sketch on the plane (draw a line)
- Extract a face
- Project sketch onto the extract surface
- Create a plane at the endpoint
- Create a sketch on the 2nd plane (draw an arc)
- Create a swept surface
R8_tail light

Tutorial 8E

- Create a sketch on the offset plane (draw a spline)
- Create Parallel curves (spacing 43mm, 3 instances)
- Project curves on the swept surface
- Extruded surfaces (x4) – 98 mm long
- Extract a back face
- Switch workbench to “Part Design”
- Thick surface (thickness1,2 = 8mm) (x4)
- Fillet R8mm
- Thick surface (back extracted face, 2mm)
- **Mirror**
- Apply “Plastic black” to PartBody
- Apply ‘DS red” to “geometrical set.2”

- **Save File as “R8_taillight_a.catpart”**
R8_rear body

Tutorial 8E

- **Start a new part file**
- Copy 3 surfaces from the master model *(Paste Special, “as result with link”)*
- Create an offset "top" parting surface (3mm)
- Split surface by the offset surface & the other parting surface
- Create a sketch on Yz plane
- Project sketch onto surface
- Split surface
- Symmetry surface

- **Insert a new geometrical set**
- Show the original copied surfaces from the master model
- Split surface by a parting surface
- Symmetry surface
Tutorial 8E

R8_rear body

- Switch workbench to “Part Design”
- Create an offset plane (4230mm from YZ plane)
- Create a sketch (two circles)
- Pad (190mm, 10mm thick)

- Create a sketch on XZ plane (a line)
- Pocket (up to last)
- Fillet 6mm

- Create a sketch
- Pad (5mm)

- Mirror

- Apply material “grey blue” to geometrical set.2
- Apply material “plastic black” to geometrical set.3
- Apply material “titanium” to Partbody

- Save File as “R8_rearbody_a.catpart”
Tutorial 8E

R8_dummy chassis

• Start a new part file

• Create 4 points as tables

• Create an Axis system at each point

• Save File as “R8_dummychassis_a.catpart”
Assembly

• File new product

• Insert all part files

• Insert front wheels, then locate them onto the Axis systems of “dummy chassis”
  • Insert rear wheels, then locate them.

• Insert “mirror” part file
  • Locate it by compass

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Tutorial 8F

(After the part “mirror” has been located)

• Select the part “mirror”

• Click “Symmetry” Under the toolbar “Assembly Features”

• Select “XZ plane” of the part “R8_door”

• Highlight “keep link with position”

• Highlight “keep link with geometry”

• File /Save all

• (A new part file “Symmetry of R8_mirror.CATpart” is created)

• (Name the assembly as R8_assembly.CATproduct)

- END -
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