

MOUSE LOGITECH M705

an assignment of Computer
Aided Design Laboratory M



Università di Bologna
Dipartimento di
Ingegneria Industriale





Choice of the assignment's topic

Some reasons which brought me to choose my computer's mouse as the object of the assignment

Shape

It has a complex shape that involves a modelling difficulty at least equal to the once of assignments done during the course

Assembly

It is made up of a lot of pieces, which are enough to create an assembly

Portability

It is easily transportable to be always available for taking measurements and comparing the CAD model with the real object

Notable features

Logitech M705

The choice of the project's topic is also justified by the features that the mouse has

- **Sculpted for comfort**

The full-sized contoured shape follows the natural curve of hand for more comfort



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- **Five editable buttons**
Two thumb controls and three movements of the mouse wheel



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Two thumb controls and three movements of the mouse wheel
- **Five editable buttons**
Dual-mode scrolling allows switching between fast and precise scrolling





Modelling strategy

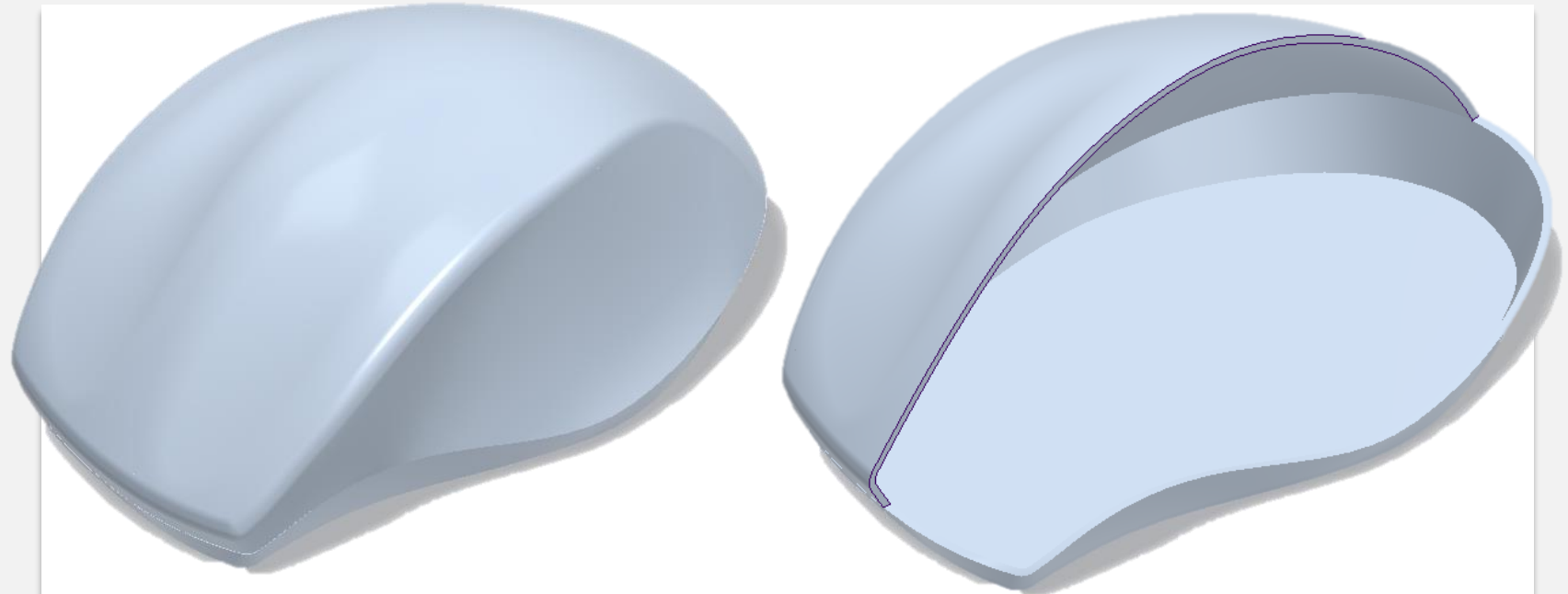
The modelling strategy is based on working firstly with a **solid single-piece model** of the mouse and then subdividing it into several pieces

- Start modelling as a single block
- Partition of the single block
- Further partitions of the block
- Detailed modelling of pieces obtained
- Addition of other components
- Export rendered images

Modelling steps

Modelling of the starting block

The modeling process starts with making a solid monoblock which will establish the basis for following operations



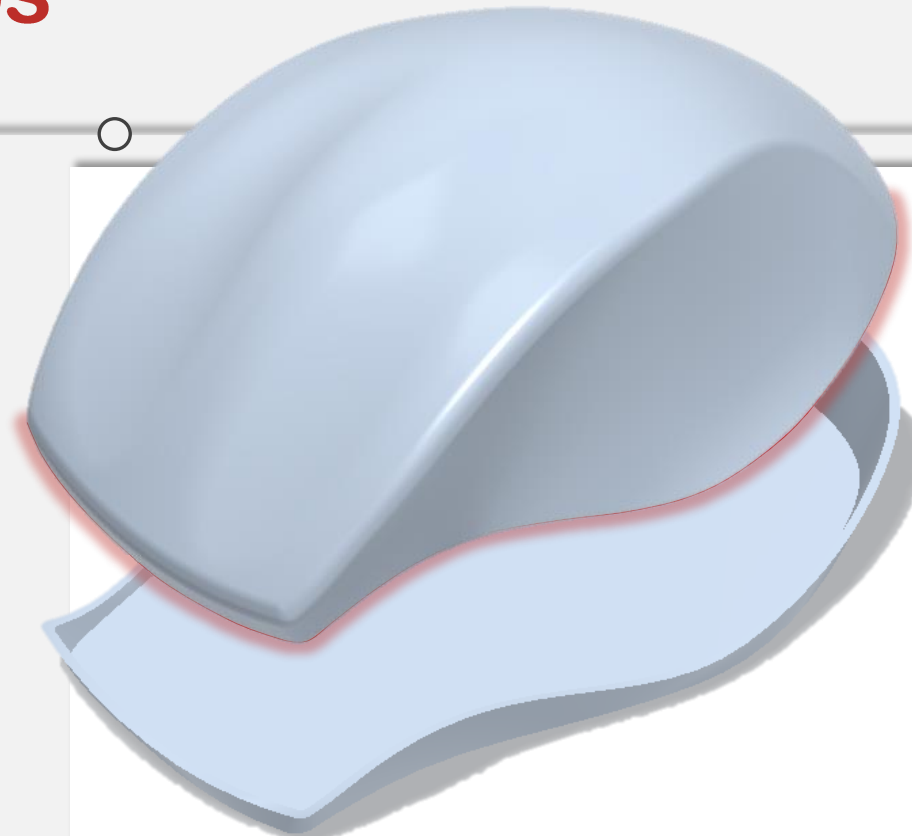
Starting from the monoblock, the shell feature removes material leaving a layer of known thickness

Shell
feature

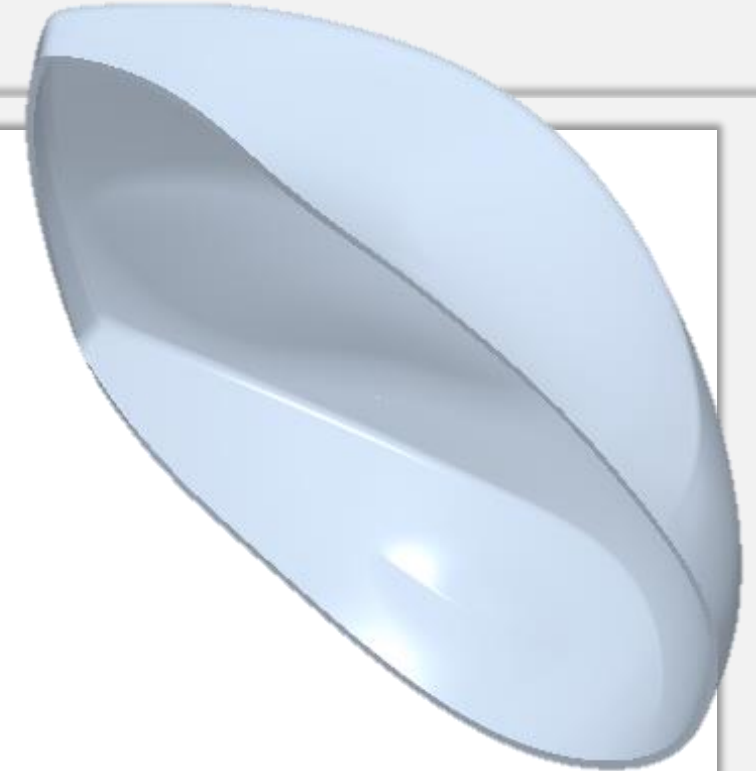
Modelling steps

Partition of the single block

Partition of the monoblock to create the bottom and the top sides of the mouse



The boolean operations feature allows subdividing the shell into two parts through an intermediate *boundary* surface



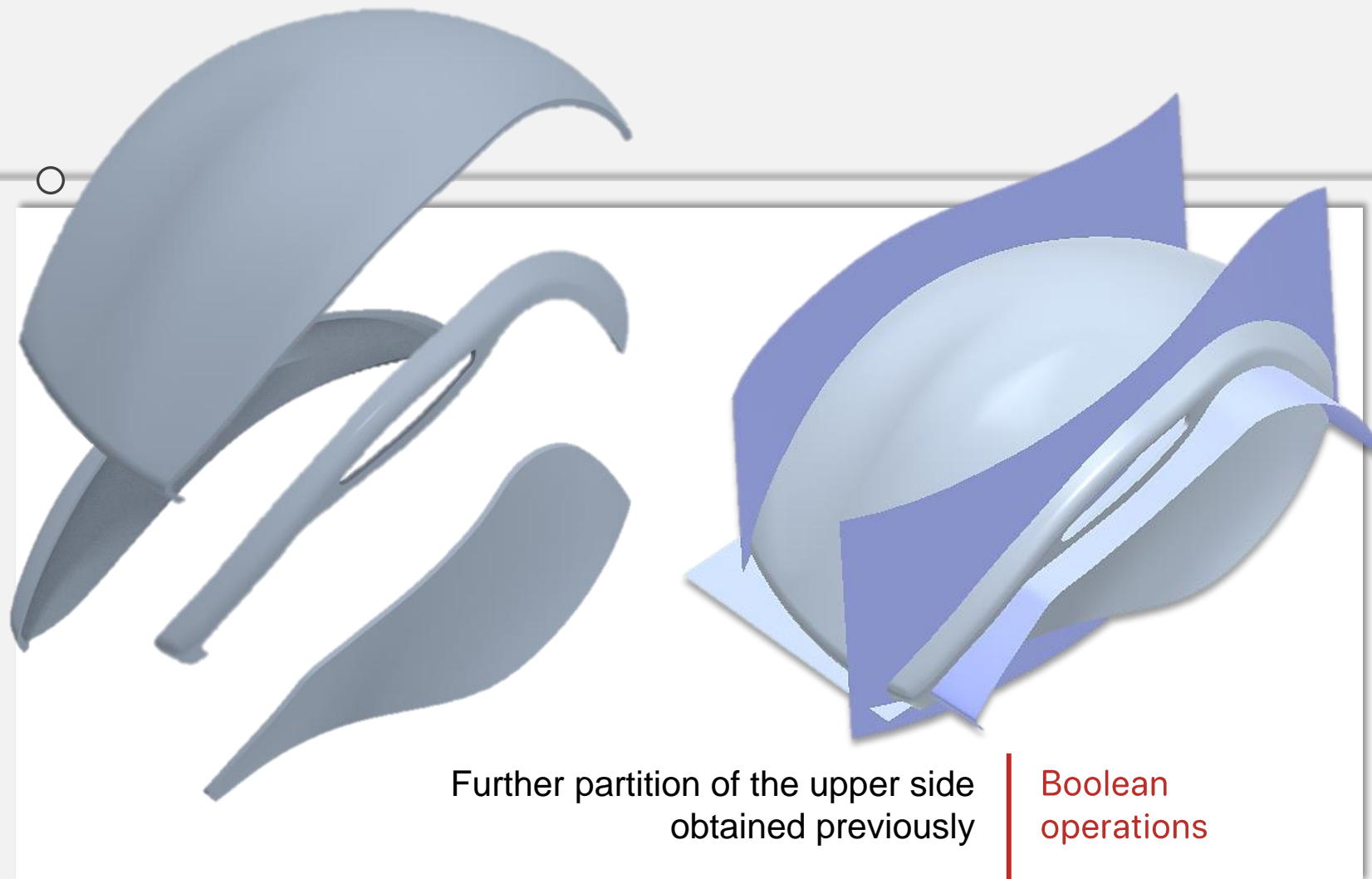
Boolean
operations

Modelling steps

Further partitions

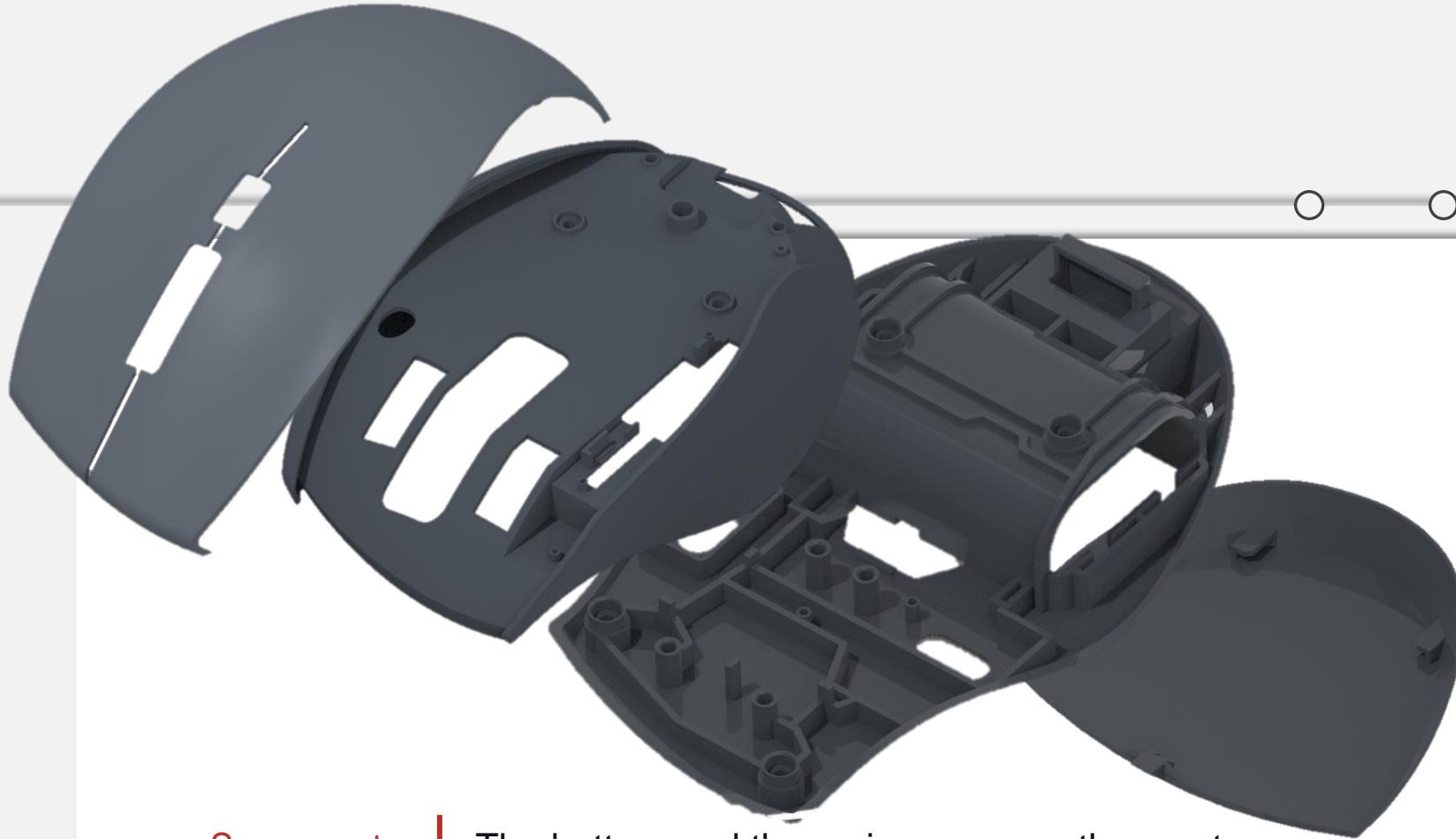
Partition of top side to obtain three pieces:

- The **top side** (including mouse keys)
- The **main-top side** (structural)
- The **lateral strip** (bracket of lateral buttons)



Boolean operations

Modelling steps



Some parts
developed

The bottom and the main upper are the most
developed

Detailed modelling of parts

Development of every
part previously obtained,
for example, the battery
case, the supports for the
motherboard, the hole of
the upper button...

Modelling strategy

Modelling steps



Adding the
editable buttons

The five buttons are included in the movements of the mouse wheel and in the lateral keys

Additional components

Adding other components that guarantee the complete functionality of the mouse.



Modelling steps



Export rendered images

The last step of the modeling strategy consists of working on the assembly's appearance, in order to exporting rendered images



Blueprints

The blueprints and images of the mouse are the main support to start *sketching*

Sketch

Sketches are fundamental to obtaining the references requested by the boundary blend feature

Boundary blend

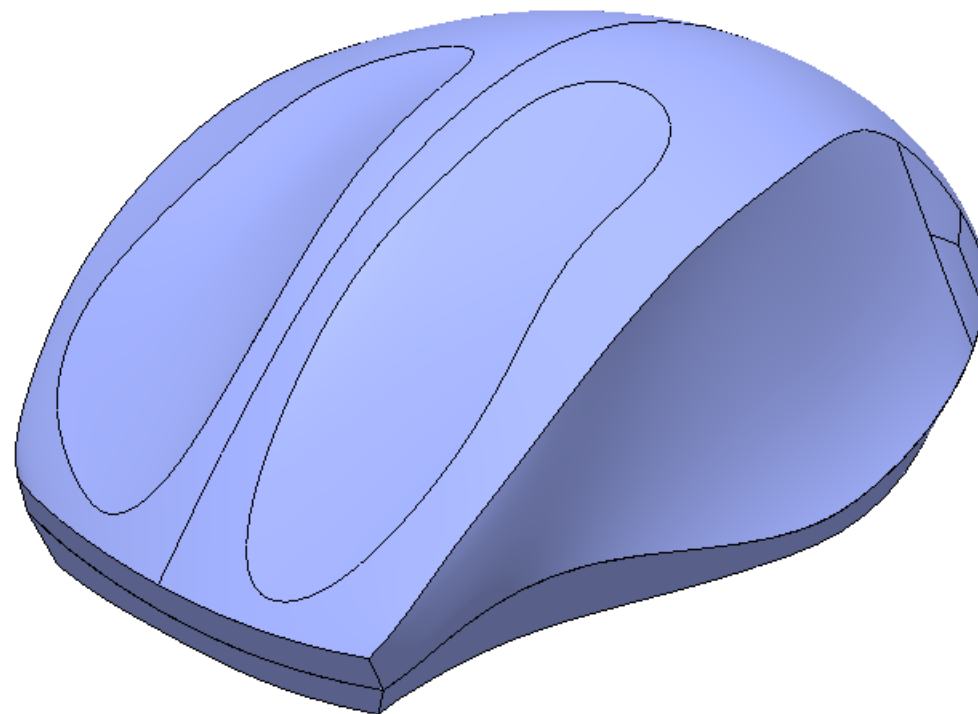
The boundary blend feature creates surfaces from curves and sketches defined in two directions

Solidify

Joining more blended surfaces in a single closed one allows to obtain a solidified object

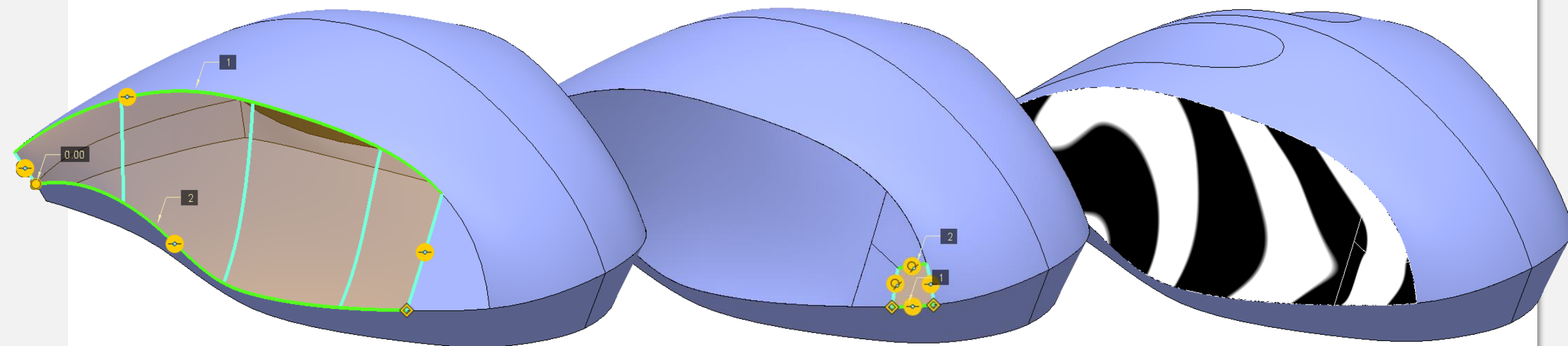
Monoblock modelling

The **modeling of the first single monoblock** is the most time-consuming step of the process but **improve the accuracy** of the final object's shape



Getting real surfaces

The grid of curves on which the blended surfaces are formed is obtained with the intersection feature: each curve is the intersection of two sketches on orthogonal planes. This procedure allows to obtain surfaces coinciding with the boundaries of the blueprints.



Points of singularity

Each side face has edges coinciding at a singularity point, which cannot be modeled correctly with a single blend surface. To close the surface, three quadrangular patches are used with continuity and curvature constraints on the previous surface

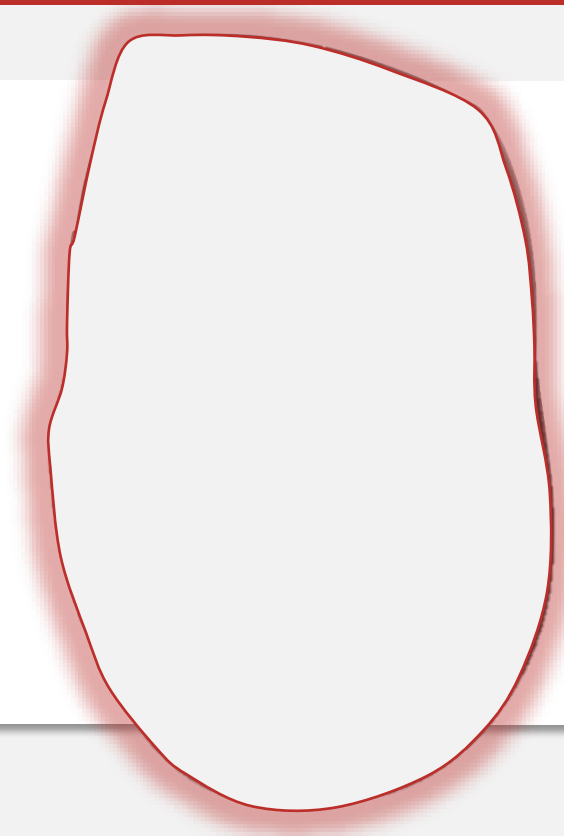


Original

The *original* one has a shape which follows the natural curve of hand to improve comfort

Assignment X

The *CAD model* mimic the original one even in the appearances



Model comparison

The final assembly is **quite similar** to the original mouse thanks to the **strategy** we used



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Exploded view

The internal parts
were modeled
following a careful
research for
disassembled parts



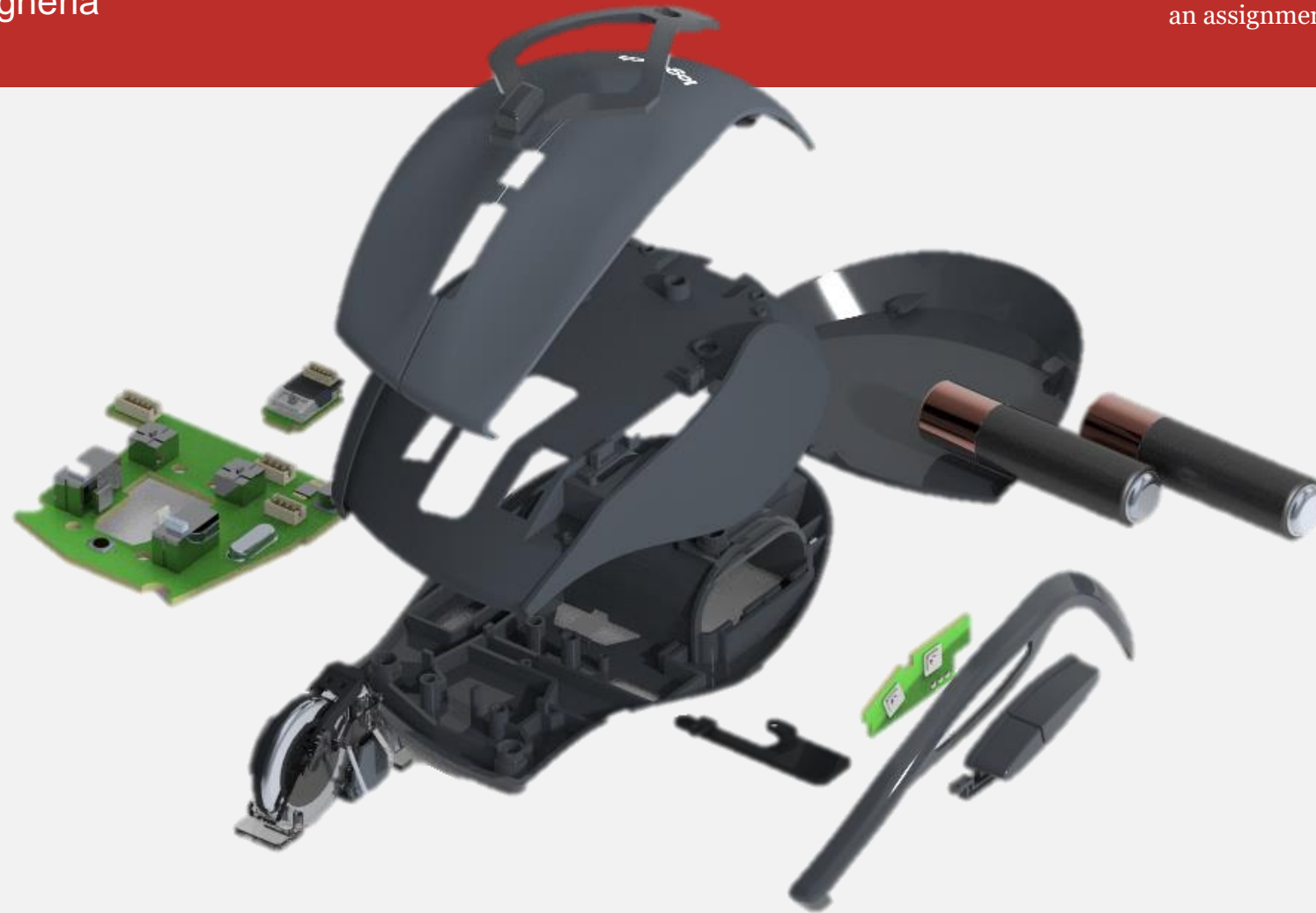
The mouse wheel

The hyper-fast
scrolling brings a
mechanism similar to
the click pen's one



Model details

The final assembly is **quite similar** to the
original mouse thanks to the **strategy** we
used



**Complete
exploded view**

A mouse **contains more parts than you think**
(some were not represented)