

Range of Handles for Mortise Lock

Objective : To design a range of mortise lock handles focusing on aesthetic appeal

The range should be wide enough to accommodate aesthetic preferences of a wide variety of users.

→ Study of existing Range of Locks

Godrej Mortise locks

Other Indian Manufacturers

Export Markets

→ Study of **Manufacturing Processes** for existing locks

→ Study of **New Materials and Finishes** for design

→ Visit to **shops and talking to dealers**

→ **Qualitative interviews** with probable users

Type of Lock



Combi Pack



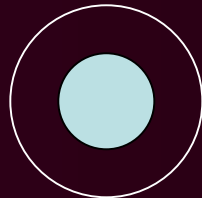
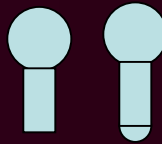
Rose Set

→Combi pack for **Euro Profile** Mortise Lock

→Combi pack for **Lever** Mortise Lock

→Combi pack for Ultra Mortise Lock

→Combi pack for Keyless Mortise Lock



Godrej Handles

Back Plate



- Semi circular, straight
- Embossing for **feature** lines
- Engraving for **Richness**



- Semi Circular
- Embossing

Handle

Straight Profile

- Detailing at ends only
- Rounded handle ends - **knobs**
- Ends are bent **inwards** and **downwards**
- Use of **Bi-metals**

Curved Profile

Details



Other Company Handles

Back Plate



- Straight end plates
- Patterns with punched holes



- Curved ends plates
- Designed profiles are used
- Many types of curved handles

Handle

Straight Profile

- Inclusion of other materials
- Mostly no engravings to retain Elegance



Curved Profile

- Richness engraving is used
- Different Lock hole position



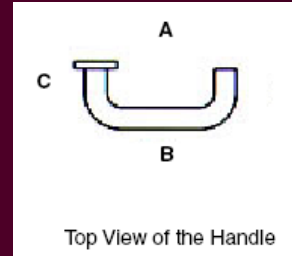
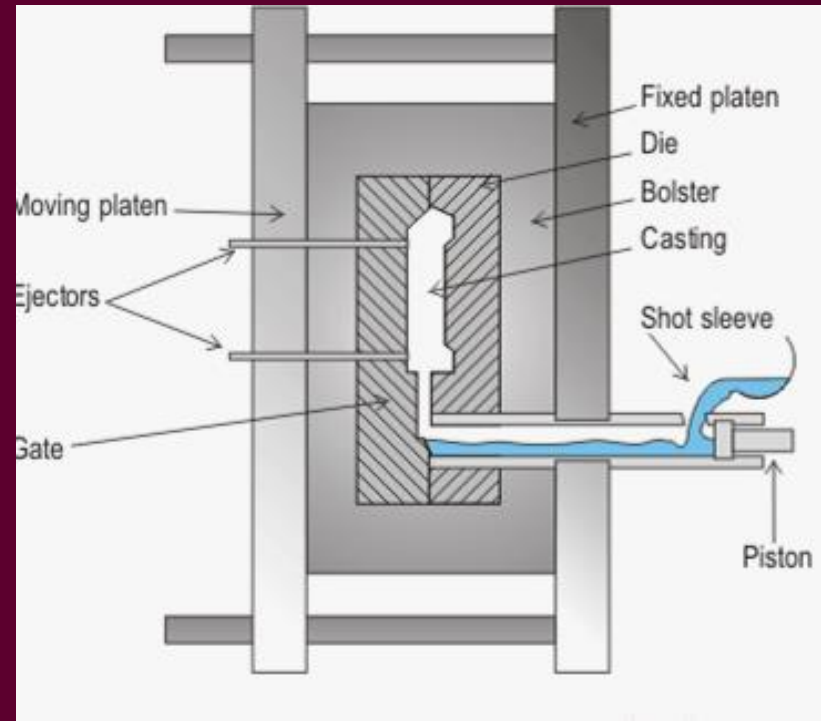
Manufacturing Details



Part	Material	Manufacturer	Process
Back Plate	MAZAK Brass Cast Iron	In house Manufacturing Vendor Vendor	Die casting/Forged Die casting/Forged Die casting/Forged
Handle	MAZAK Brass Cast Iron	In house Manufacturing Vendor Vendor	Die casting/Forged Die casting/Forged Die casting/Forged
Spring	Spring Steel	Available	Coiling
Stopper Plate	Hardened Steel	Vendor	Sheet metal Blanking
Circlip	Spring Steel	Available	

Manufacturing Details

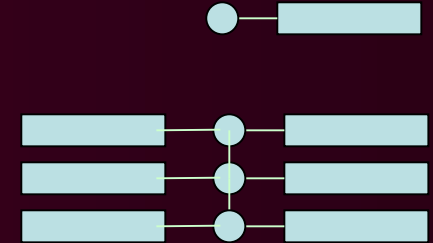
Die Casting



A → Difficult

B → For single Cavity

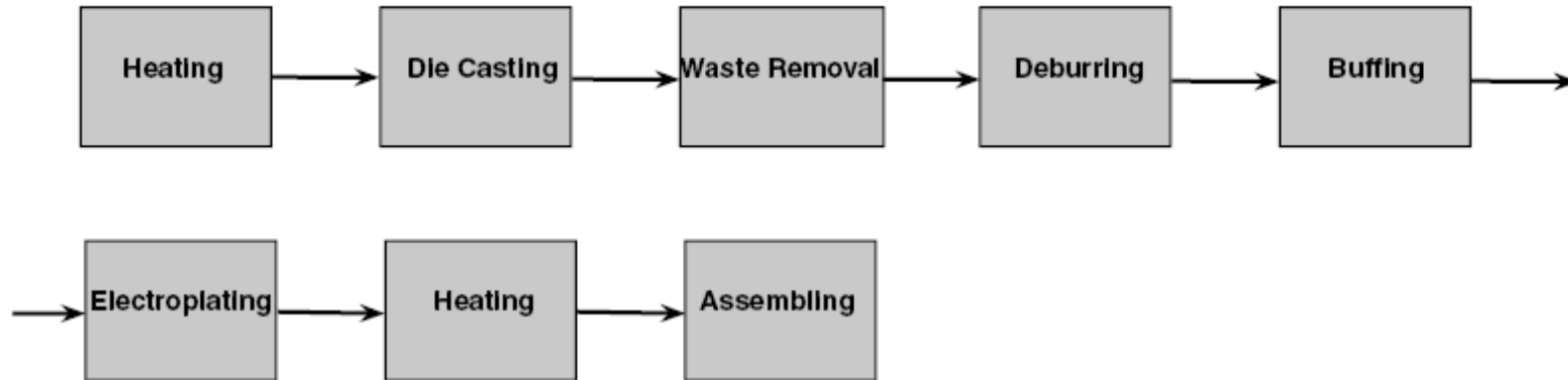
C → Multiple Cavities

Dis. Adv.

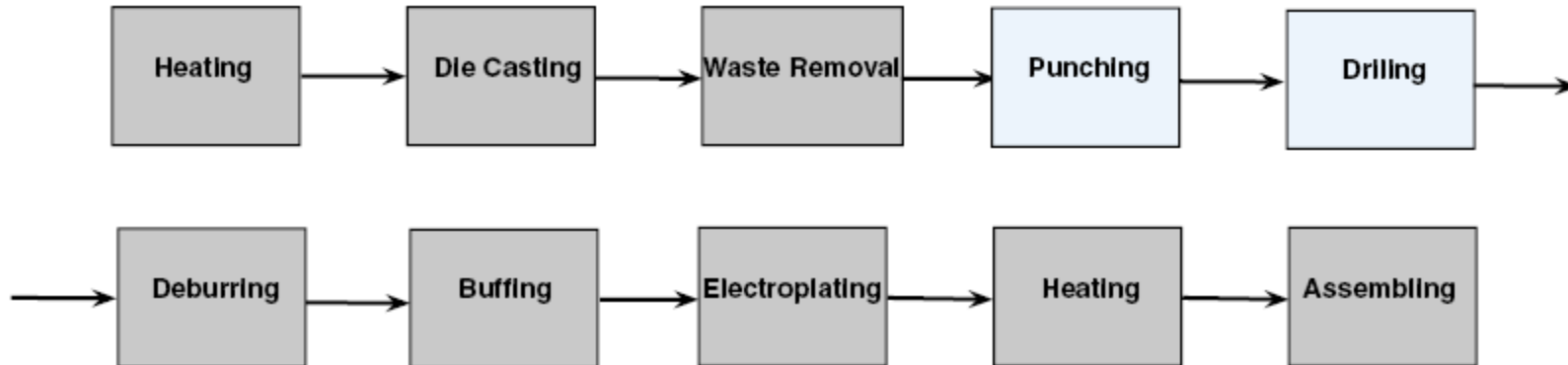
- Voids & **Porosity** is Possible in Complex Shapes
- **Expensive** Machinery & Dies
- Limited to Metals With **Low** Melting Points (normally no higher than copper-based alloys)
- Hollow sections are complicated

Manufacturing Details

Handle

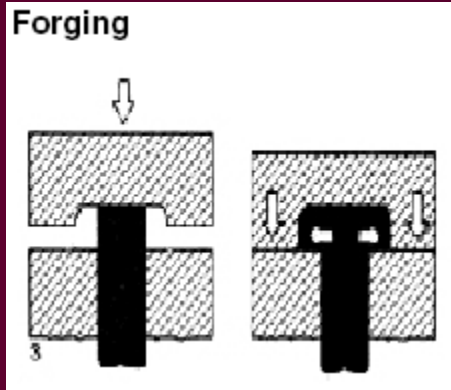


Back Plate



Manufacturing Details

Forging



- Improves properties and Required shape
- Tolerance – 0.5 to 1%
- Reasonable complex structures

Dis. Adv.

- Expensive Dies
- Skilled Labour
- Rapid Oxidation

Using Forming Process for new design

- Cost effective
- Formal advantage of volume
- Versatile Shape
- Less material usage

- Roll Forming
- Stretch Forming
- Drawing
- Stamping
- Rubber Forming
- Spinning
- Super Plastic Forming
- Peen Forming
- Explosive Forming
- Magnetic Pulse Forming

Finishes



Finishes

New Types of Finishes



Oil Rubbed Bronze



Chrome-White Enamel



Satin Black



Antique Nickel / Pewter



Distressed Brass



Venetian Bronze

Antique Copper



Distressed Oil rubbed Bronze

Antique Nickel

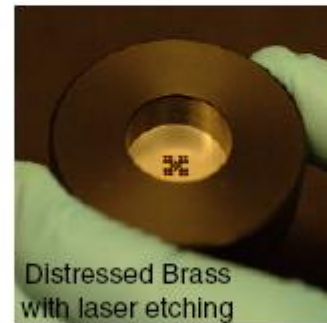
Finishes



Enamels



Stainless steel with Titanium coating



Distressed Brass
with laser etching



Titanium Nitride Coating

~ HIGHPOINT HANGING COLLECTION ~



HP-441H ~ 5.75"W X 10"H
Square in Design with Brass Finish



HP-440H ~ 5.75"W X 10"H
Square in Design with Brass Finish



HP-442H ~ 5.75"W X 12"H
Square in Design with Brass Finish



HP-473H ~ 4"W X 7"H
Square in Design



HP-471H ~ 4"W X 7"H
Square in Design



HP-472H ~ 4"W X 7"H
Square in Design



HP-490H ~ 4"W X 7"H
Square in Design with Brass Finish



HP-465H ~ 4"W X 7"H
Square in Design with Brass Finish



HP-466H ~ 4"W X 7"H
Square in Design with Brass Finish



HP-480H ~ 3.75"W X 7"H
Square in Design



HP-460H ~ 2"W X 4"H
Square in Design



HP-490H ~ 10"W X 9"H
Square in Design

~ 12V, 26W bulb w/ surface mount ~
~ 120V, 40W bulb w/ 4" canopy ~
~ 18" Solid brass chain included ~

Finishes by Other Materials

GE Plastics



Lexan Resins

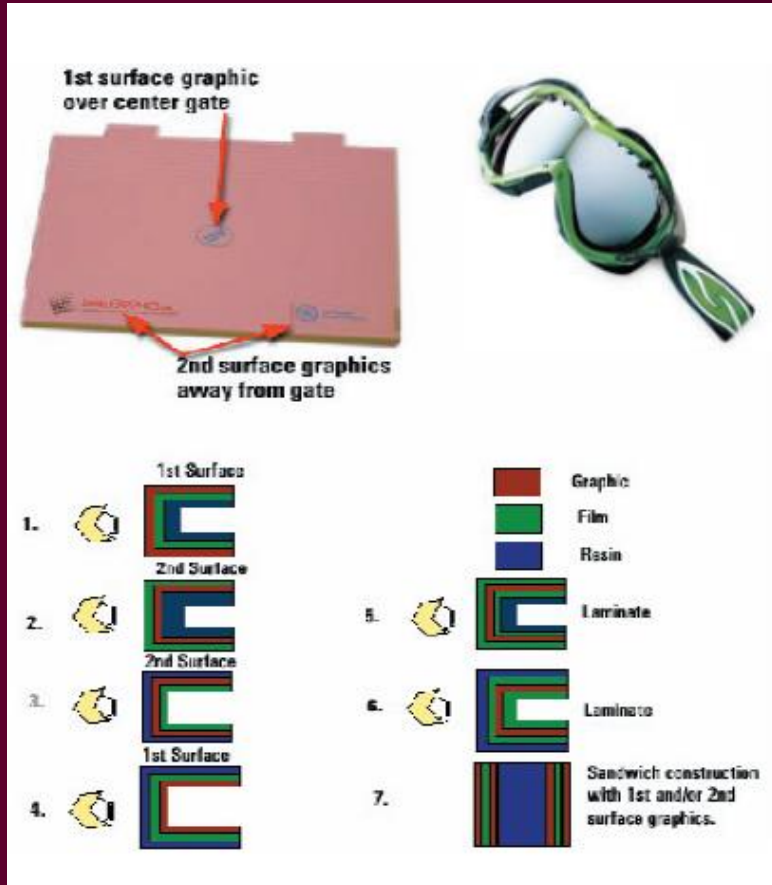
Lexan Polycarbonate -- ↑ Impact Strength, Crystal Clear

PC ABS -- ↑ Strength, Thin wall molding

Cycloy Polycarbonate -- ↑ Impact Resistant, heat resistant, Aesthetics

Finishes by Other Materials

GE Plastics



In-Mould Decoration

IMD -- ↑ Design flexibility and productivity
 Multiple colors, effects, and textures
 Long - lasting graphics
 Systems **cost** reductions

Manufacturing gains --

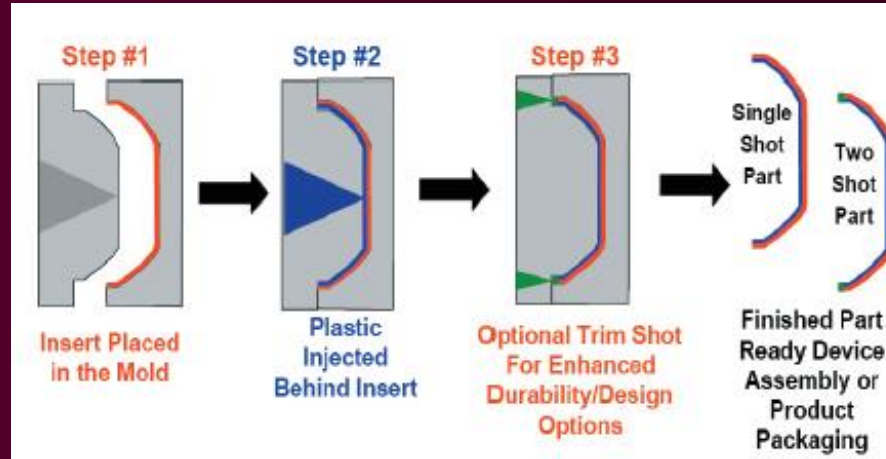
Reduced secondary operations
 Molds and decorates in one operation
 Reduce cost and process
 Lower system costs
 Reduced inventory

Finishes by Other Materials

INCLOSIA



The EXO Over molding process



The design flexibility includes --

- Deep draw
- Holes and pockets
- 3-D shapes
- Logos and emblems
- Embossing and debossing
- Printing and laser etching
- Mixed materials
- Integrated fasteners

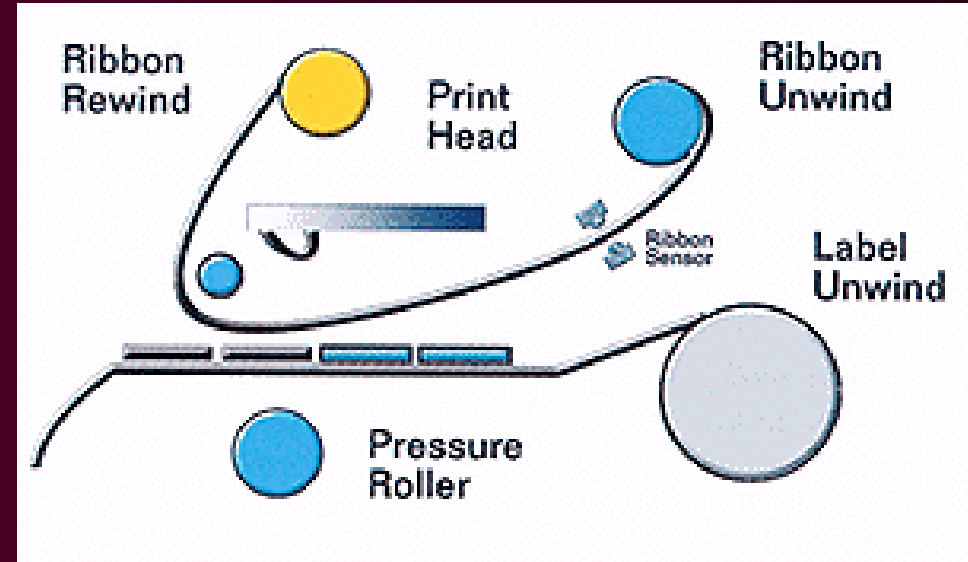
Finishes by Other Materials

Techno Prints, Mumbai



Heat Transfer Printing

Polyester or high-density tissue coated on one side with either a wax-base ink, resin-base ink or a combination of both.



Finishes by Other Materials

Techno Prints, Mumbai



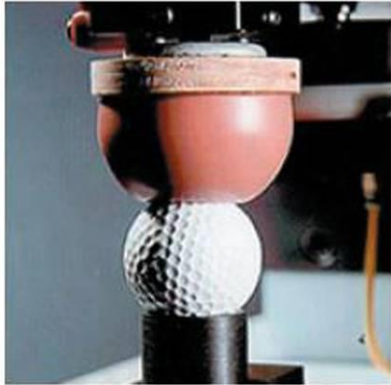
Heat Transfer Printing

- Works on a heating concept
- Durable, high quality labels
- Used under a wide range of environments
- Wide range of color ribbons available
- Easy to use
- Multiple Colors



Finishes by Other Materials

Techno Prints, Mumbai

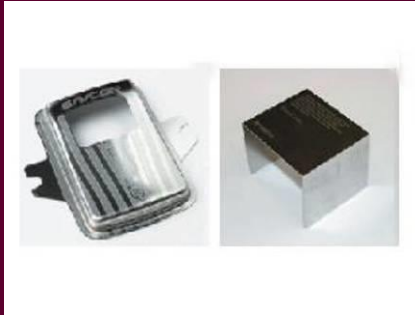


Pad Printing

- Applied on Round surfaces
- Only CMYK colors
- Extreme adaptability
- Can be used on objects of various material with its specific ink.
- Printing wet on wet

Finishes by Other Materials

Sharpline Converting Inc, Newyork, US



Etching

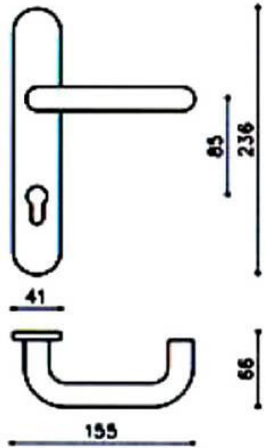
Crystal Clear

Process involves debossing relief patterns in the chrome base of the image, providing additional detail and complexity

Material : Urathene



Constraints

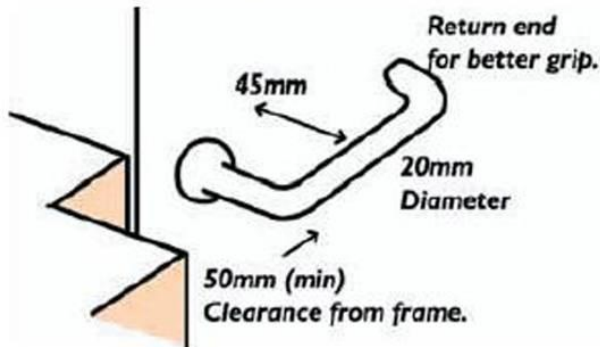


Dimensional Constraints

1. The center to center distance = 85mm
2. The center to center distance between the screws holes = 236mm

Human Factors Constraints

1. The force $< 20\text{N}$
2. Distinguishable colors with the door
3. The length of the handle $\geq 145\text{mm}$
4. Gripping dia = minimum 20mm and maximum 35mm
5. It is preferred if return end has a little bigger gripping dia



Handling of Handle



Thumb Position



Colored handles



Protrusion on one end



Avoids Slipping



Key hole Position



Form

- Rose set forms developed than Combi Pack
- Back plate form is almost same in most of the handles
- Larger handle – More expressive
- Curved profiles are more Playful and Dynamic
- Straight profiles are Elegant and Modern
- Fitting Screws details are not worked out much
- Only Solid forms are used

Manufacturing

- Processes – Die Casting or Forging



Finishes

- Contrast between materials is giving more Expressive
- No graphics – Engraving or Embossing
- Availability of More finishes

Materials and Expressions

- Polished brass, black and gold – Elegance, elightness
- Matte nickel and gold -- Richness
- Brass -- Pure
- Chrome / Nickel -- Moderns

Brief



To design a range of mortise lock handles focusing on aesthetic appeal which will satisfy the following

1. Form and Aesthetics

- Playful range** – Youth
- Elegant** -- Middle age population
- Postmodern** -- Who wants to be different

2. Manufacturing

Reduction in cost by tooling

3. Cost

Common Dies
Reflect Godrej's capability in precision die manufacturing

4. Common back plate → Economical and defines range

Playful – Mortise Lock Handles

Form



Material



Details



Low

High

Elegant – Mortise Lock Handles

Form



Material



Details



Low

High

Form



Material

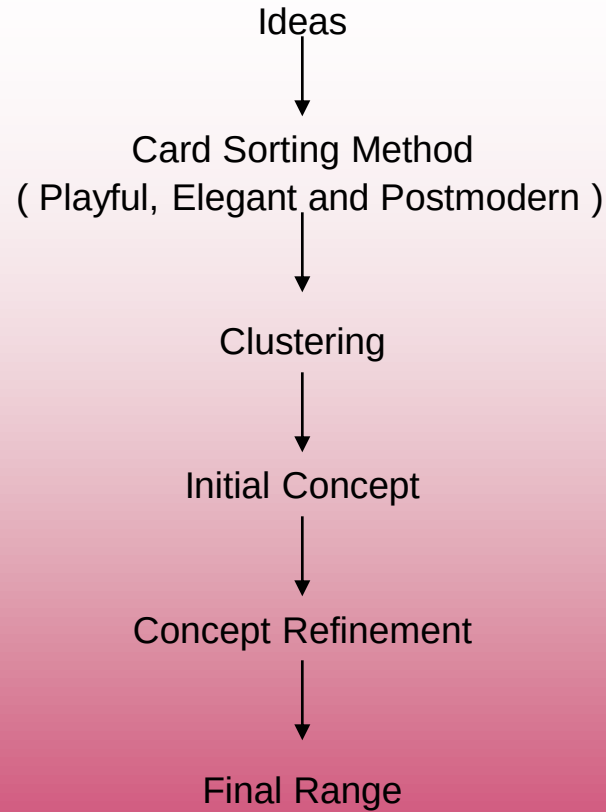


Details



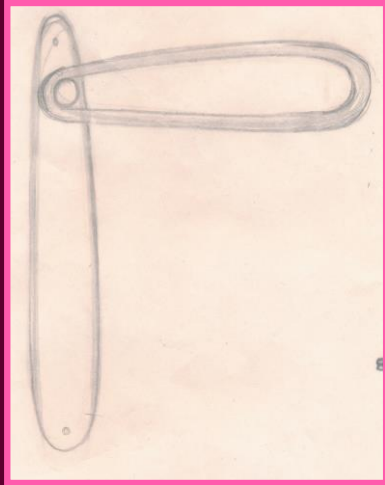
Low

High



Cluster 1: Rod Shape

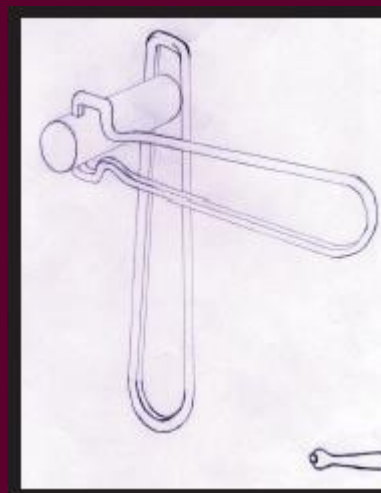
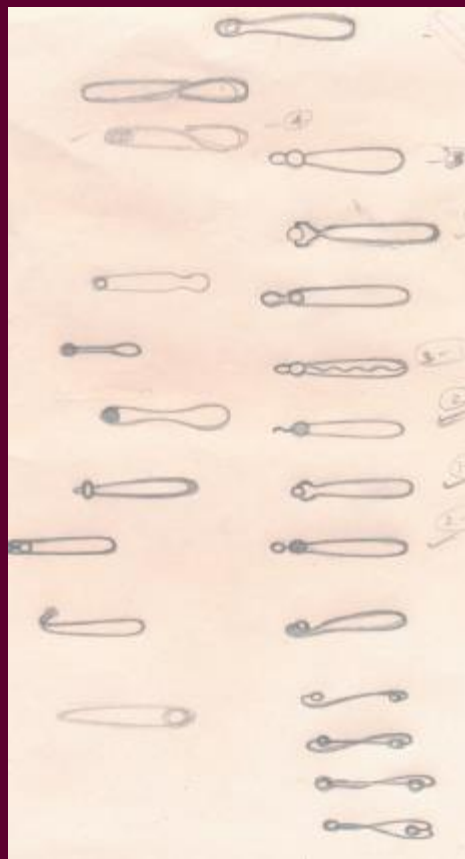
Playful – Interplay between elements



Cluster 1: Rod Shape

Playful

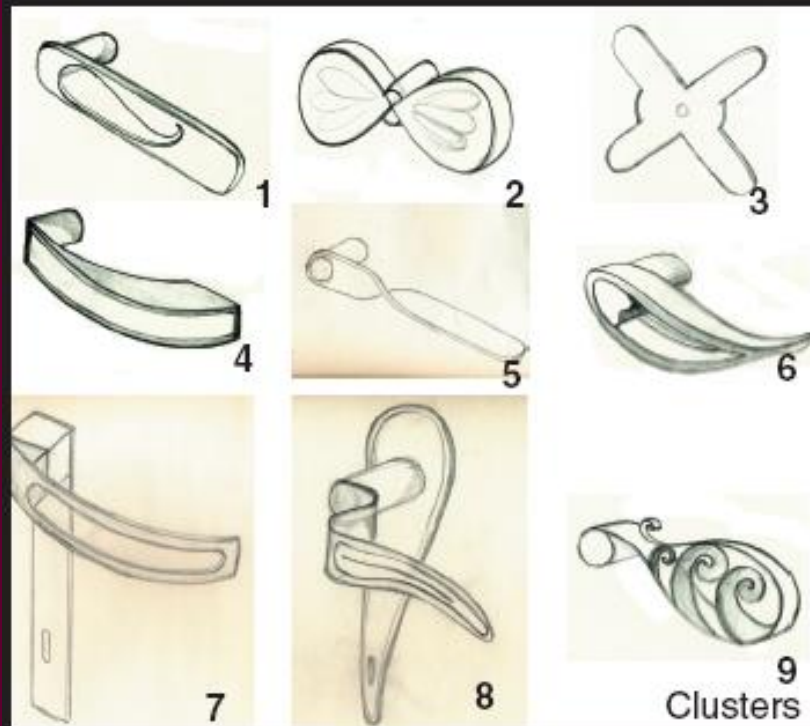
- Foreground and background
- Flow of lines
- Intersecting lines



Cluster 2: Sheet Form

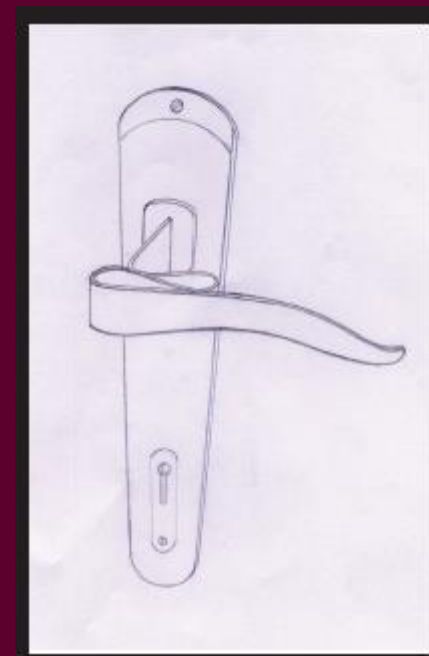
Playful

- Bents
- Flow of lines



Cluster 2: Sheet Form

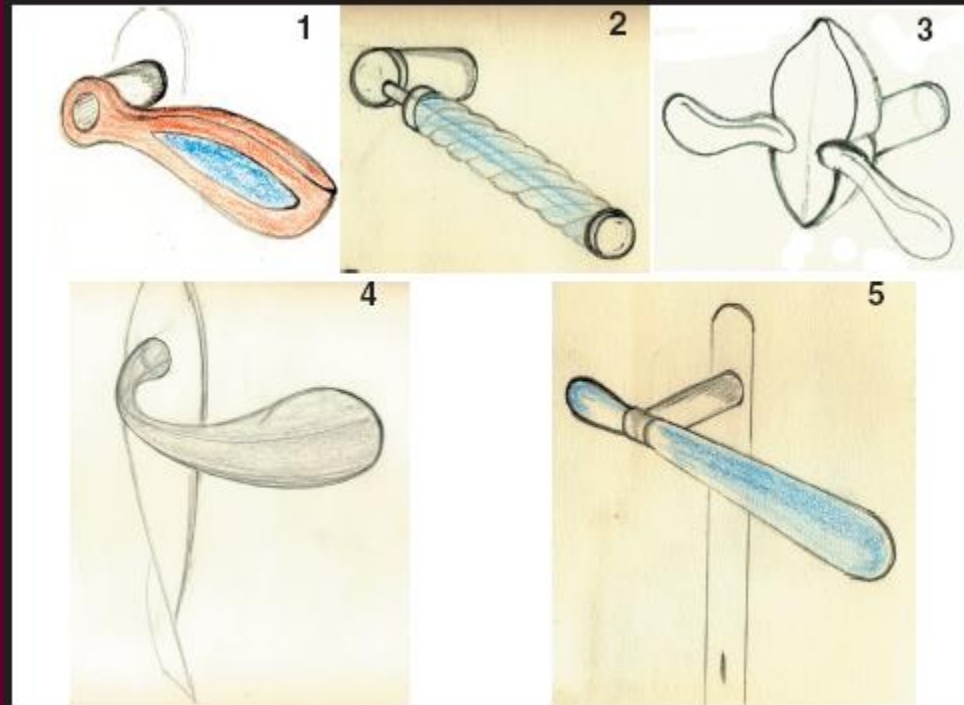
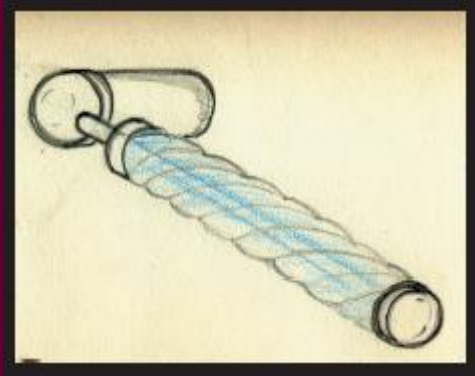
Mockups



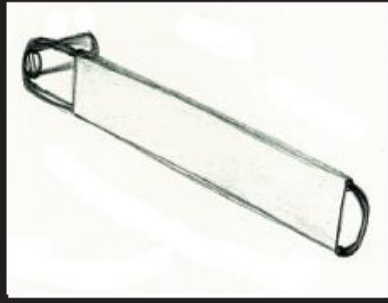
Cluster 3: Solid Form

Playful

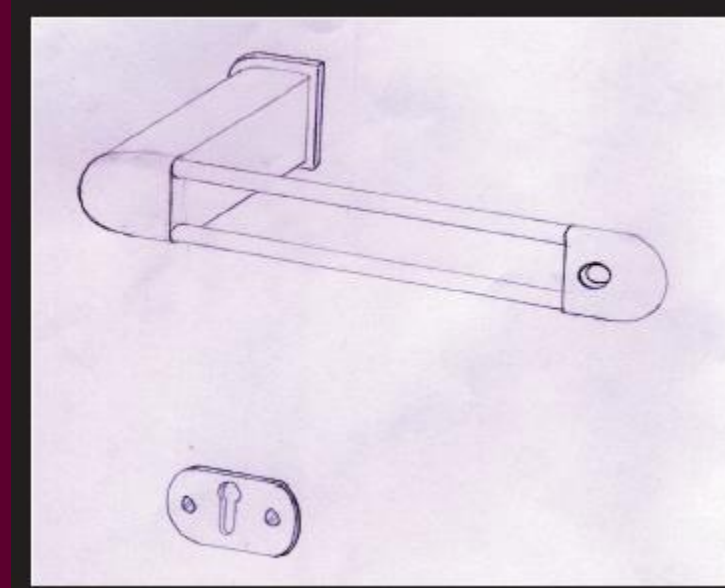
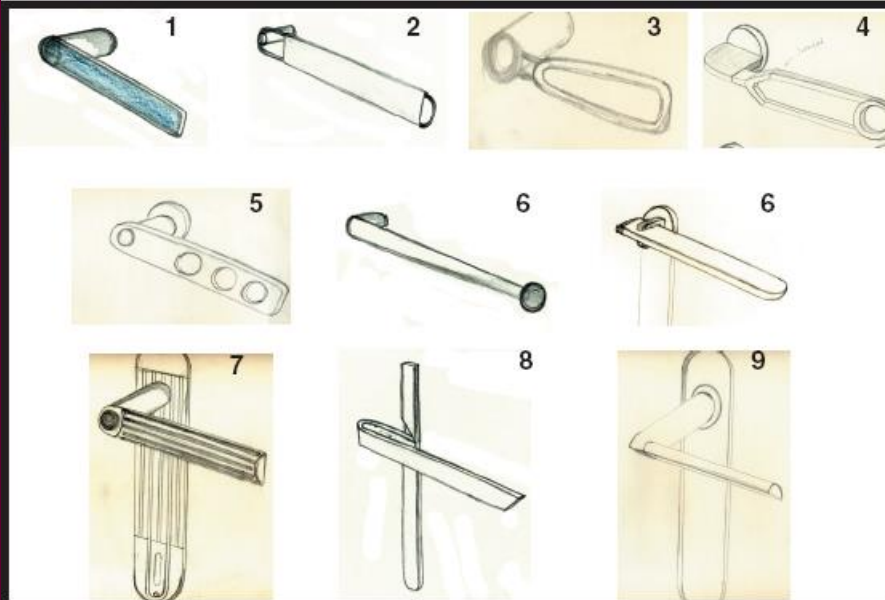
- Interesting twists
- Multiple lines / Curves



Cluster 4: Rod Shaped



Elegant – Sleek lines
-- Small radii

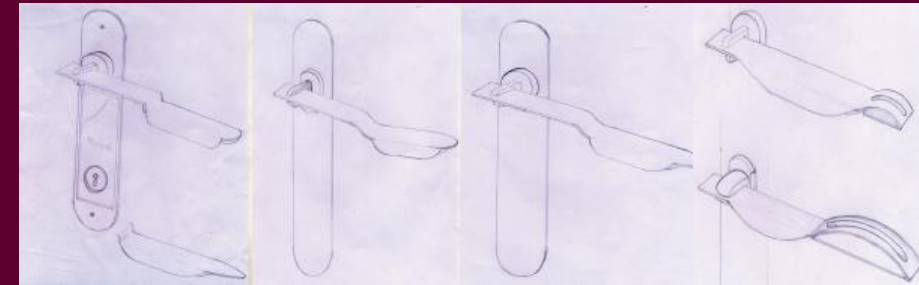
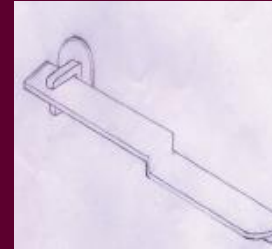
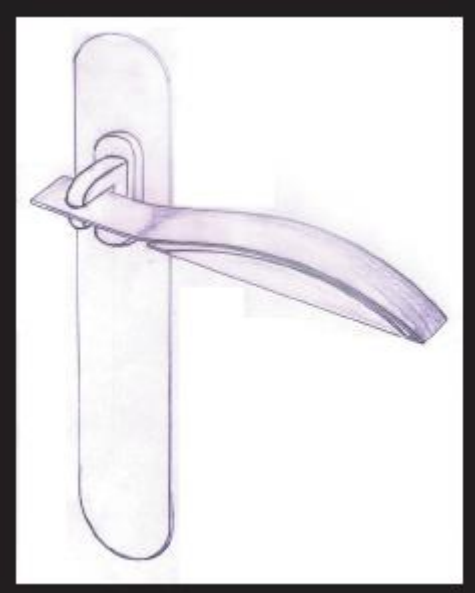
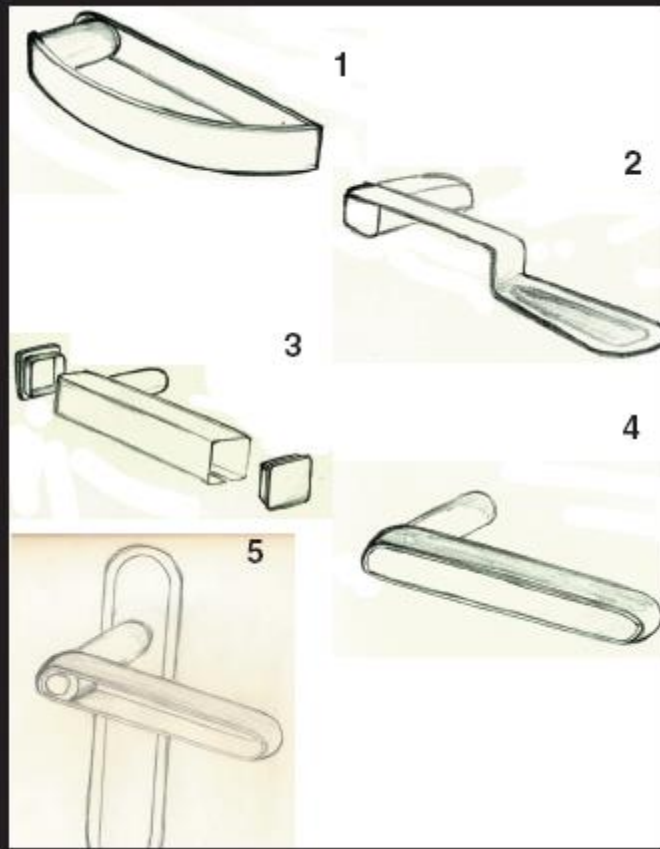


Cluster 5: Sheet Form



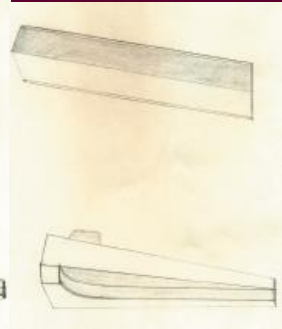
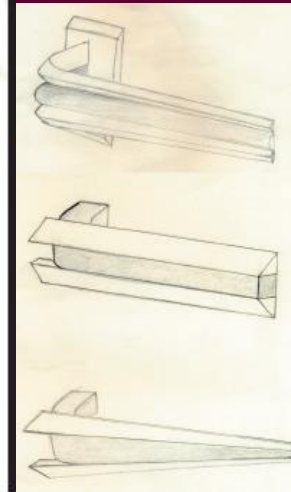
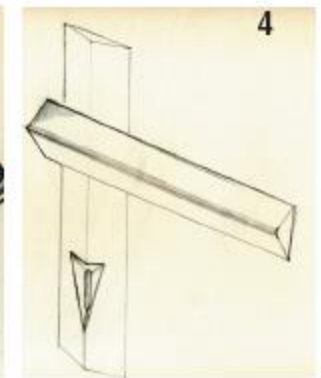
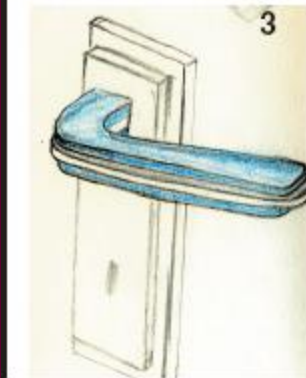
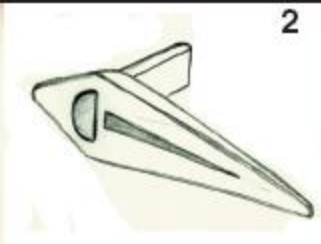
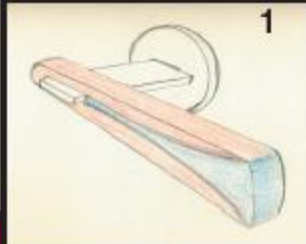
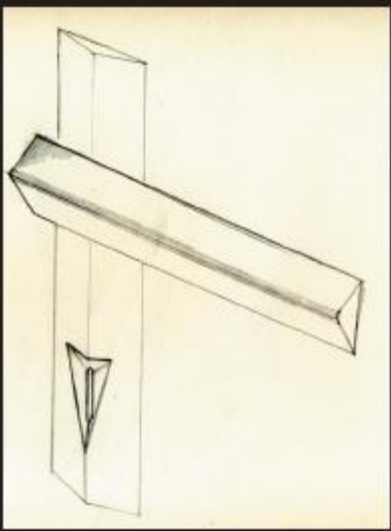
Elegant

- Sleekness in the whole form
- Narrow bents and Joining details



Cluster 6: Solid Form

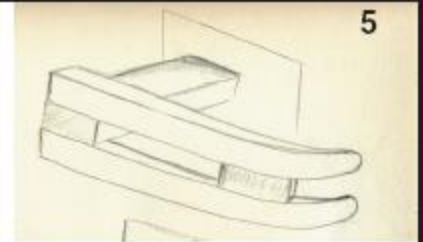
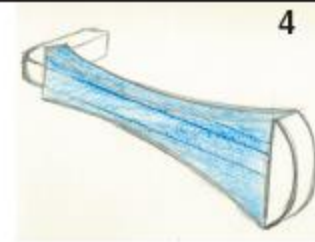
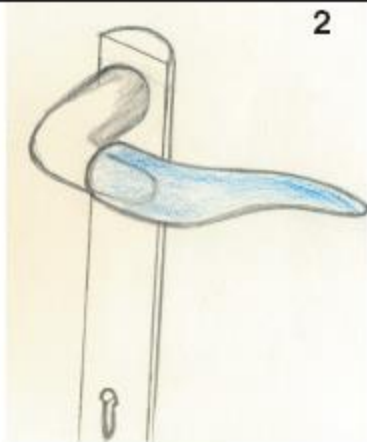
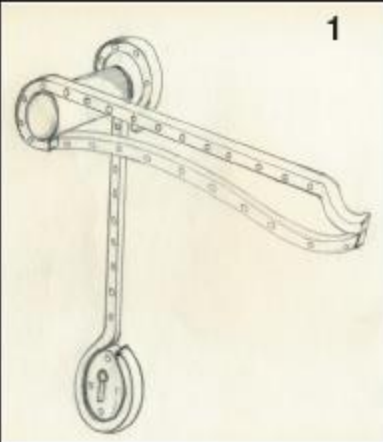
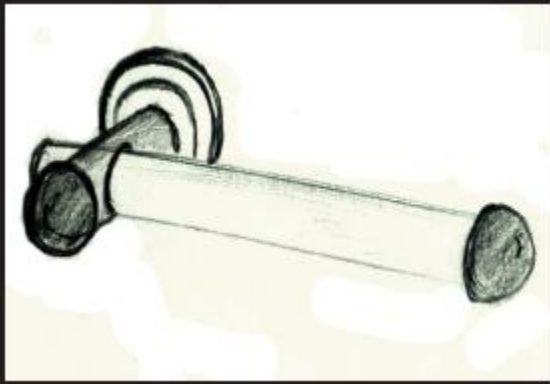
Elegant – Straight and Sleek in whole form
-- Simple geometry



Cluster 7: Rod Shaped

Postmodern

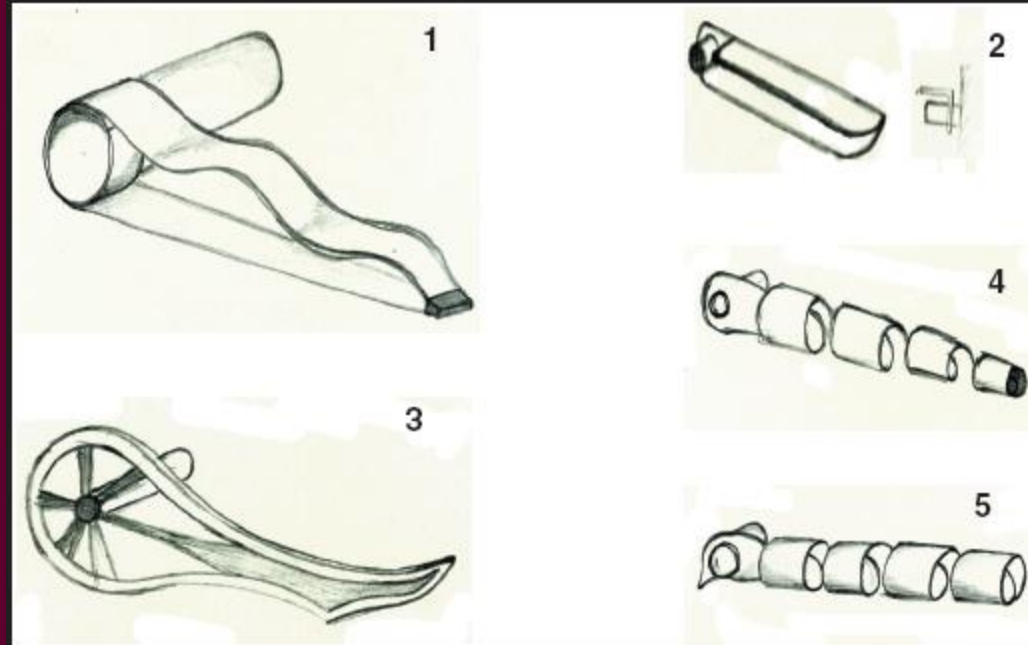
- Irregularity, new material
- Narrow bents and Joining details



Cluster 8: Sheet Form

Postmodern

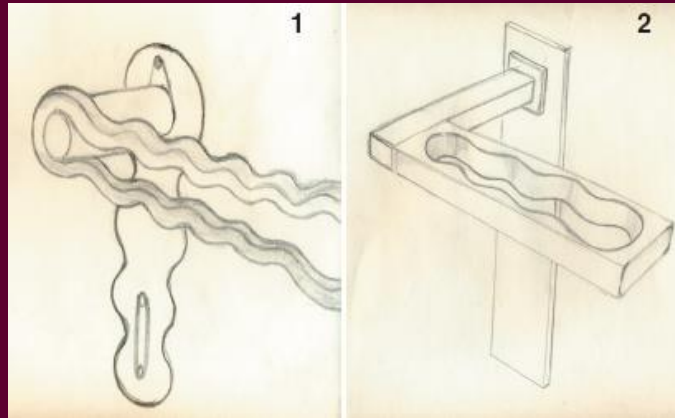
- Use of metaphor of Spring
- Wavy patterns



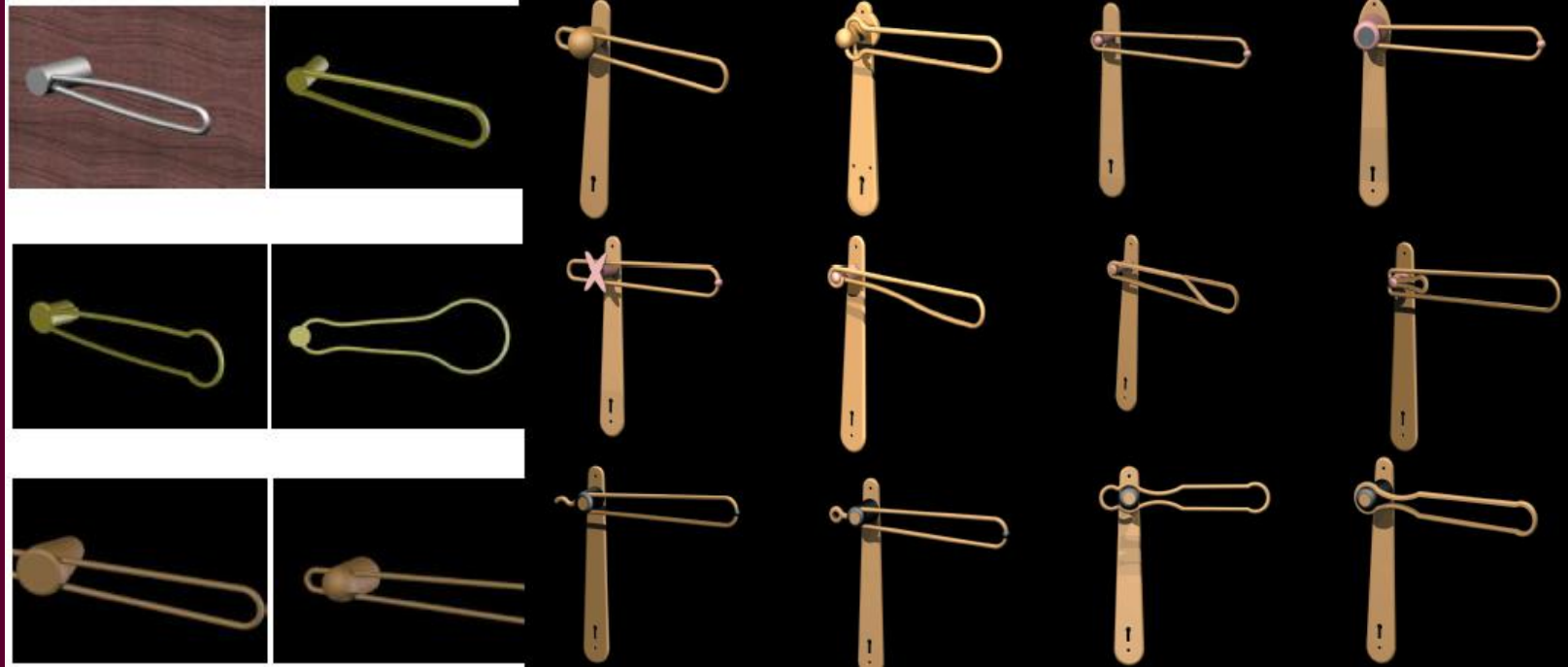
Cluster 9: Solid Form

Postmodern

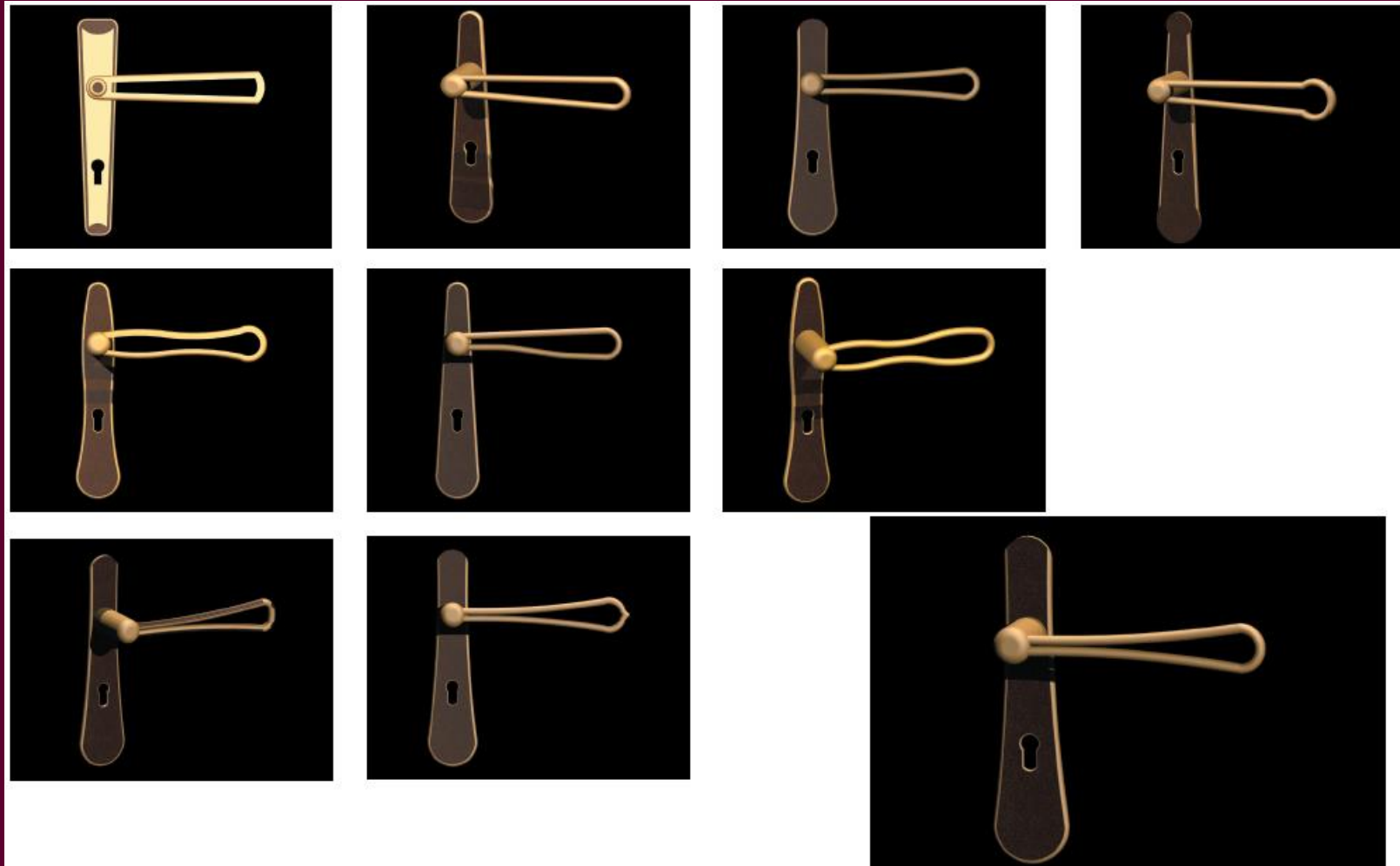
- Use of Profile of the hand
- Sudden tilt at the joint



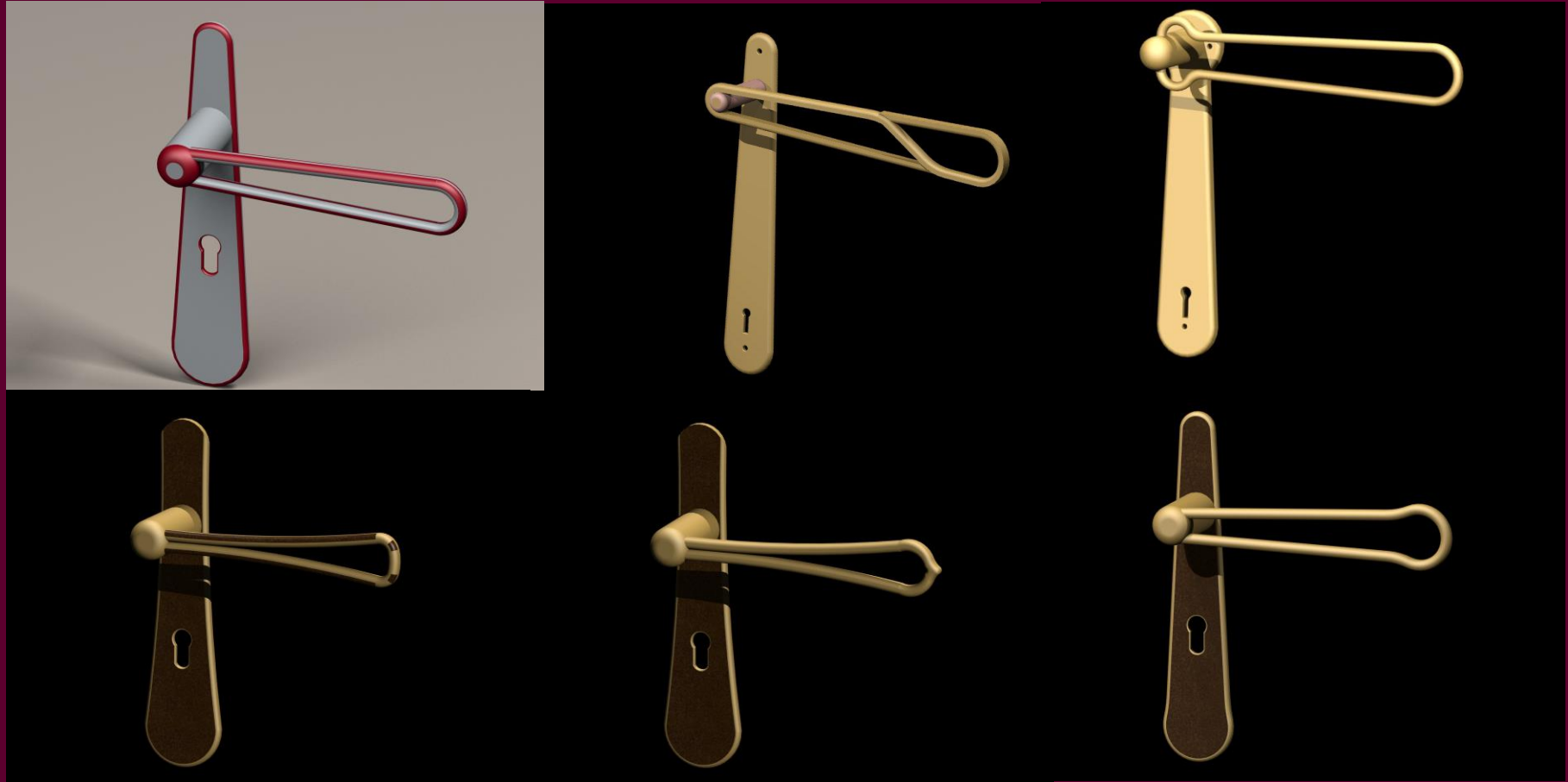
Playful - Rod Shape



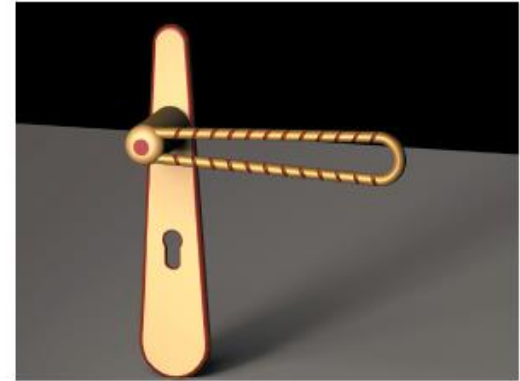
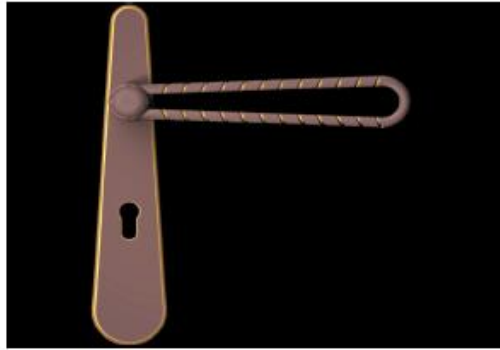
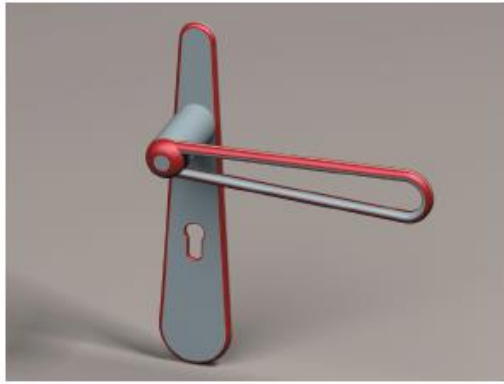
Rod Shape



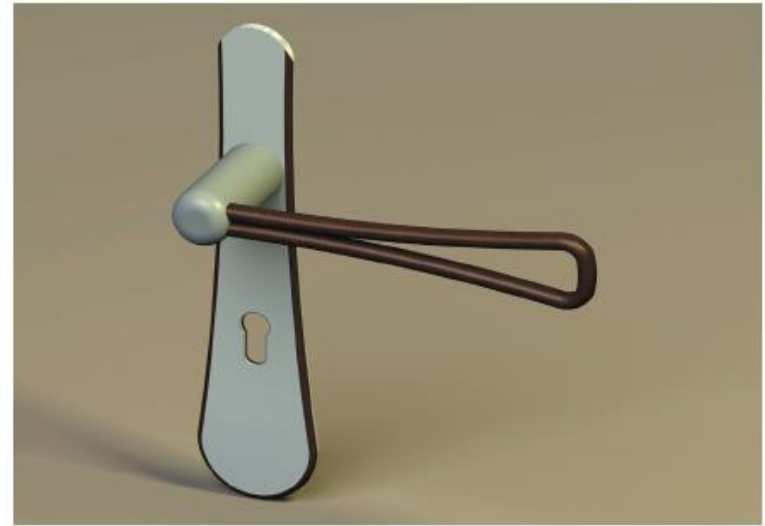
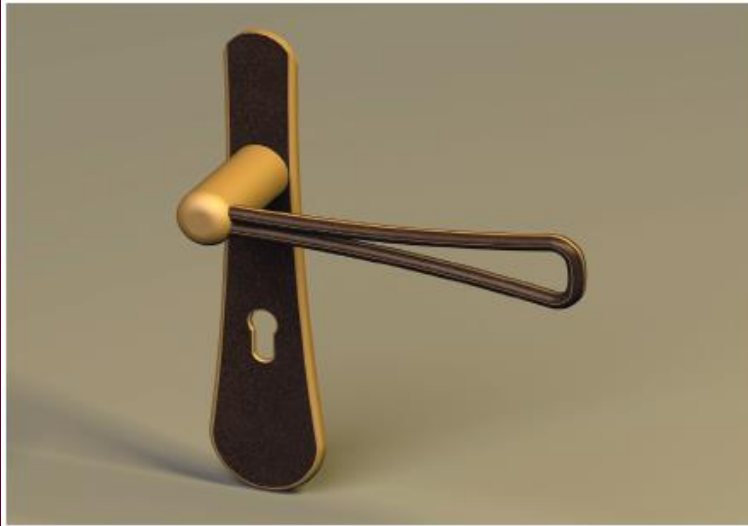
Rod Shape



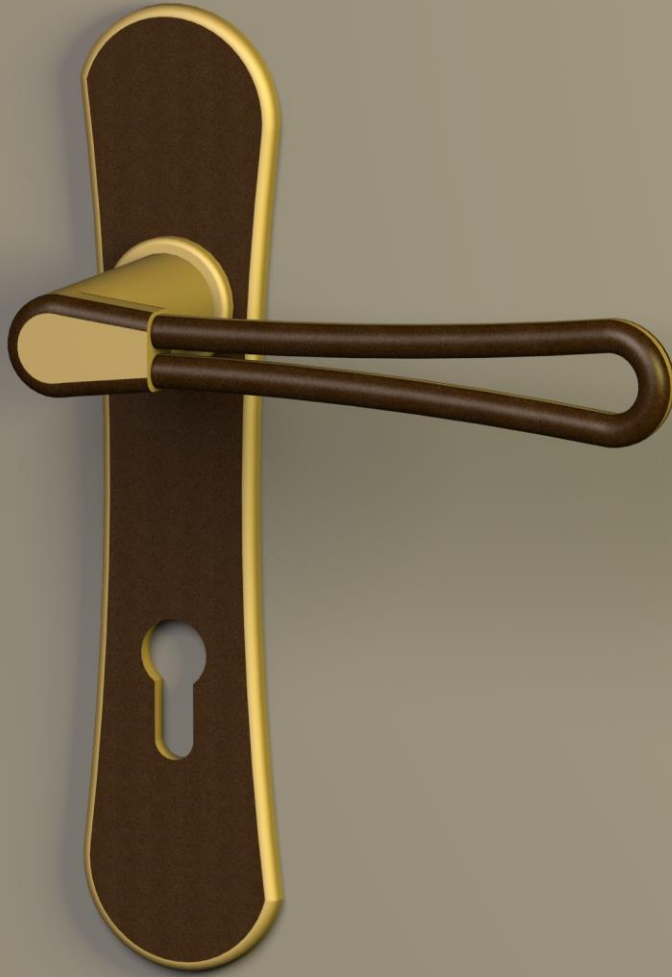
Rod Shape - Graphics



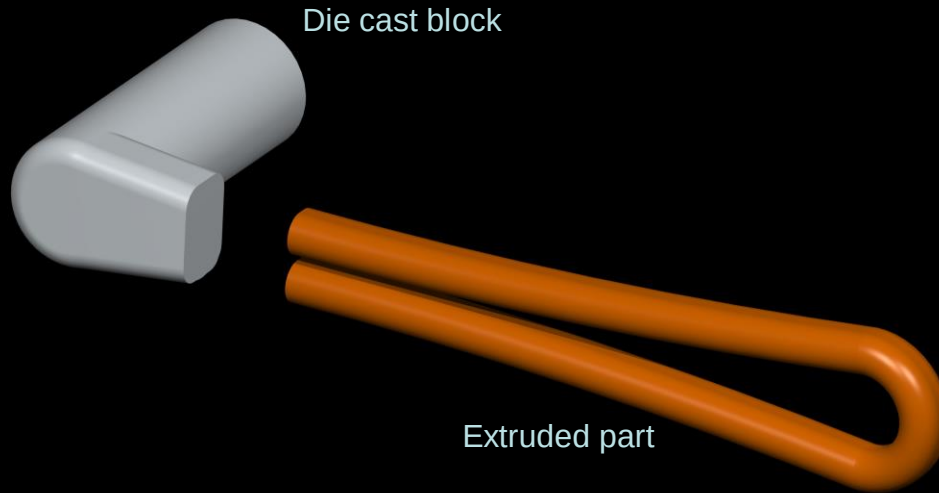
Final Concept Refinement



Rod Shape



Rod Shape



Manufacturing :

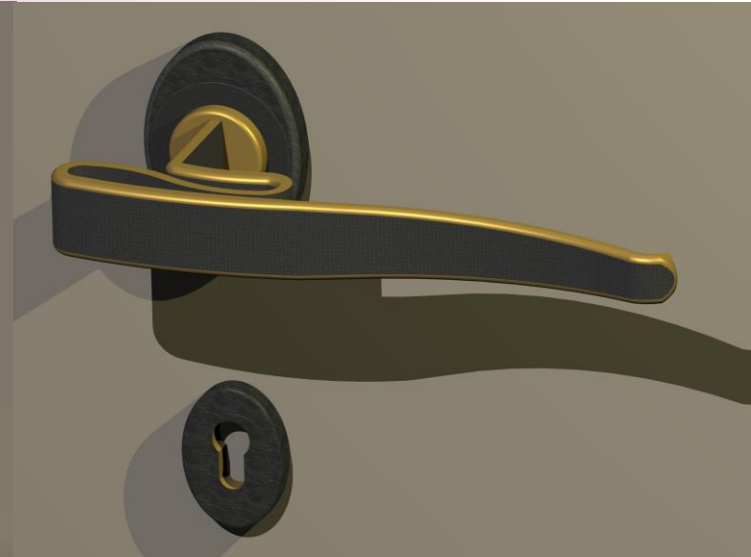
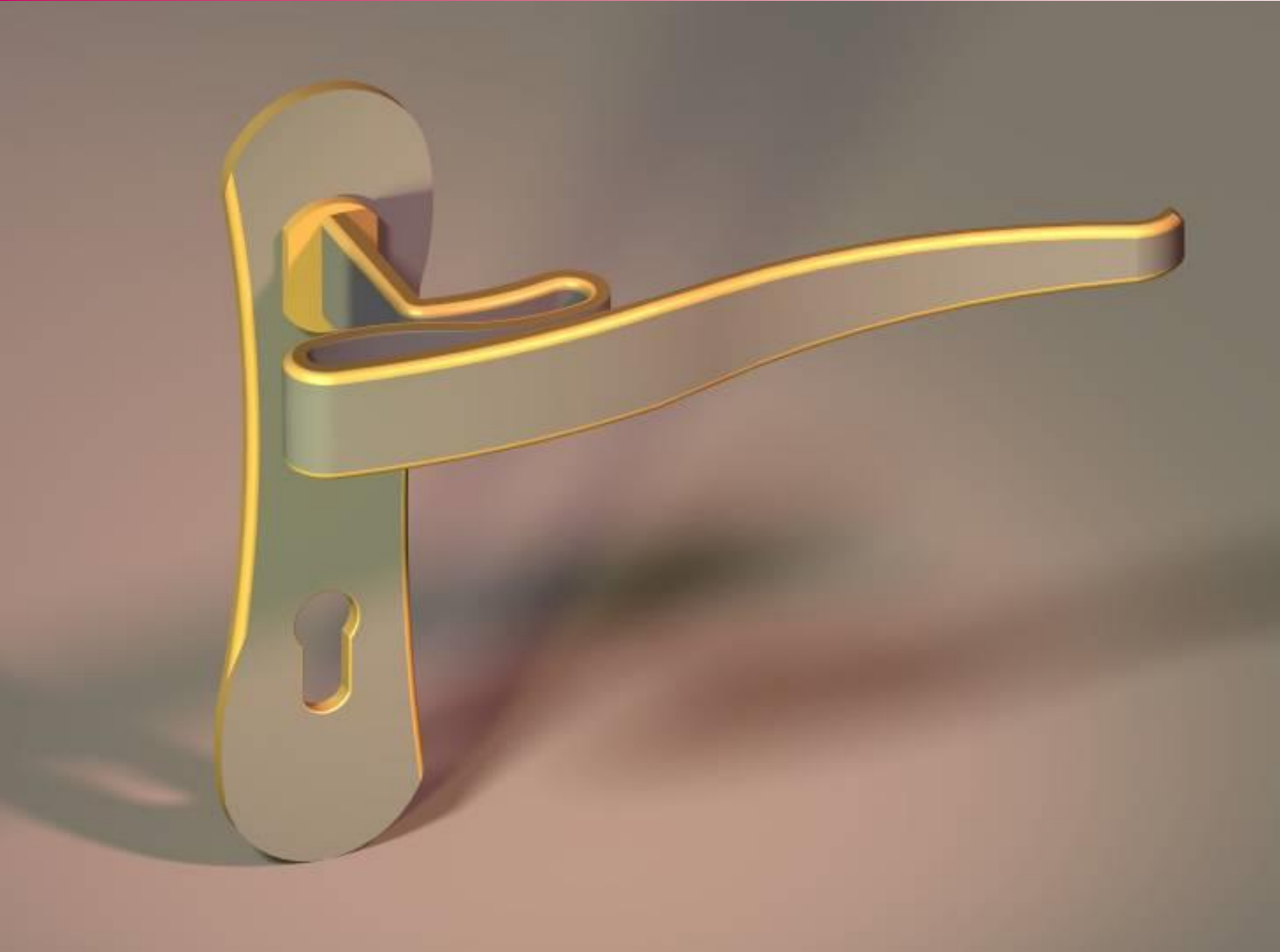
Handle and Knob rod – Welded from Inside

Material : Aluminium / Brass / Plastic

Rod Shape



Sheet Form



Manufacturing :

Multiple Stage Bending

Material : Aluminum alloy, Brass

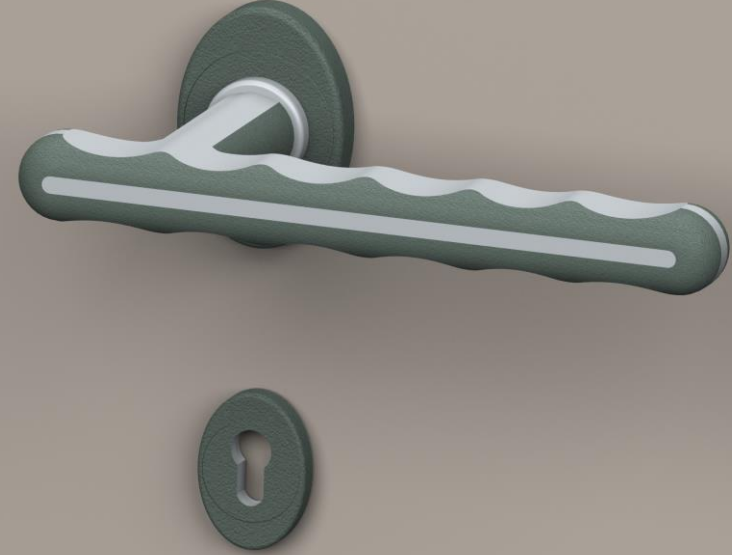
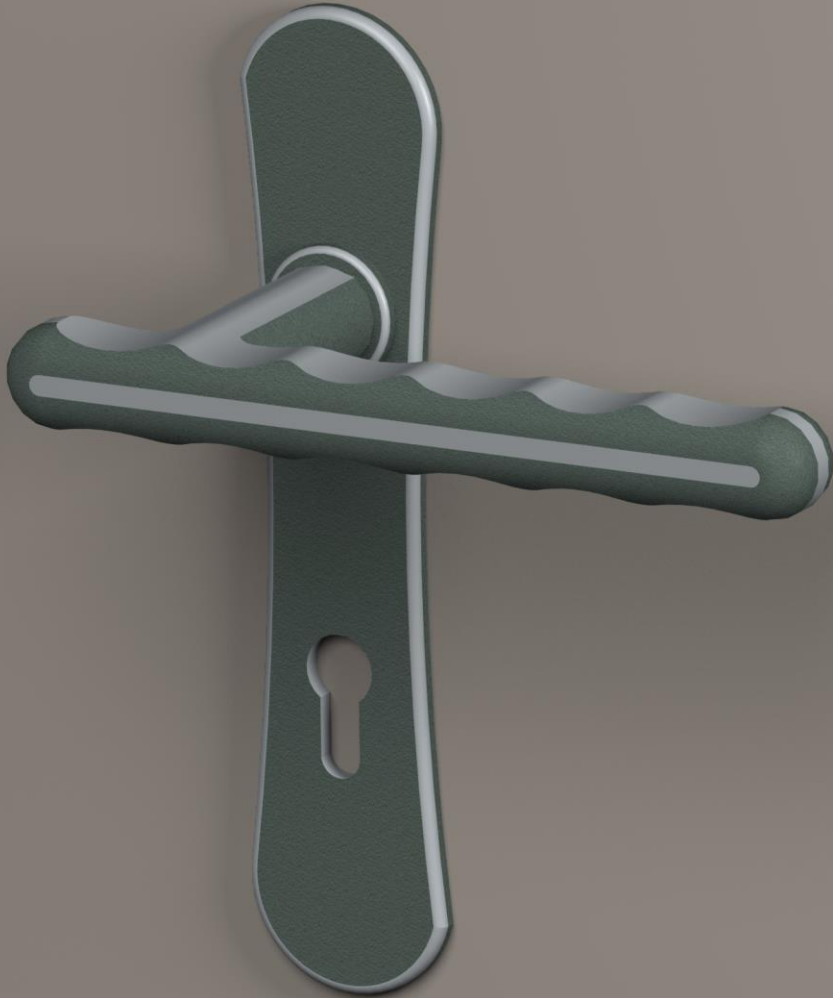
Sheet Form



Sheet Form



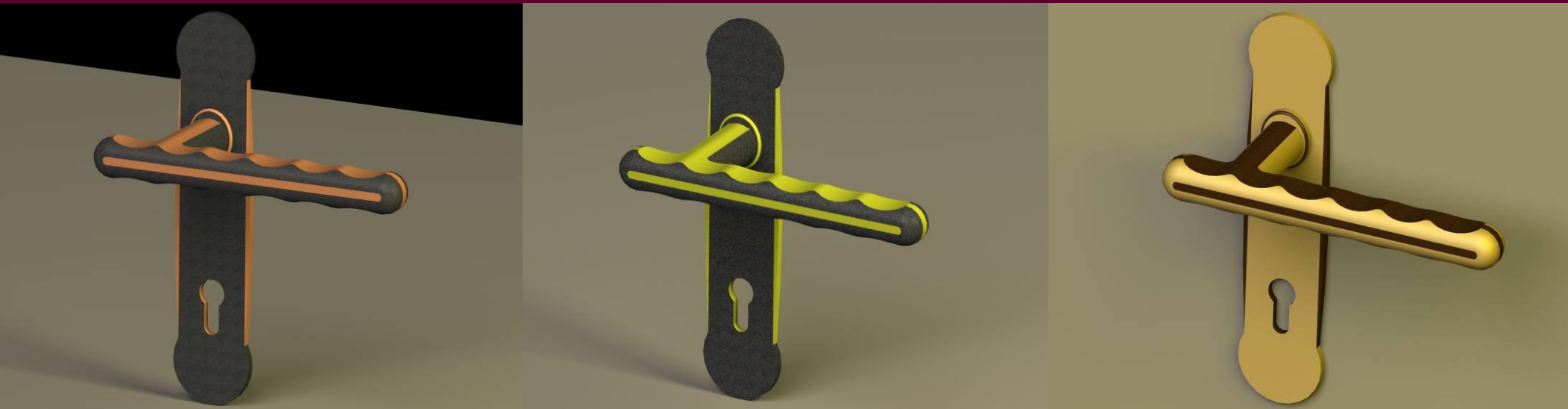
Solid Form



Manufacturing :

In mold Injection Molded or Die cast

Material: PC-ABS / Aluminum alloy

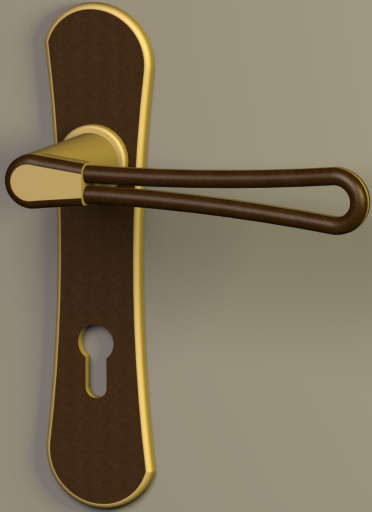


Solid Form



Playful

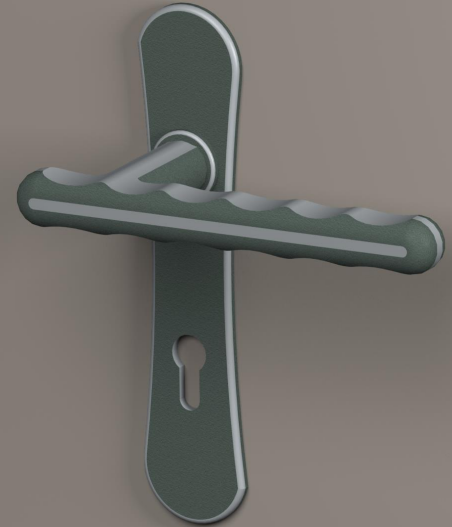
Extruded



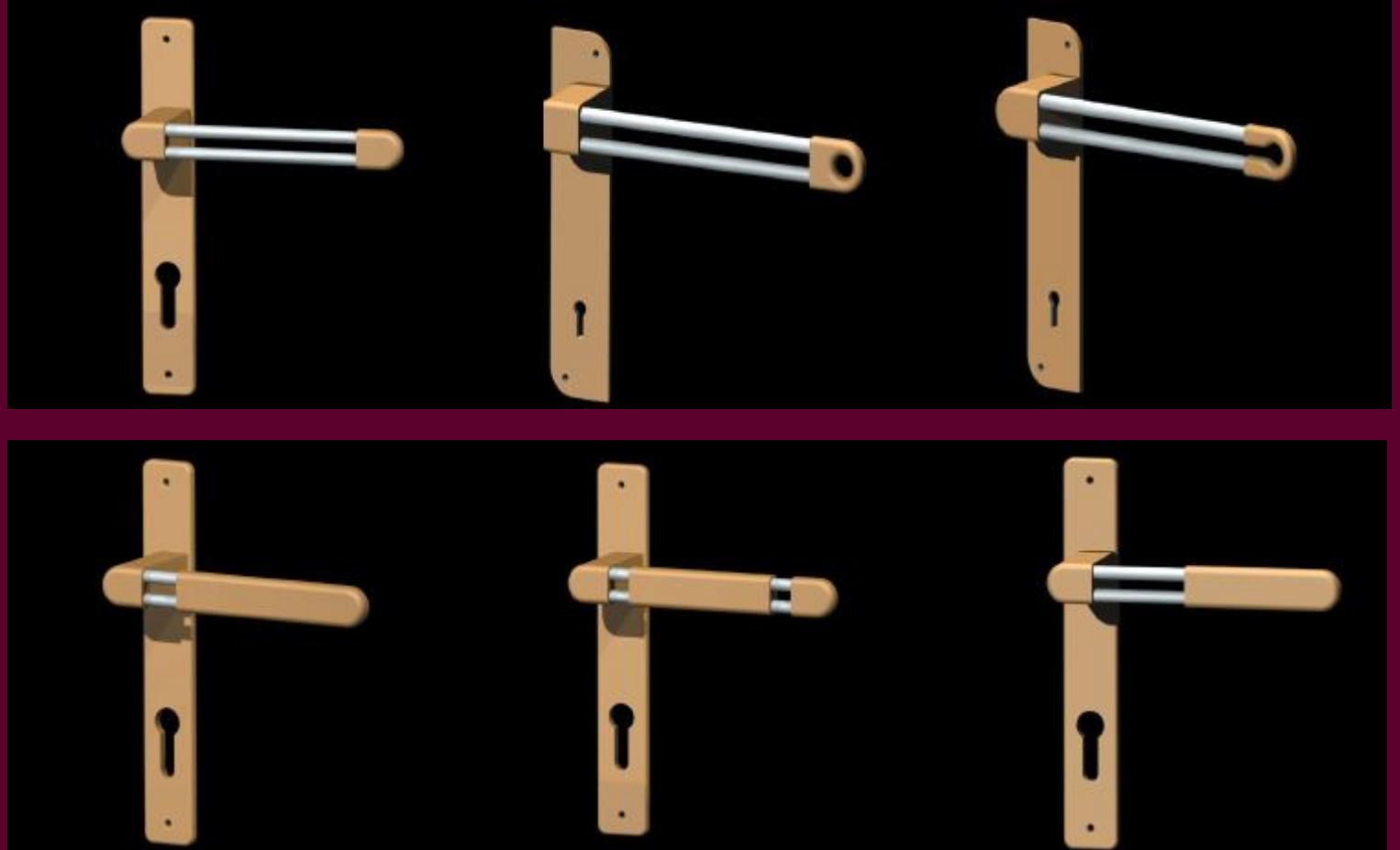
Sheet / Flat



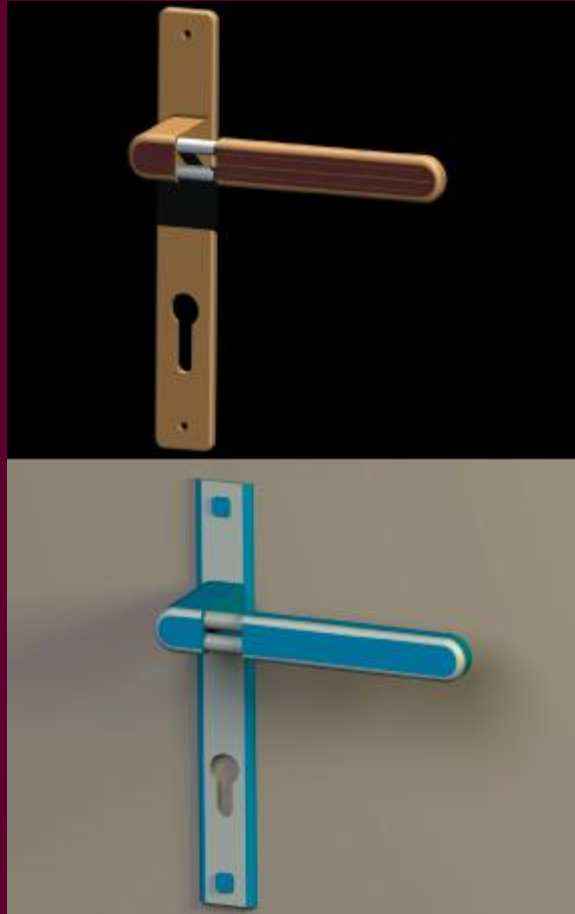
Solid



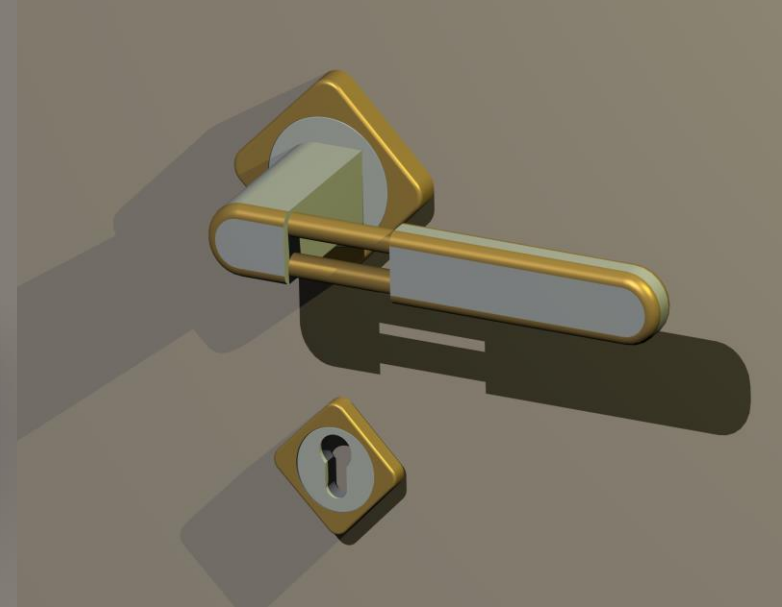
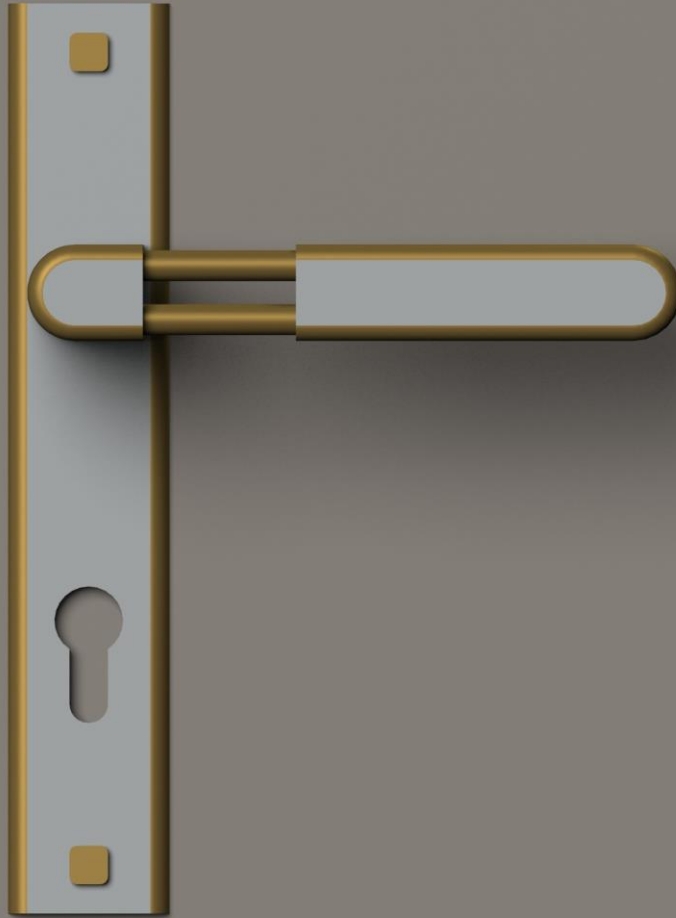
Rod Shape



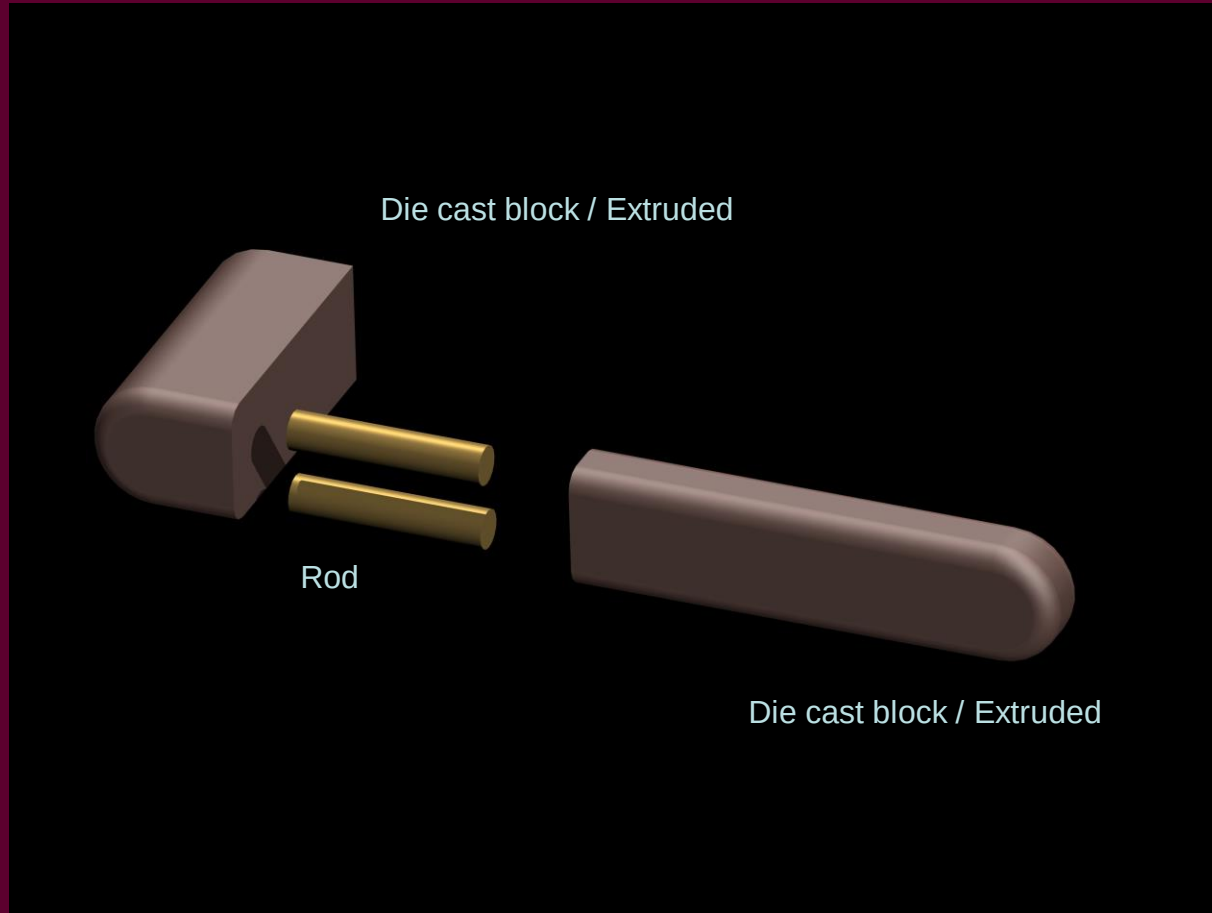
Rod Shape



Rod Shape



Rod Shape



Manufacturing :

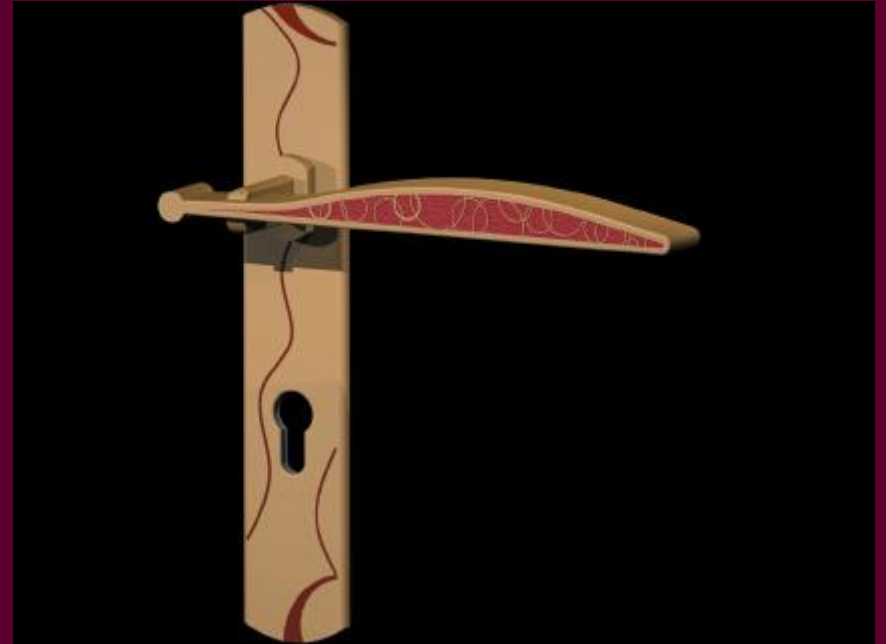
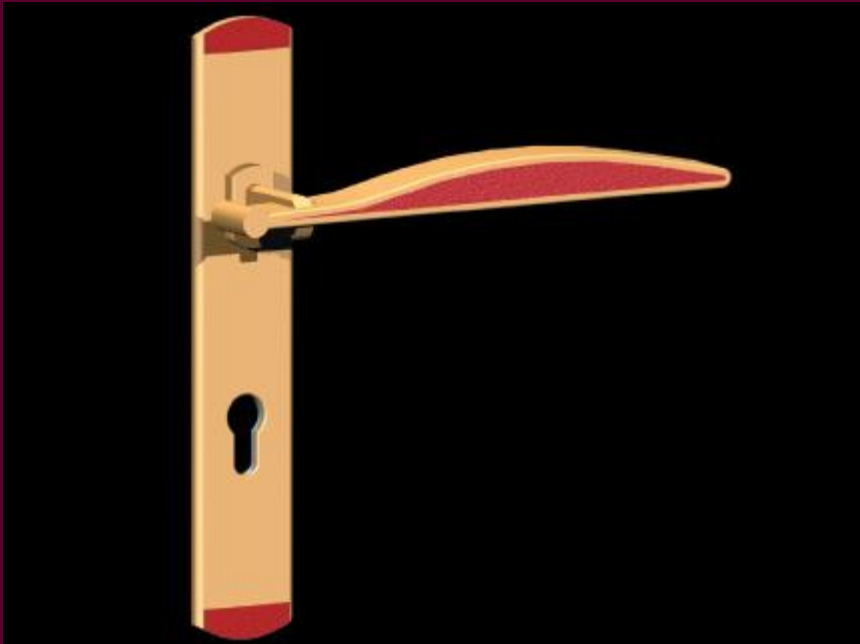
Solid section and Rods are welded

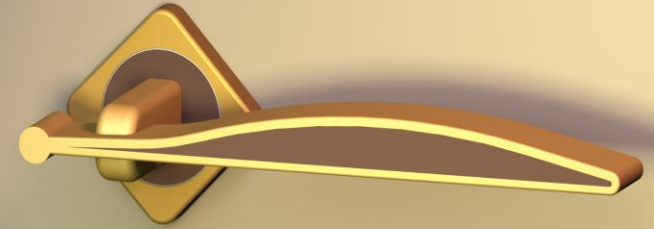
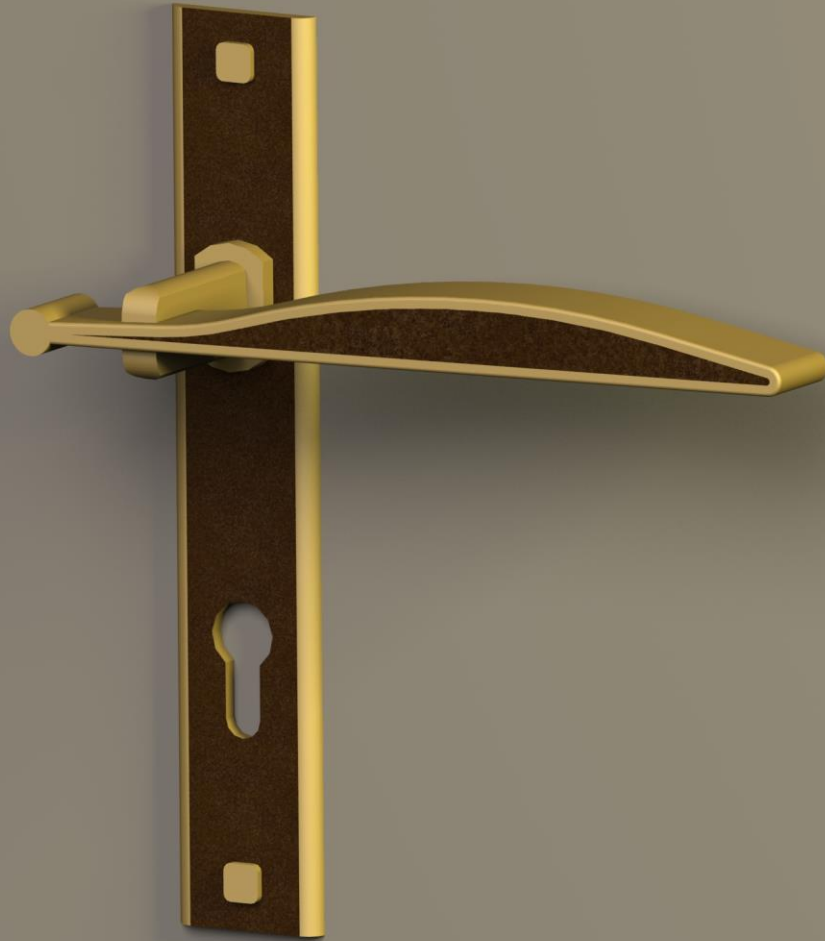
Materials: Aluminum alloy and Brass

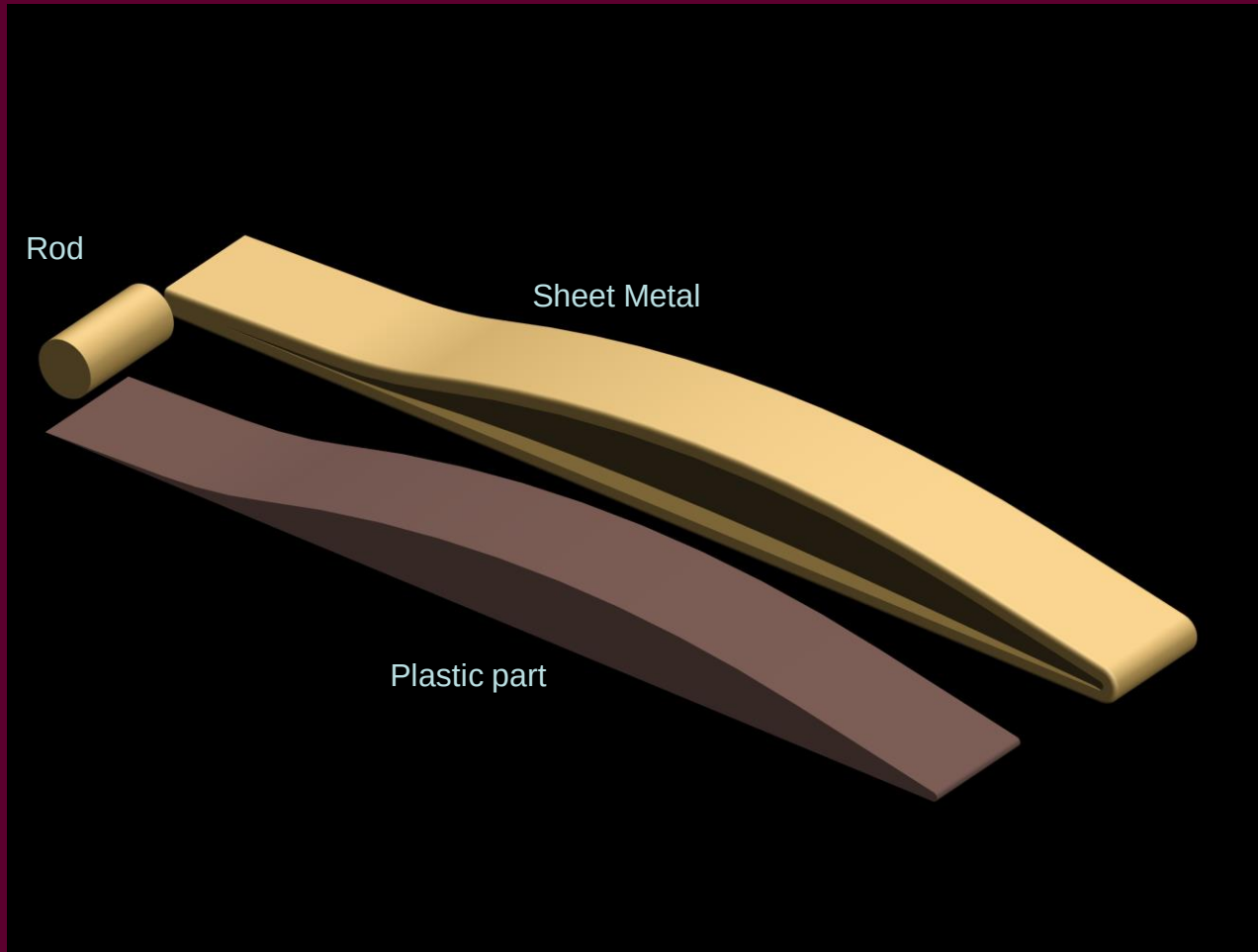
Rod Shape



Sheet Form



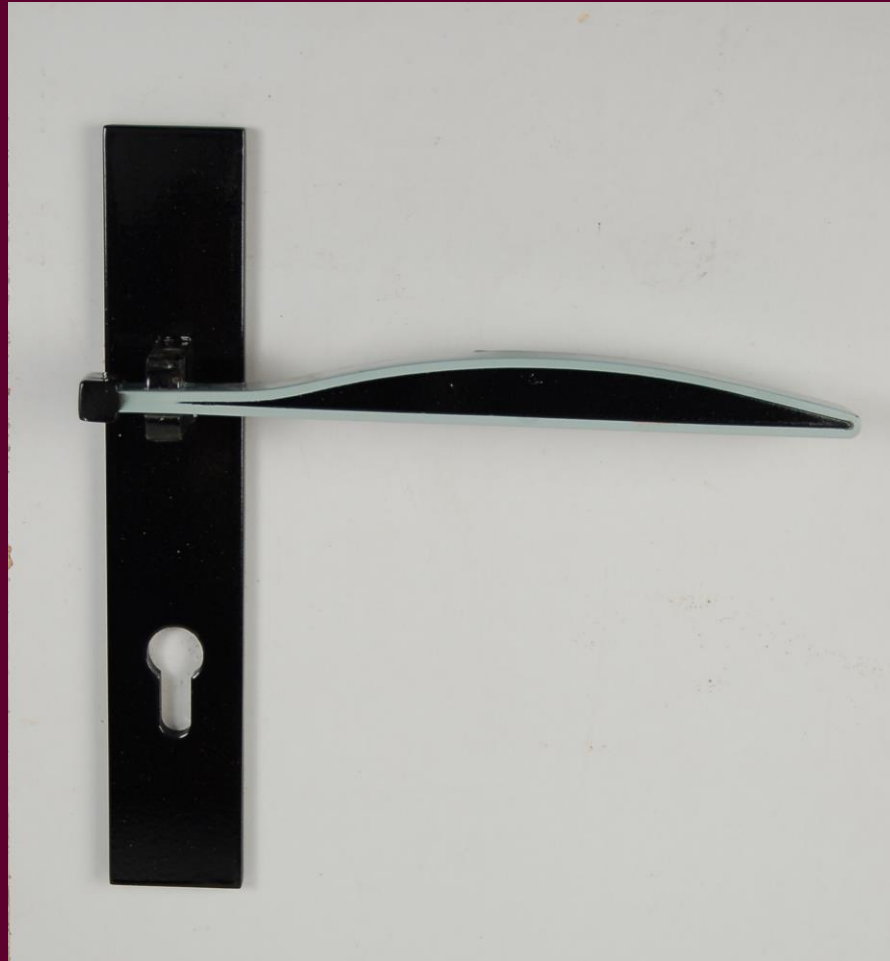




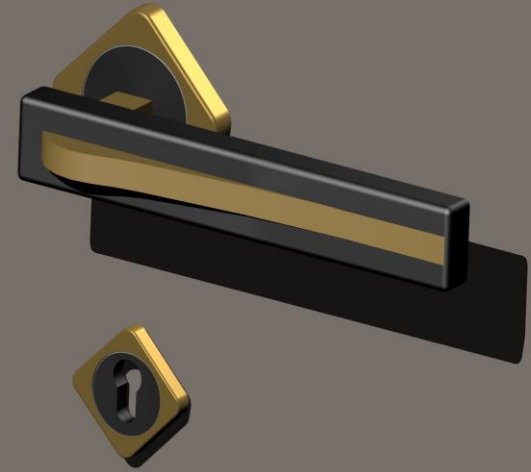
Manufacturing :

Bending and Welding at the end

Materials: Brass / Aluminum Alloy



Solid Form



Manufacturing :

Die casted

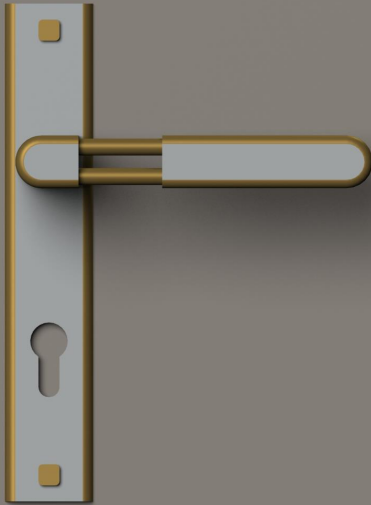
Material : Brass and Aluminum alloy

Solid Form

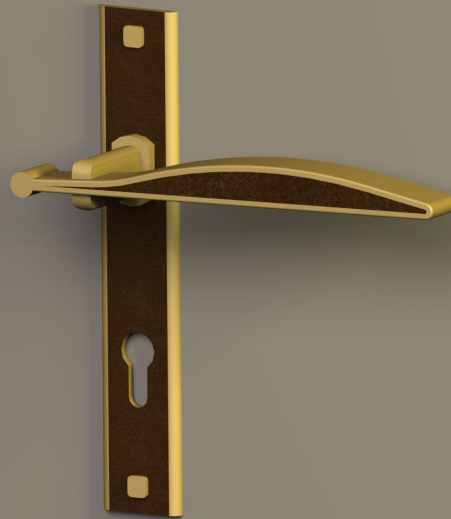


Elegant

Extruded



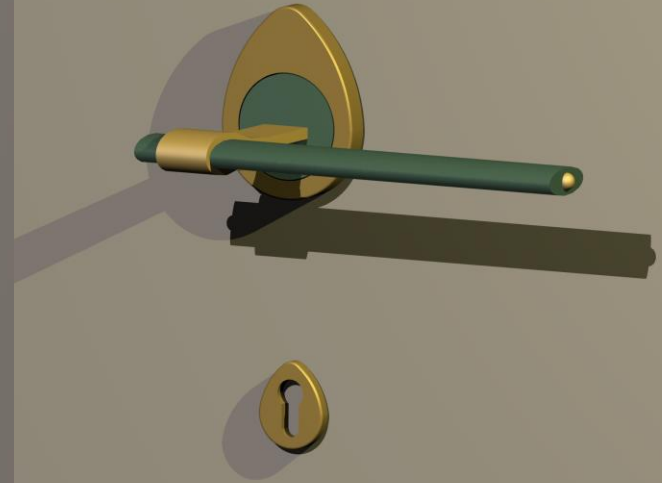
Sheet / Flat



Solid



Rod Shape

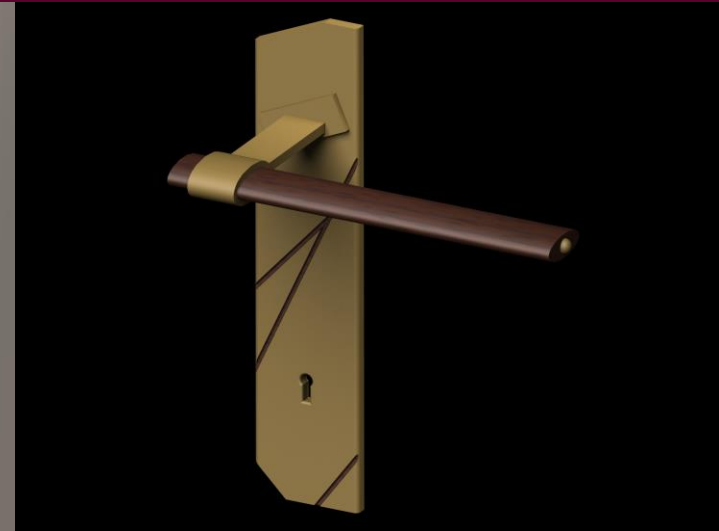


Manufacturing :

Handle – Metal, Wood, Bamboo, Granite,
Plastic

Silicon Glue or Press Fit

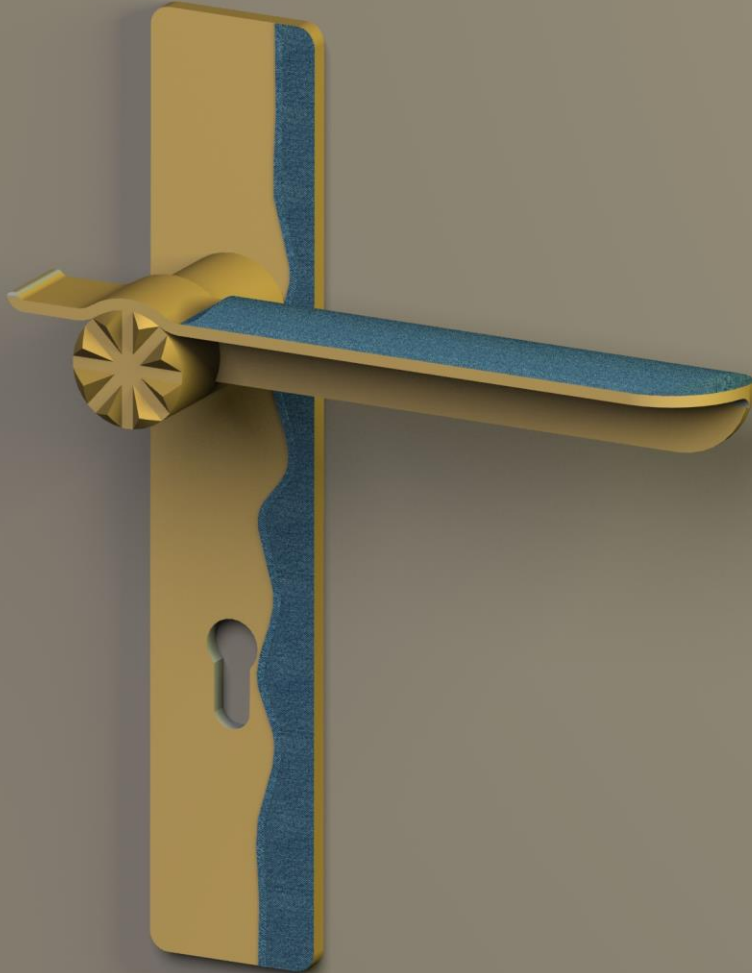
Rod Shape



Rod Shape



Sheet Form



Manufacturing :

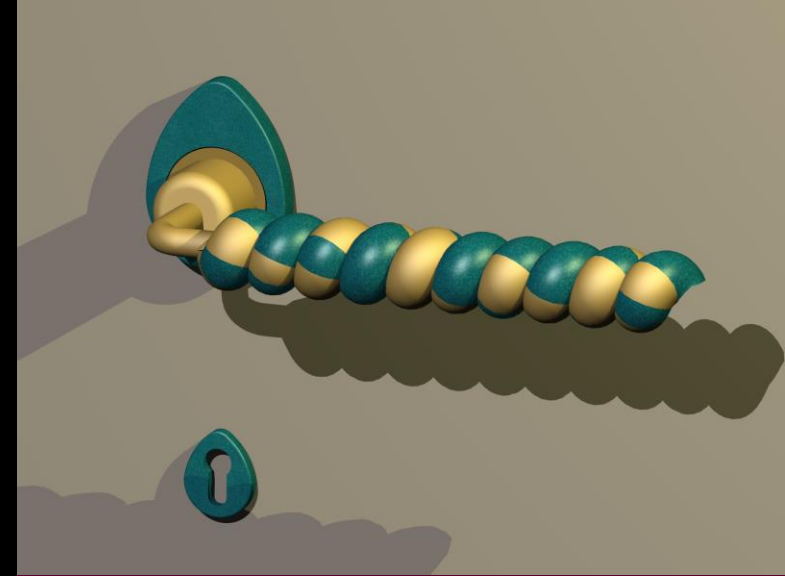
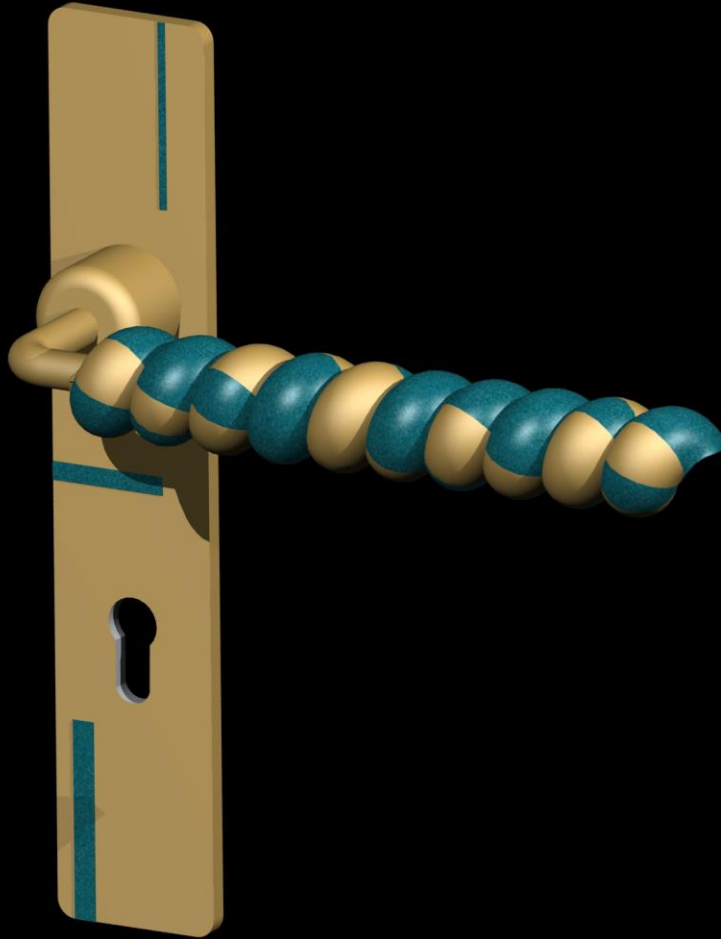
Sheet metal Punching and Bending

Materials : Aluminum alloy / Brass with additional materials like wood / plastics

Sheet Form



Solid Form

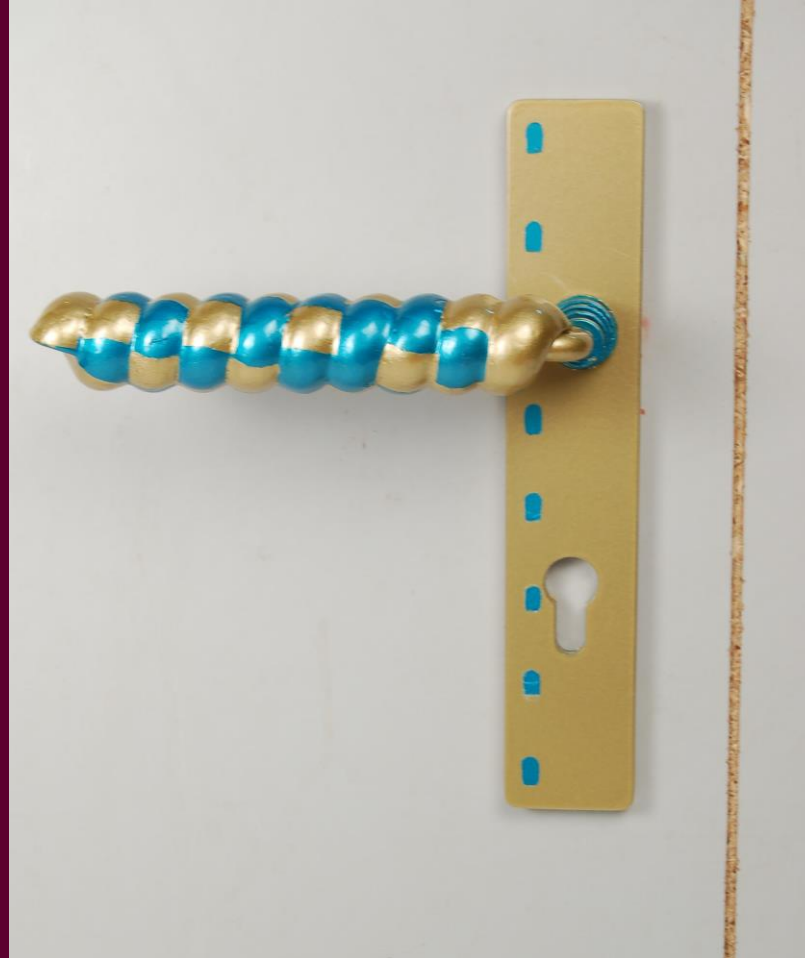


Manufacturing :

In mould Injection molding, Heat transfer printing / Die casting

Materials : PC-ABS, Brass or Aluminum alloy

Solid Form

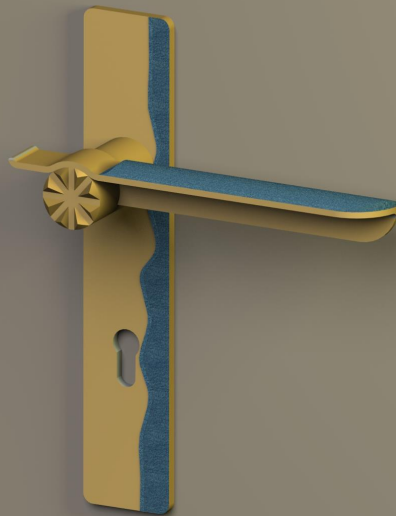


Postmodern

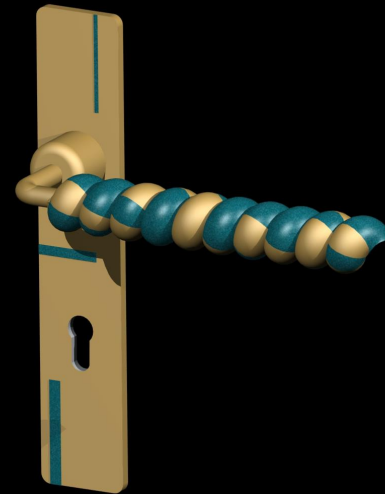
Extruded



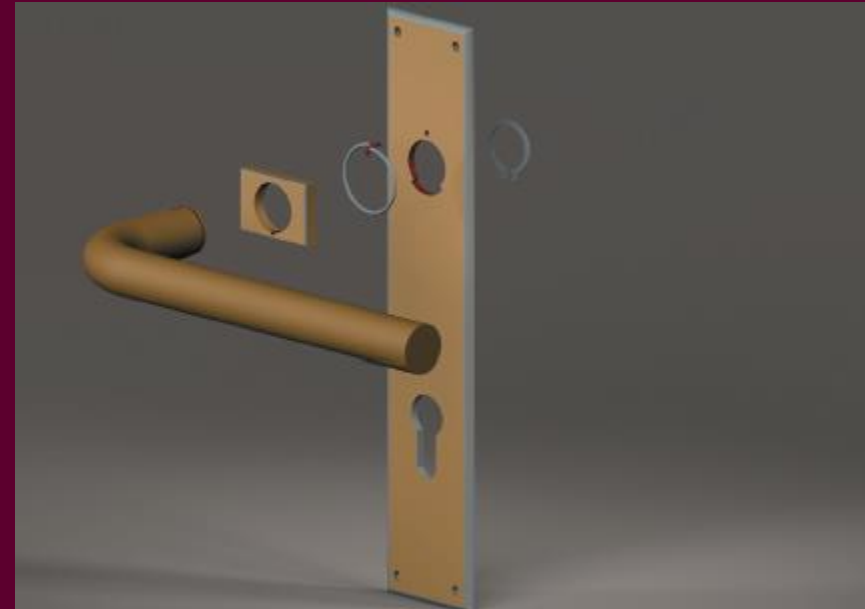
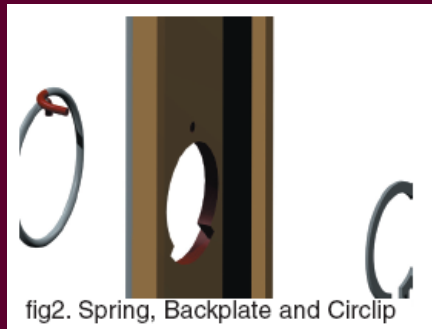
Sheet / Flat



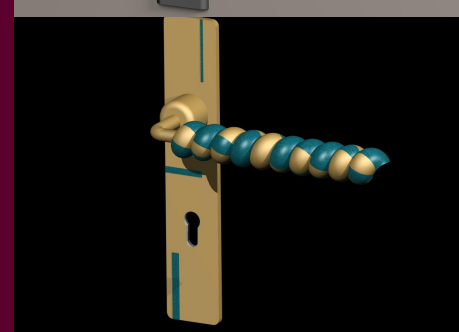
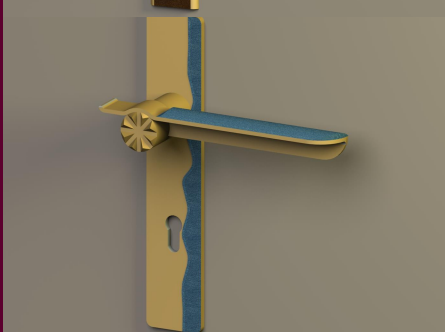
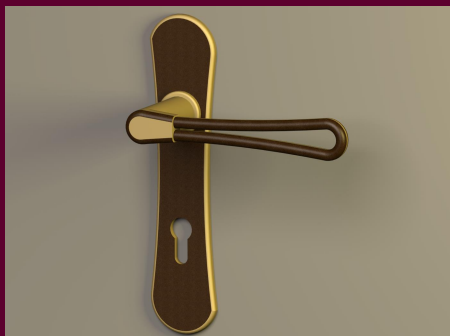
Solid



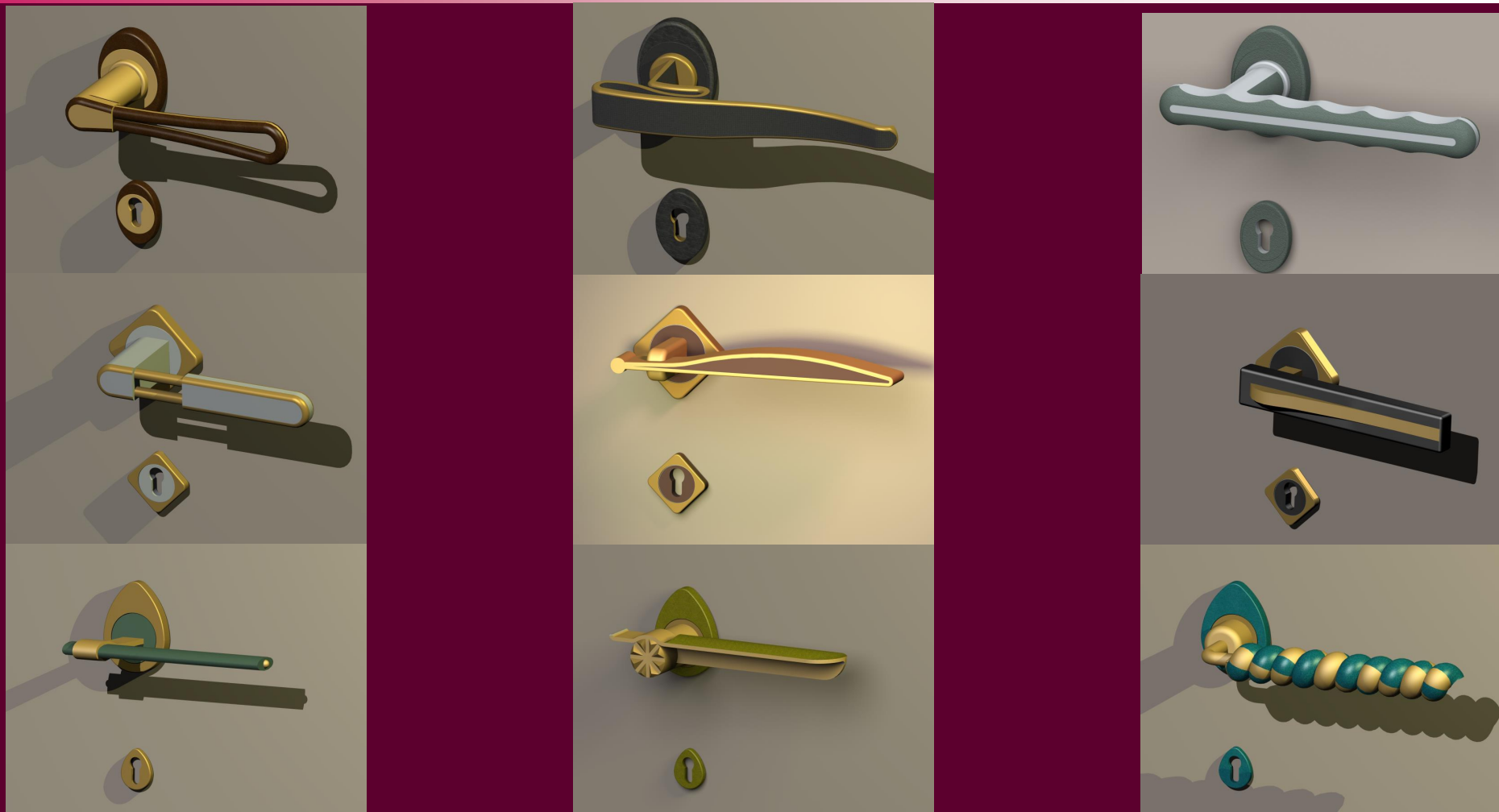
Detailing



Final Range : Combi Pack



Final Range : Rose Set



Thank you