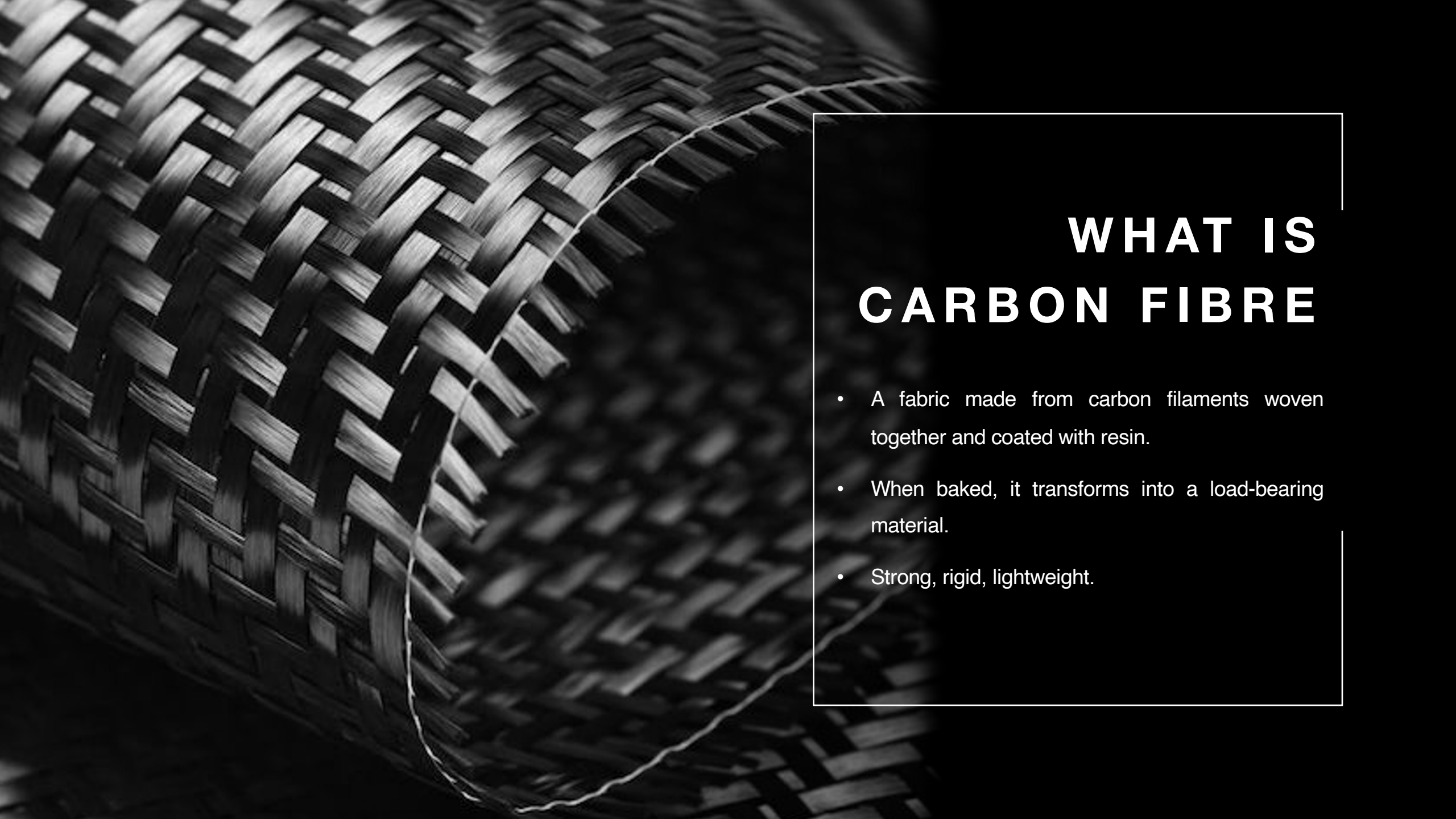
CARBON FIBRE RACKS

THE PRODUCTION PROCESS

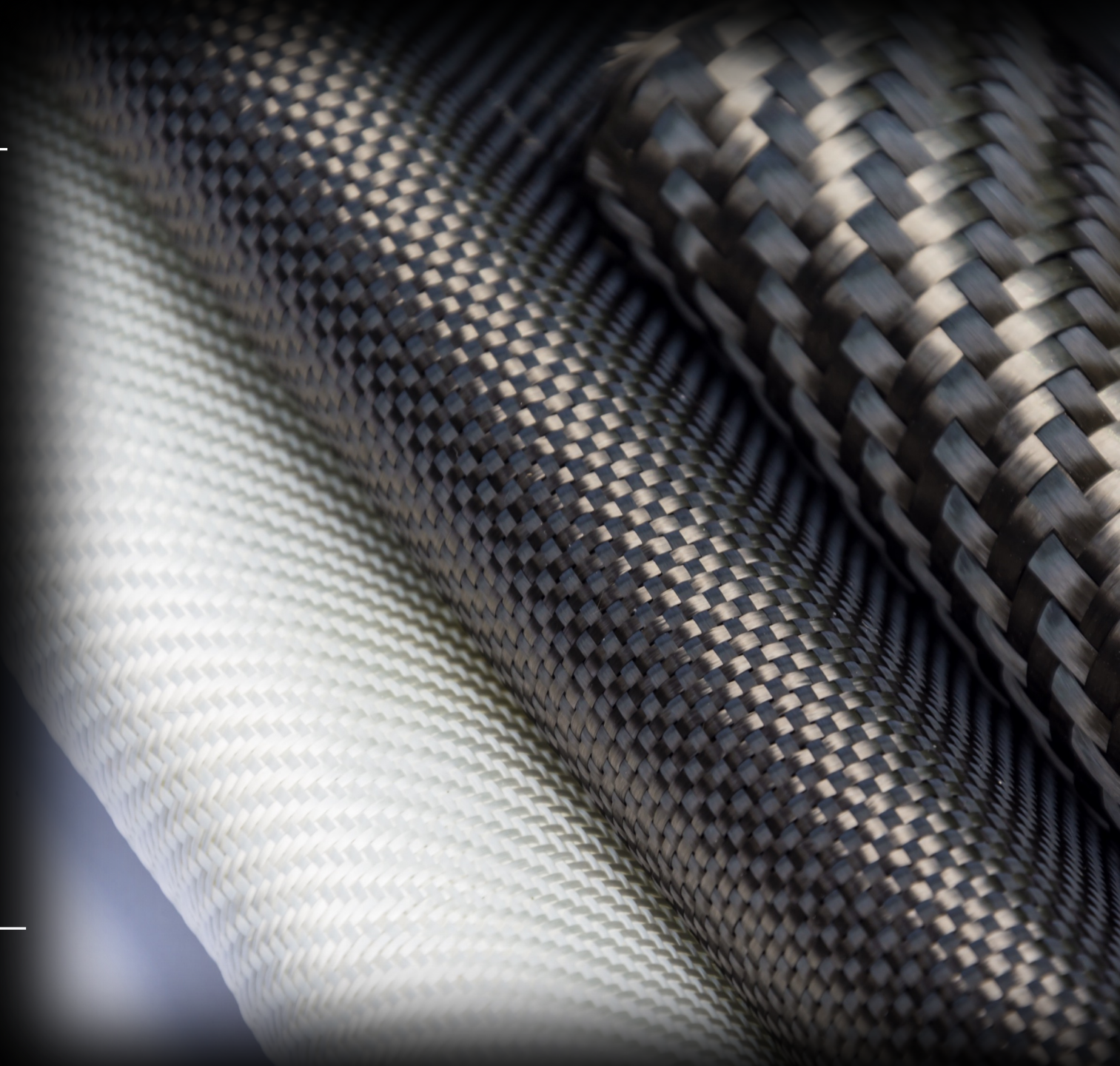


WHAT IS CARBON FIBRE

- A fabric made from carbon filaments woven together and coated with resin.
- When baked, it transforms into a load-bearing material.
- Strong, rigid, lightweight.

TYPES OF CARBON FIBRE

- Different types based on fibre density.
- Higher density = better properties.
- Carbon fibre is always black. Other colours mean polyester or paint.



CARBON FIBRE CHOICE

Carbon fibre choice depends on production goals.

- Bidirectional: Balanced, strength in two directions.
- Unidirectional: Reduces torsion risk.
- Recycled: Used for added thickness.
- Carbon + Polyester: For producing coloured items.

CARBON FIBRE:

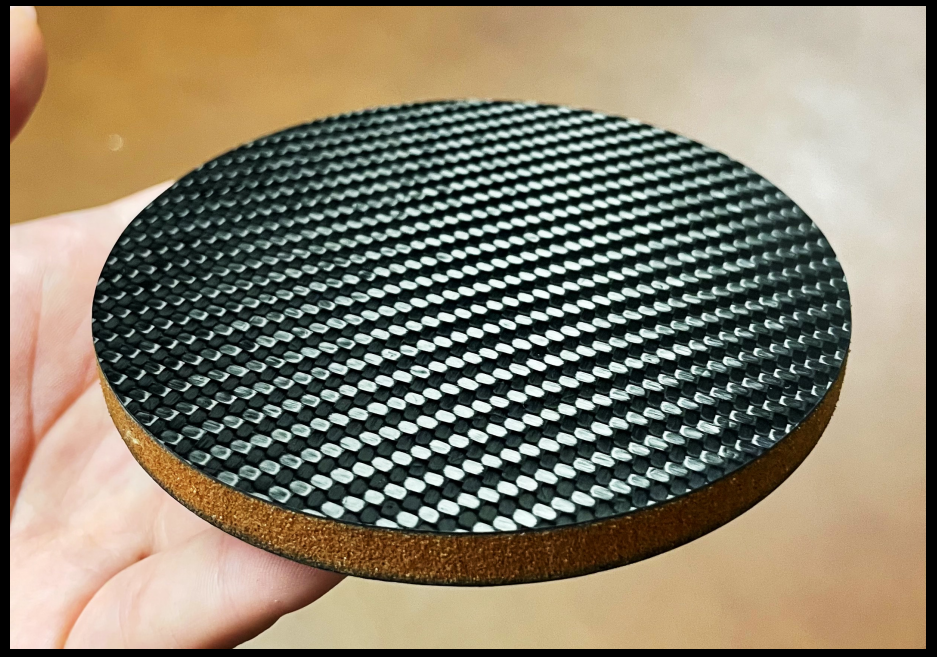
WHEN, WHY, WHAT?

STRUCTURAL CARBON FIBRE

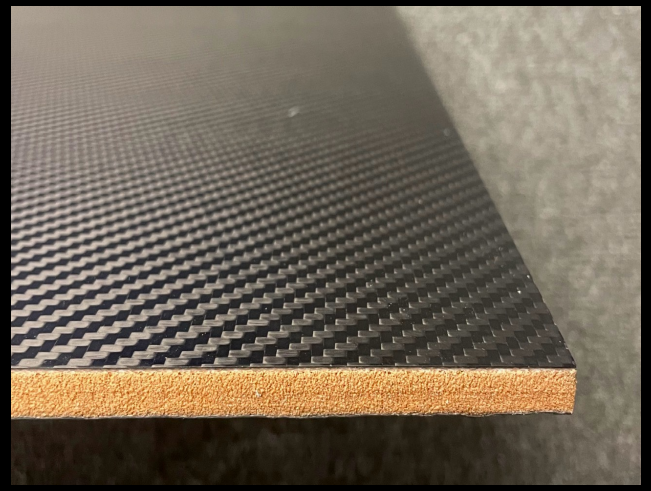
- Used to build the load-bearing structure. It provides mechanical strength and stiffness.

COSMETIC CARBON FIBRE

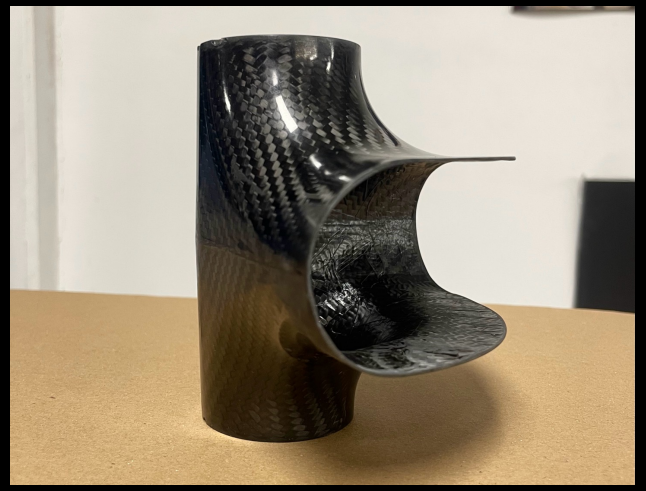
- Used only to cover the surface of an existing structure (decorative purpose).



TEST:
STRUCTURAL OR COSMETIC CARBON?



Cosmetic Carbon Fibre



Structural Carbon Fibre

Plastic

FAKE CARBON FIBRE REPRODUCTION

Moulded plastic that replicates carbon fibre

Carbon-look adhesive film

CARBON FIBRE IN HIFI INDUSTRY

- Reduction of unwanted vibrations;
- Improvements in sound clarity and precision;
- Minimization of distortions and interference;
- Complex shapes creation;
- Weight reduction (without compromising strength);
- Durability: greater resistance to corrosion and wear.

WHERE WE USE STRUCTURAL CARBON FIBRE

Aeon X, Eos X, Argo X and Maxi Argo

Connectors

Aeon Light

WHERE WE USE COSMETIC CARBON FIBRE

Inlay panels

Inlay panels

CARBON FIBRE STORAGE

- Stocked at 7-9°C in a refrigerating room.
- Storage is essential to prevent resin reaction.
- Within a few hours outside refrigeration, carbon fibre becomes rigid and unusable.

AEON X

PRODUCTION PROCESS

AEON X RACK

Made by the combination of two parts:

A MONOCOQUE FRAME

A FLOATING SHELF

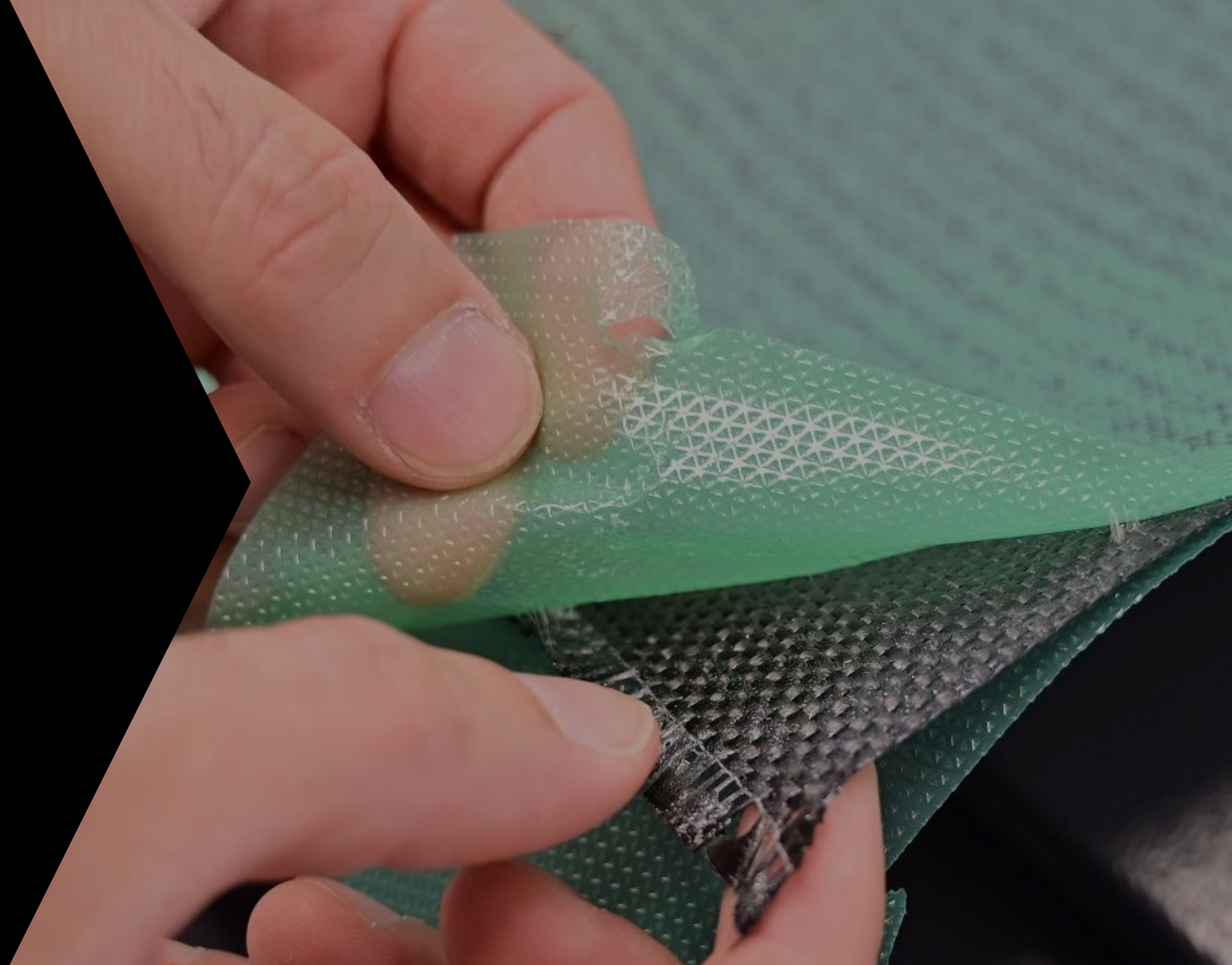
Therefore, the production process is divided into two stages and the components are manufactured separately.

MONOCOQUE FRAME

PRODUCTION PROCESS

00.

LAMINATION PLAN



WHAT IS IT?

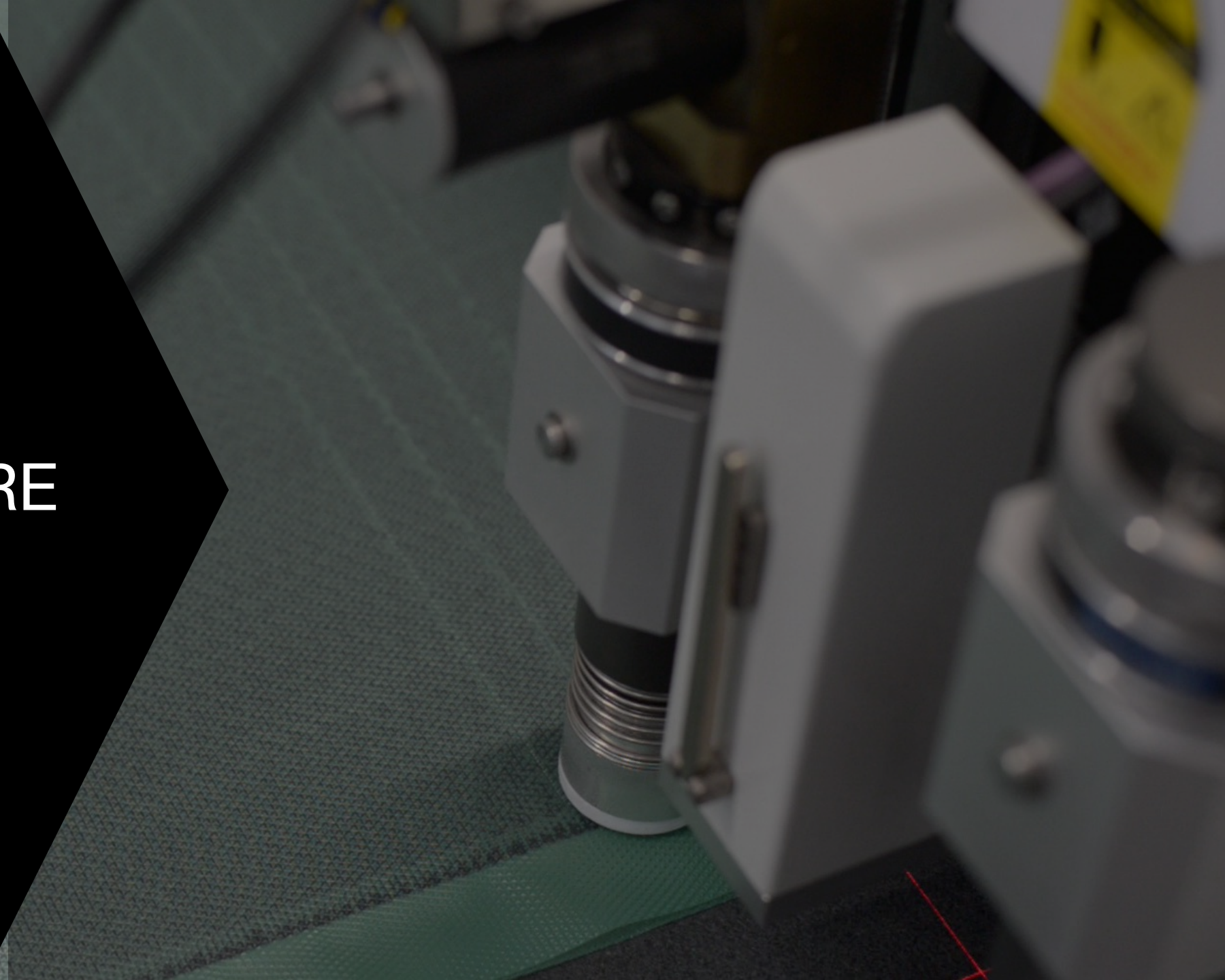
The process of defining the technical specifications for the arrangement of the carbon fibre layers that will form the final product.

KEY FIGURES IN CARBON FIBRE PRODUCTION

- The **client** share its project idea.
- The **designer** creates the product design, and upon client approval, develops the FMEA simulation project.
- The **contractor** develops the lamination plan and proceeds with the development of the prototypes (15/20 before arriving to the final product).

01.

CARBON FIBRE CUTTING



The cutting process is divided in three steps:

1. Creating an AutoCAD file to arrange the pieces for cutting, with the goal of maximizing material efficiency.
2. Positioning the carbon roll on CNC cutting plotter.
3. Cutting using plotter.

Many carbon fibre rolls are used, as each roll contains fibres with different characteristics.


WATCH THE CARBON FIBRE CUTTING VIDEO
ON OUR YOUTUBE CHANNEL:
https://youtu.be/BBqr-UMT7gE

02.

LAMINATION PROCESS

Using closed mould (with a lid)

WHY A MOULD?

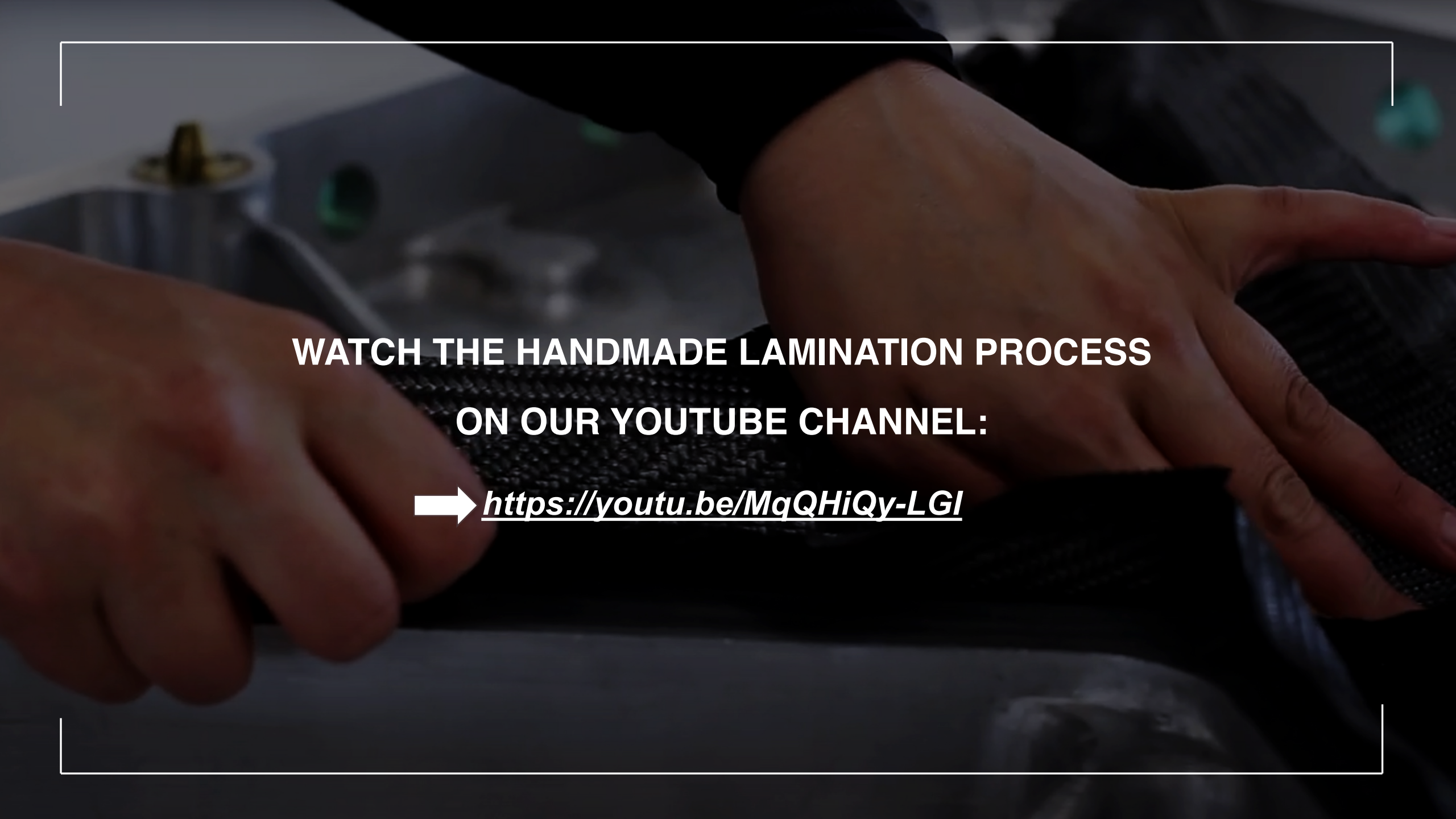
- Carbon fibre is ideal for creating complex shapes, with thin profiles, and hollow interiors due to its strength and versatility.
- Achieving complex shapes requires precision-engineered moulds and monocoque technology.
- Mould designed with internal cavities for easier handling and efficient heat transfer.

CARBON FIBER PLACEMENT

- Placement of 120+ pre-cut carbon fibre pieces into the aluminium mould.
- Handmade procedure.
- Time required: 1.5 hours.
- High precision and manual skills.

- Overlap sequence follows the lamination plan.
- Carbon fibre layers: thick 0.4 – 0.5 mm each.
- Over 10 layers overlapped in some areas.

- **Importance of resins**: its adhesive properties keep the carbon in the same position during the lamination process.



WATCH THE HANDMADE LAMINATION PROCESS

ON OUR YOUTUBE CHANNEL:

➡ ***https://youtu.be/MqQHiQy-LGI***

INSERTING PLASTIC BAGS

- Two plastic bags aligned with cross directions.
- Function: push the carbon against the mould walls during curing.

  …How?

  - ➢ The autoclave applies 6 bars of positive pressure in the plastic bags.
  - ➢ Bags inflate, ensuring the contact with mould walls.

.

- **Delicate step**: extra care required to avoid damaging plastic bags.
- **Risk of Puncture**: long nails or careless handling can cause holes.
- **Team Effort**: success depends on the entire production team's diligence.

OVERLAP

- **Procedure**: excess of carbon fibre is overlapped on both sides of the cross, so as to close it.
- **Reinforcement**: four long pieces of carbon fibre are added alternately in both directions.

MONOCOQUE TECHNOLOGY

- Necessary to create the cross as a single, unified piece.
- Ensures compliance with performance requirements and integrity of the structure.
- Same technology used in F1 safety cells.

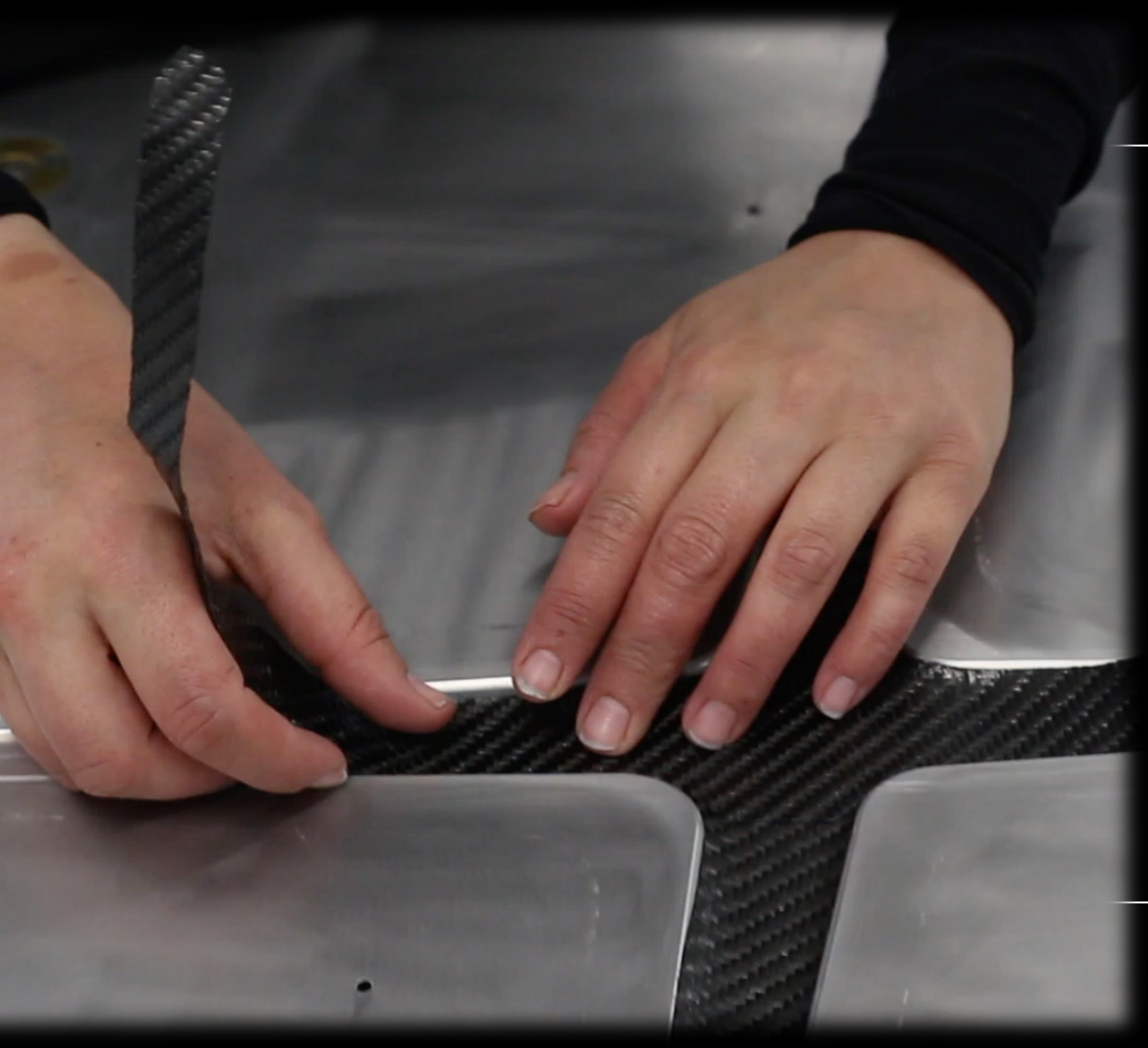
03.

LAMINATION OF THE CAP

Using closed mould (with a lid)

PREPARATION OF THE CAP

- Creation of the rib by laminating the cap of the mould
- Why? Presence of residual torsion on prototypes.



Lamination process divided in 2 steps:

1. Stickers application
2. Layer placement: first unidirectional carbon (visible), followed by bidirectional and recycled carbon to build up thickness.

WATCH THE VIDEO

ON OUR YOUTUBE CHANNEL:

➡ ***https://youtu.be/MHi9aY_xf-c***

04.

COOKING PROCESS

MOULD CLOSURE PROCEDURE

- **Mould Closure**, bringing the two halves together.
- **Sealing** all potential air escape points before curing.

LAST STEPS BEFORE COOKING

Once the mould is sealed:

- cover the mould with white fabric: it keeps the temperature during cooking process and protect the external plastic bag from scratches.
- Cover the white fabric with an external plastic bag: it keeps negative pressure inside of the mould.

SEAL TESTING BEFORE CURING

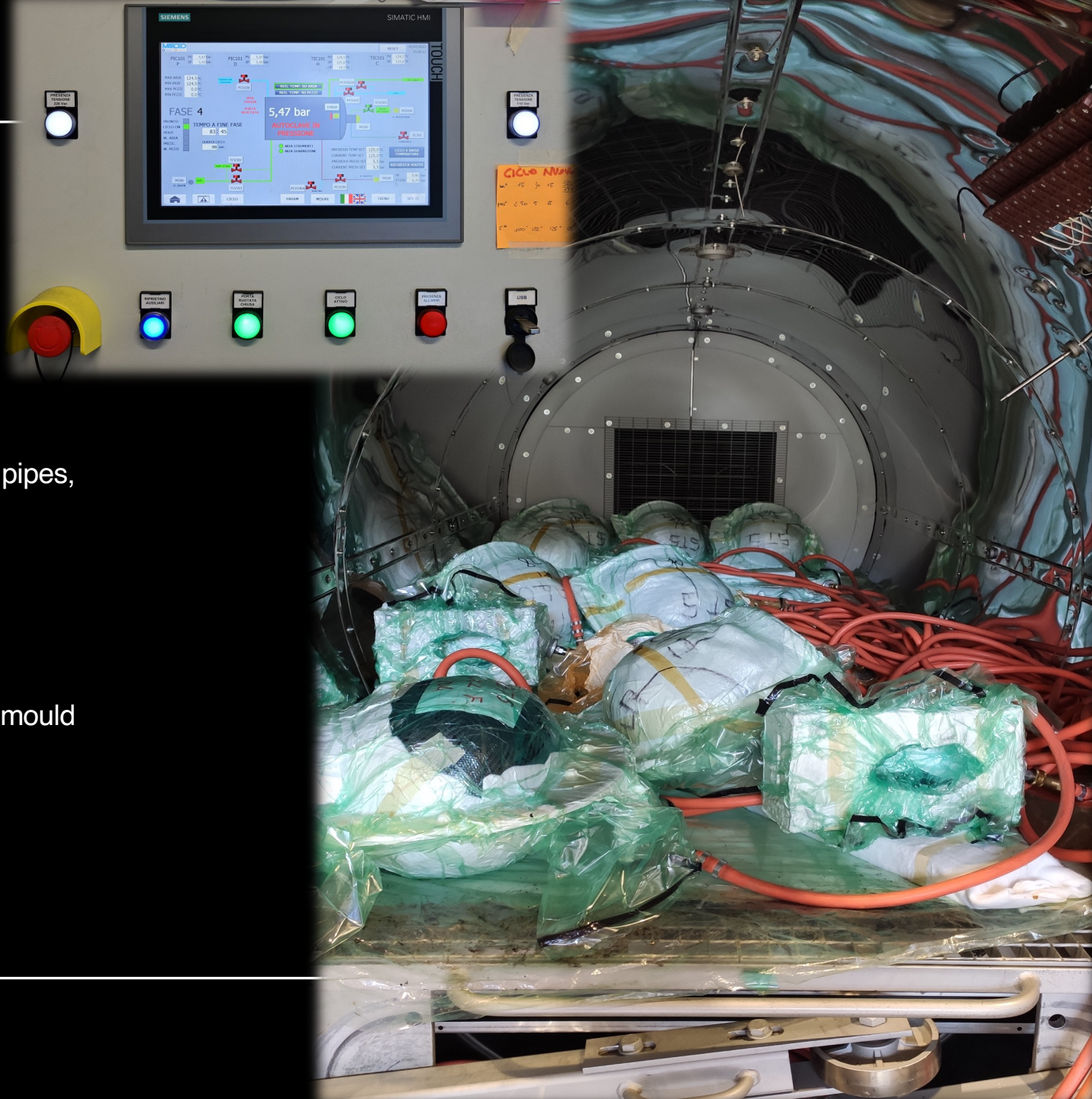
- **Test Importance**: crucial to verify the bag seal.
- **Connector Affixation**: attach a connector to the plastic bag.
- **Vacuum Creation**: remove air inside the mould.
- **Final result**: passing the test ensures the bag will not break during the cooking process.

COOKING PHASE

- **Where**: autoclave
- **Duration**: 3 hours
- **Procedure**: place moulds on the tray, connect to pipes, and monitor via the control panel.

Use of two different pressure :

- **Positive Pressure**: push carbon against the mould walls.
- **Negative Pressure**: remove air between layers.



- **Temperature Increase/decrease**: 2-3°C per minute
- **Optimal temperature**: 126-128°C. Constant for 2 hours
- **Pressure removal**: before opening the autoclave door
- **Cooling**: moulds must cool before items can be removed.

Our daily production: one cross and one shelf per day (with one mould).

More moulds = more products.

05.

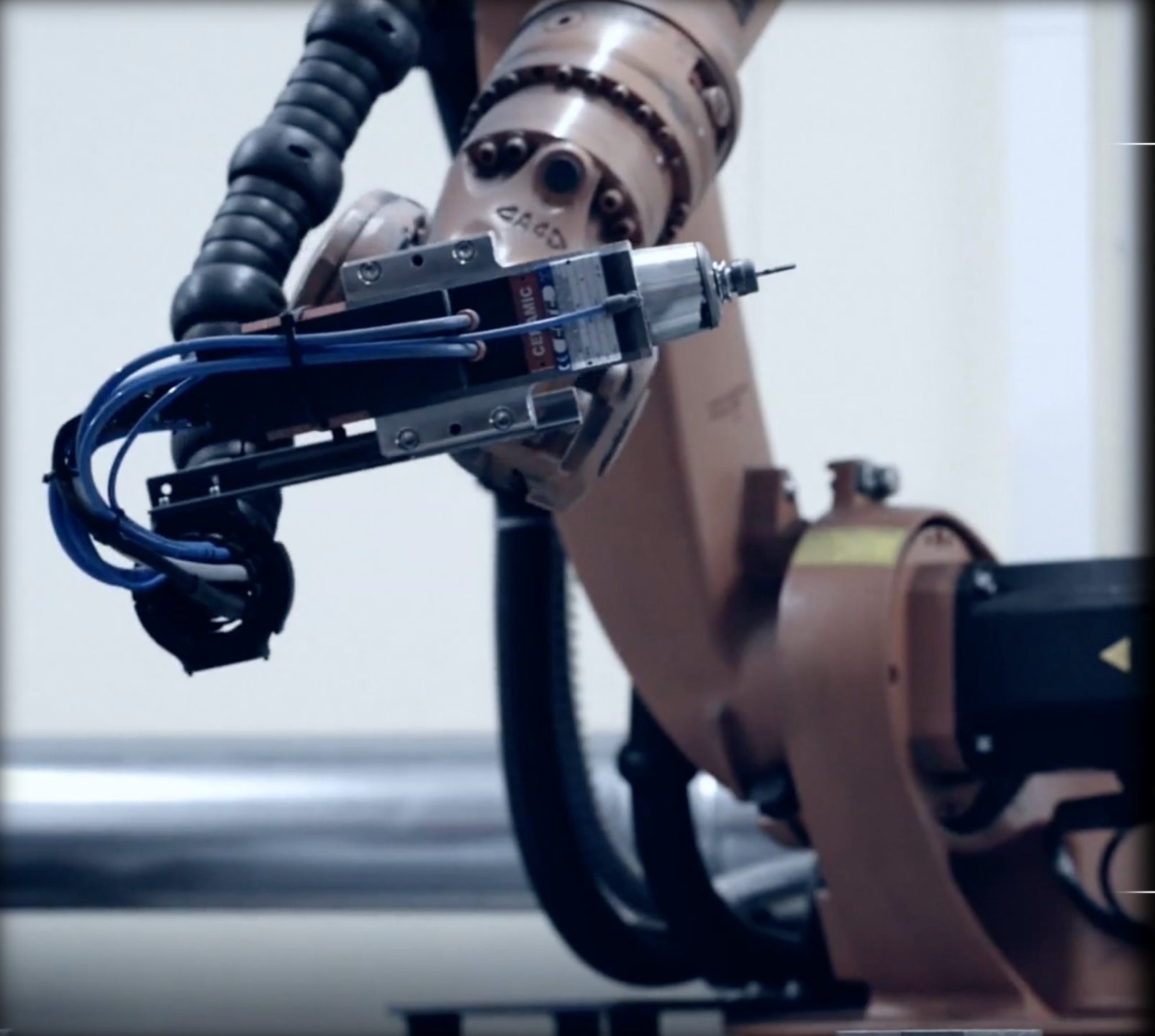
POLISHING

- Reaction between resin and carbon under heat and pressure. Result? Carbon becomes a strong, rigid, yet flexible material.
- During cooking resin becomes liquid and shifts everywhere within the mould.
- Essential to clean and smooth all surface imperfections (excess of resin and fibre).

SURFACE REFINEMENT

1. Larger imperfections are eliminated using appropriate abrasive papers or milling machinery.
2. Surface polishing using a series of pastes specifically designed for carbon fibre.


WATCH THE VIDEO
ON OUR YOUTUBE CHANNEL:
https://youtu.be/8-U_VocGuT0



HOLES MAKING

- **Where**: at the ends of the cross.
- **How:** Using CNC robot.
- **Why**: for the installation of metal parts during assembly.

FLOATING SHELF

PRODUCTION PROCESS

Using open mould

PRINTING TECHNOLOGY

1. **Backside Printing**
2. **Frame Printing and Application**
3. **Foam Application** inside the shelf. It helps bond the top panel to the shelf while filling the interior, preventing it from being hollow, increasing its load-bearing capacity and reducing resonances.
4. **Top Panel Application:** The top panel is affixed with structural glue to complete the shelf.
5. **Weights Application**: to ensure flatness.

TOP PANEL FINISHING

- **UV printing technology** to reproduce the logo.
- **Result**: a "see-through" effect, with the logo visible only from certain angles.

AEROLINE CONNECTORS

WATCH THE PRODUCTION PROCESS

OF AEROLINE CONNECTORS:

➡ ***https://youtu.be/eQyAQ7X2oms***

AEON LIGHT

PRODUCTION PROCESS

AEON LIGHT

- Entry-level structural carbon fibre rack
- The simplified and economical version of Aeon X.
- A balance between advanced technology and affordability.
- It integrates cross and shelf into a single piece

WATCH THE PRODUCTION PROCESS OF

AEON LIGHT SHELVES ON OUR YOUTUBE CHANNEL:

➡ ***https://youtu.be/Buk6W9YFIOk***

DIFFERENCES BETWEEN AEON X AND AEON LIGHT

1st difference:

RACK COMPOSITION

AEON X

Shelf made by the combination of:

floating shelf + monocoque cross.

AEON LIGHT

Shelf built in one piece only:

cross already incorporated in the shelf.

2nd difference:

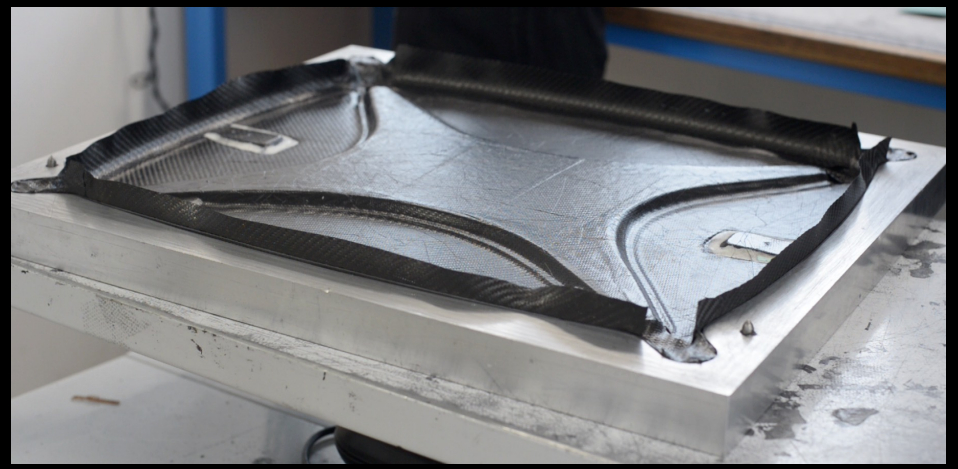
MANUFACTURING TECHNOLOGY

AEON X

- **Cross**: produced using the monocoque technology and a closed mould.
- **Shelf**: produced using a printing technology and an open mould .

AEON LIGHT

- Aeon Light: different shape compared to Aeon X shelf. Produced using a different open mould and a specialized printing techniques.

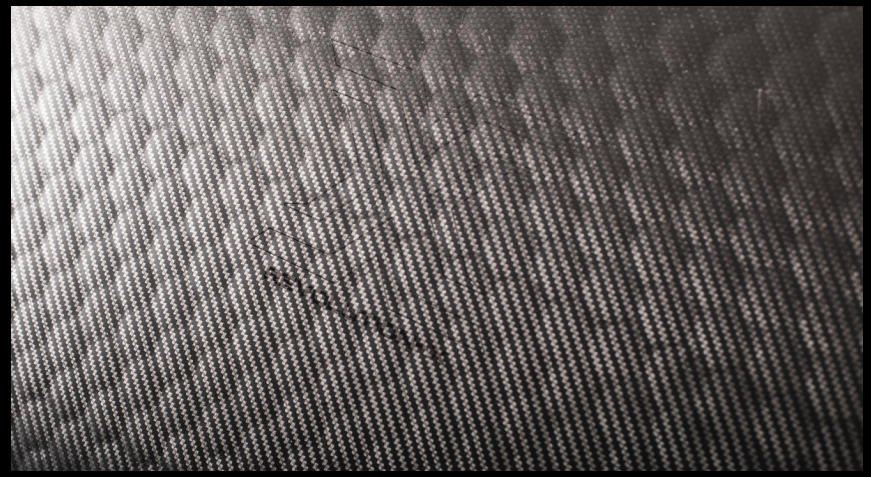


3rd difference:

TOP PANEL

AEON X

- Made from the overlapping of 4/5 different layers of carbon fibre.
- Logo: reproduced using UV printing technology.



AEON LIGHT

Composed of 5 different layers: 2 layers of aluminium and 3 layers of polyurethane.

Logo: reproduced through laser engraving process.

4th difference:

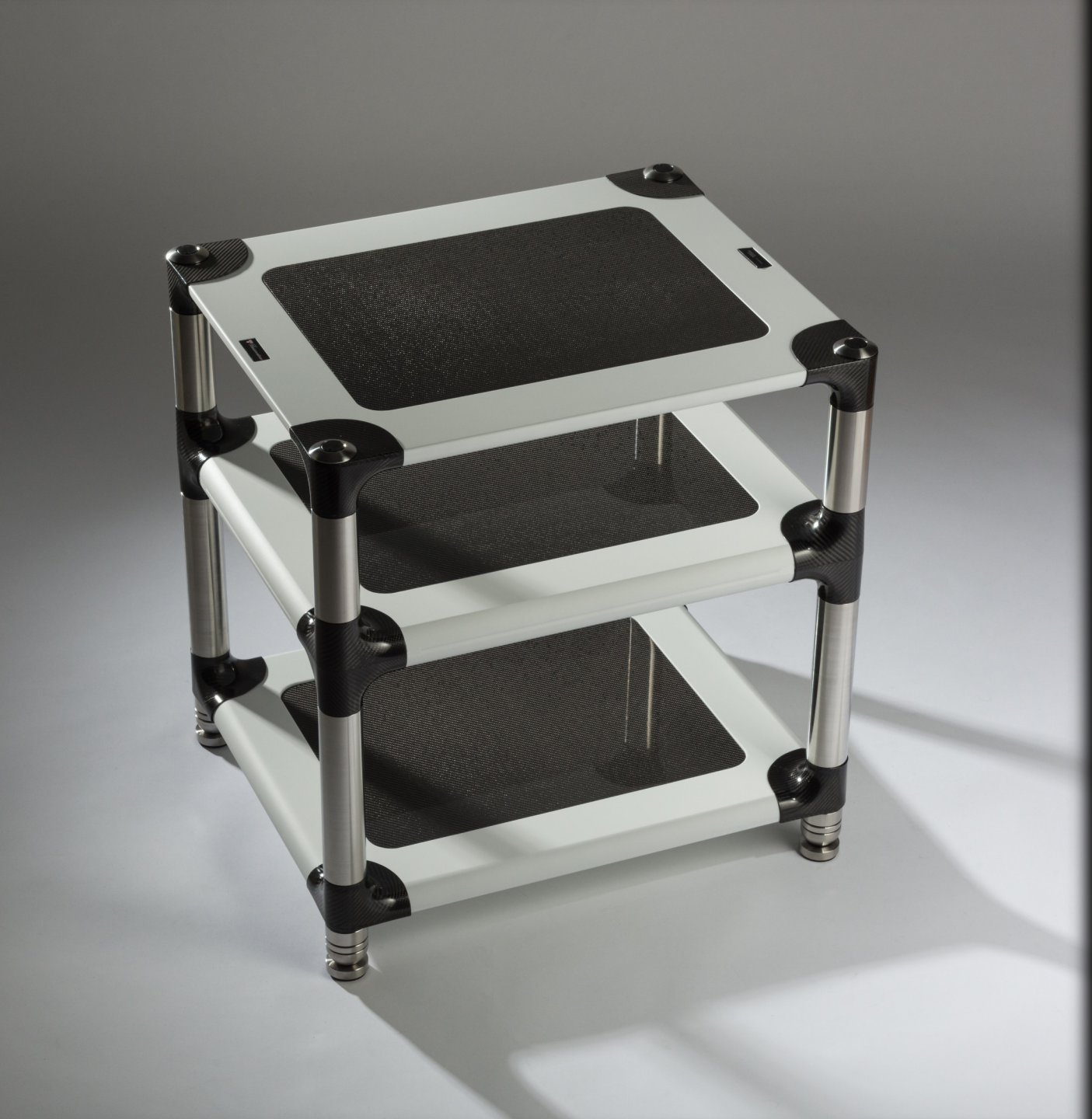
RECYCLED CARBON FIBRE

Aeon Light is made with 70% recycled carbon fibre, primarily used in the rear of the shelf.

A higher percentage than Aeon X.

INLAY PANELS

PRODUCTION PROCESS



COSMETIC CARBON FIBRE

Production Process:

1. Lay carbon fibre on a glass/aluminium plate.
2. Add support material and more carbon fibre layers.
3. Cover with the original plate.
4. Cure in the autoclave.

Handmade in Italy

Bassocontinuo®

FINE AUDIO RACKS

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