

RESNA 2017



FOLDING WHEELCHAIR TRANSFER BOARD

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Caltech





## PROJECT OBJECTIVE

### OUR GOAL

Help promote user independence by streamlining the process of transferring in and out of a wheelchair by developing a solution that helps reduce the possibility of falls and future medical complications.





FIELD RESEARCH

INTERVIEWS  
& OBSERVATIONS

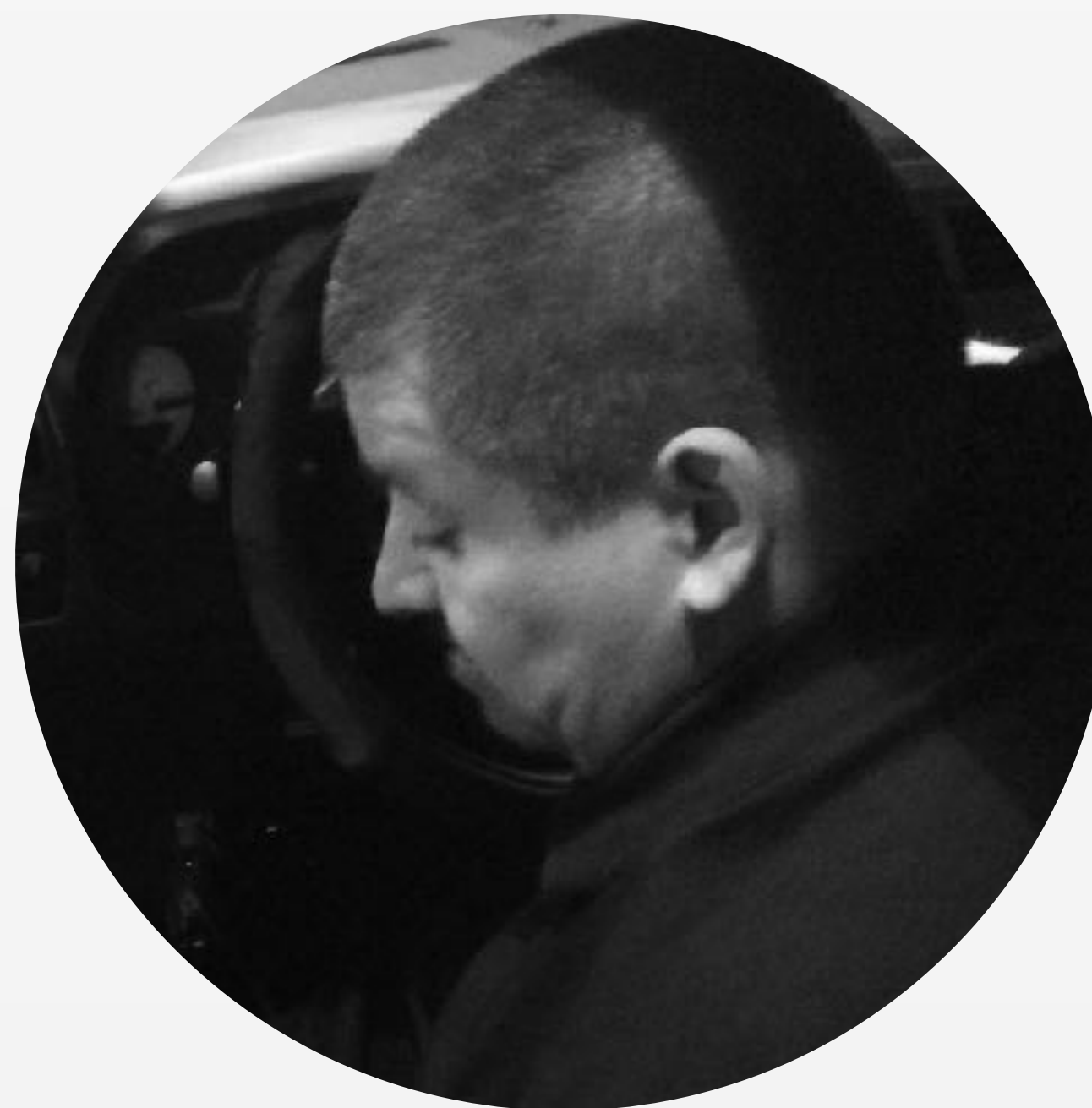
To help understand the problem we interviewed several experts from the **Rancho Los Amigos National Rehabilitation Center** and the Don Knabe Wellness Center.



DENISE



BOBBI



LUIS



MIKE



Don Knabe  
Wellness Center



## TYPES OF TRANSFERS

### **DEPRESSION TRANSFER**

Individuals use their upper body strength to lift themselves up while they move short distances. This is very hard on the body and not everyone can perform this maneuver.

Many women have a hard time performing a depression transfer.



DEPRESSION TRANSFER



SLIDING TRANSFER



## TYPES OF TRANSFERS

### **SLIDING TRANSFER**

Transfer boards help wheelchair users move in and out of their chairs. Most new wheelchair users and elderly individuals will utilize a board to execute a transfer.

Transfer boards are more often used in a home setting.



DEPRESSION TRANSFER



SLIDING TRANSFER



## TYPICAL PROCESS

### **APPROACH**

The individual opens the door and prepares for the transfer.





## TYPICAL PROCESS

### **DEPRESSION**

A depression transfer is performed on the wheelchair, lifting himself by his upper body.





## TYPICAL PROCESS

### **BRIDGING**

One hand is then moved to the transfer location.

**This is the most dangerous point during the transferring process.**





## TYPICAL PROCESS

### **TRANSFER**

In a controlled manner he then moves himself to the desired transfer location.

**A lot can go wrong on during this step and would likely result in a slip or fall.**





## TYPICAL PROCESS

### **DISASSEMBLY (1/5)**

The cushions are removed to prep the chair for disassembly.





## TYPICAL PROCESS

### **DISASSEMBLY (2/5)**

The wheels have quick release pins.





## TYPICAL PROCESS

### **DISASSEMBLY (3/5)**

The wheelchair undergoes a lot of wear and tear when the wheels are removed.





## TYPICAL PROCESS

### **DISASSEMBLY (4/5)**

The other wheel is then removed.





## TYPICAL PROCESS

### **DISASSEMBLY (5/5)**

The back is then folded down to make the frame compact for storage.





## TYPICAL PROCESS

### **STORAGE**

The frame and wheels are then lifted and stored in the vehicle.

Disembarking is the reverse of this process.

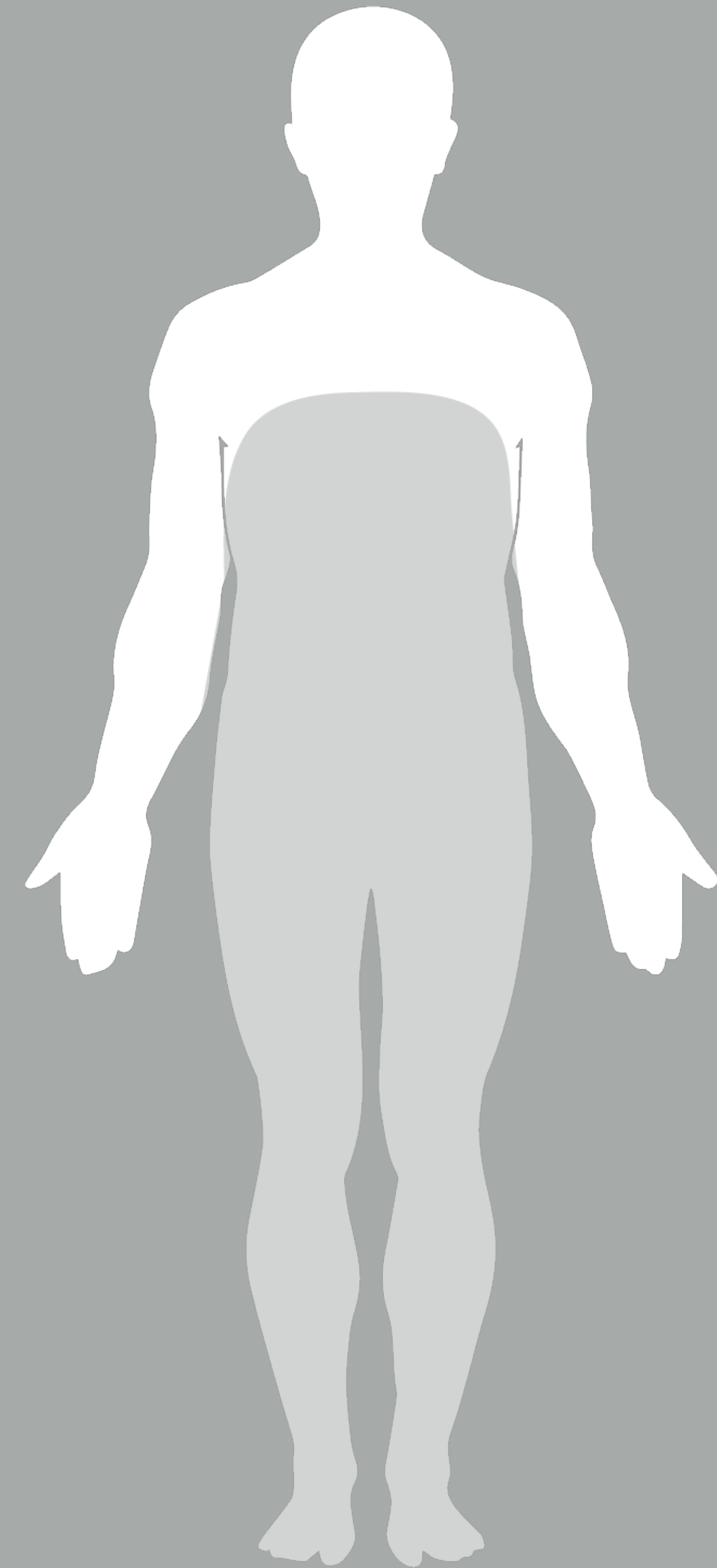




## LIMITING FACTORS

### UPPER BODY STRENGTH

Transferring is highly dependent on upper body strength. The upper body must work overtime to compensate for the lower body.

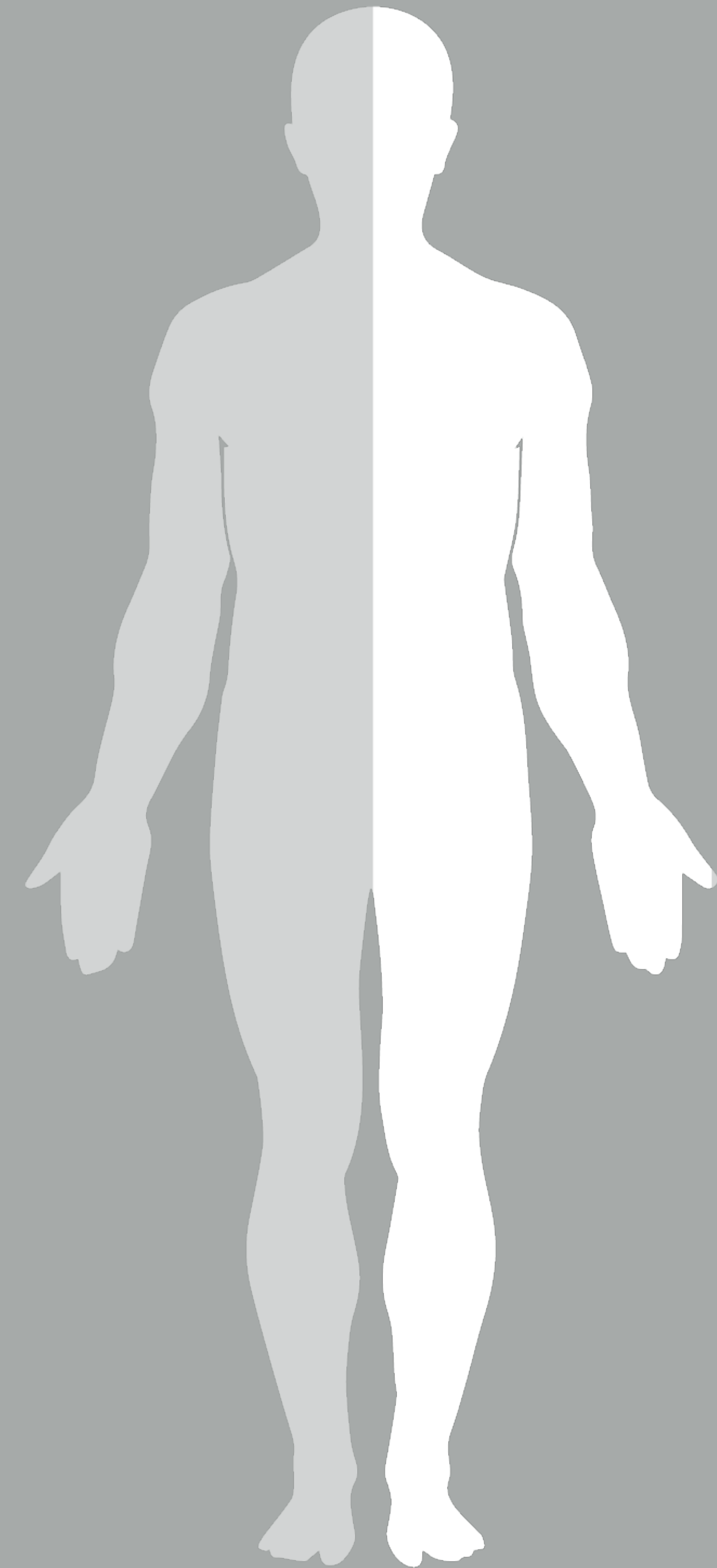




## LIMITING FACTORS

### **STRONG vs. WEAK SIDE**

Disproportion lateral capability or strength can hinder transferring and limit the overall ability and independence of an individual.

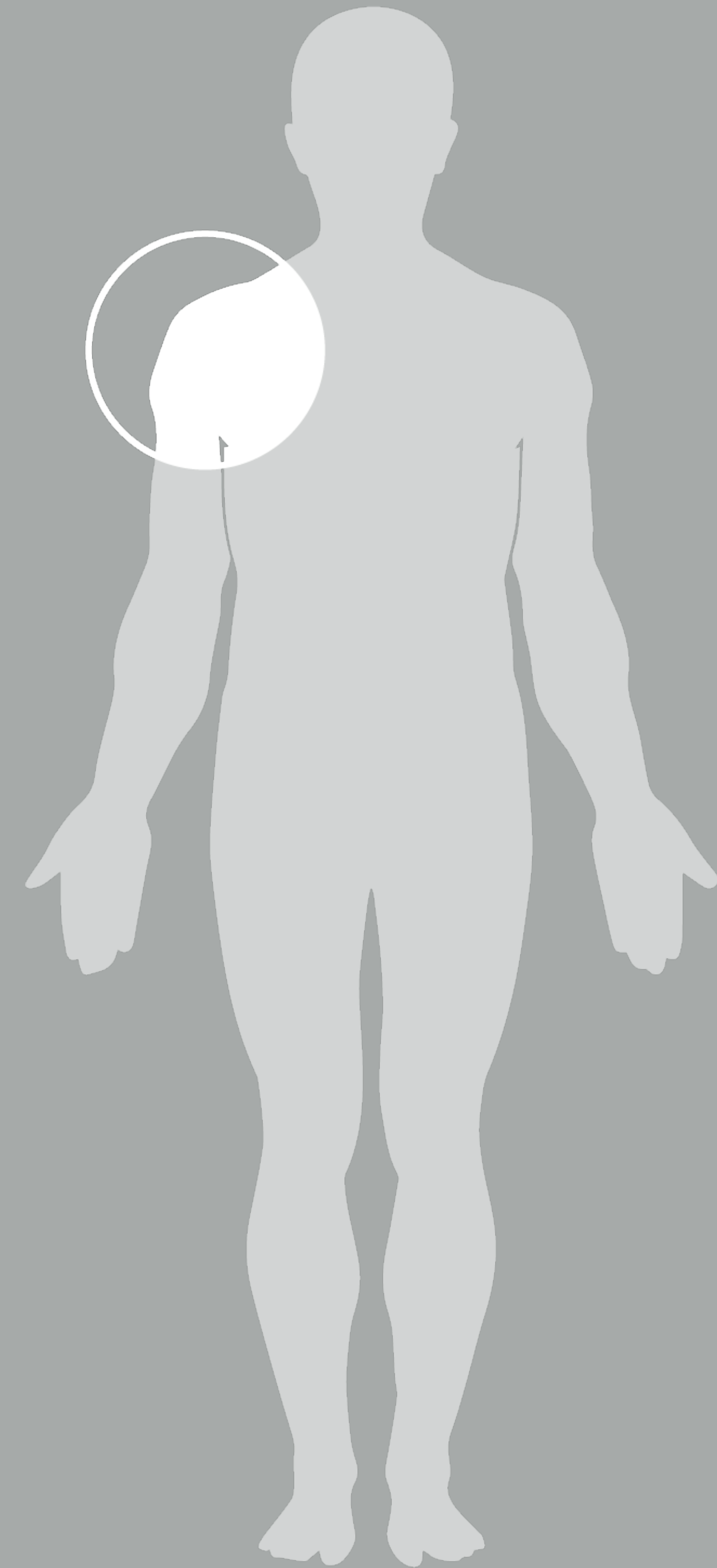




## LIMITING FACTORS

### LOCALIZED INJURIES

Specific injuries can limit the ability to perform transfers and can take much longer to rehabilitate for individuals that have a spinal cord injury.





A grayscale photograph of a person sitting in the driver's seat of a car, looking out the window. The person's head is turned away from the camera, and their hands are on the steering wheel. The car's interior and exterior are visible, including the side mirror and the window frame.

INSIGHTS

# **NOT EVERYONE CAN DO A DEPRESSION TRANSFER**

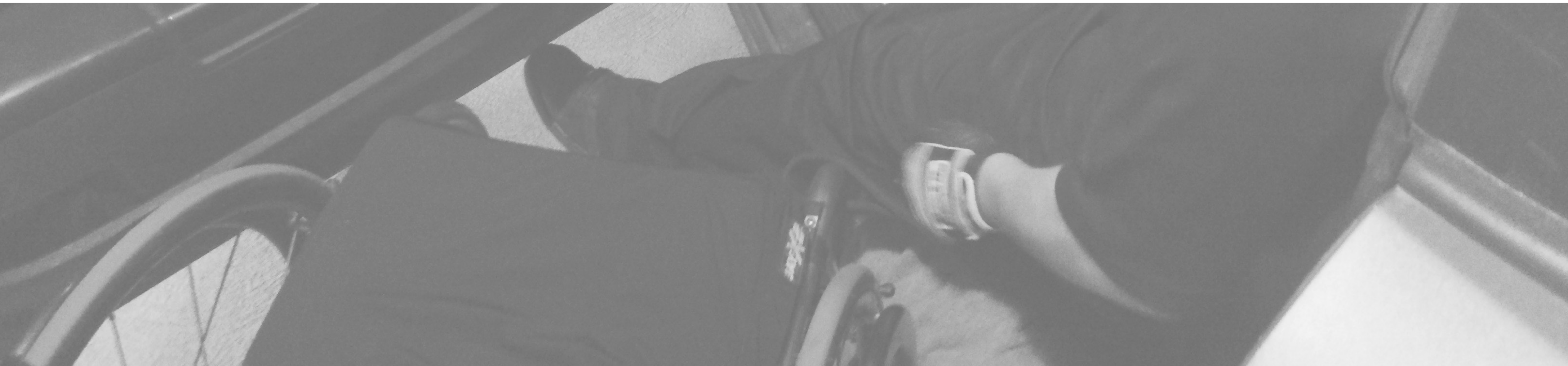






INSIGHTS

# **INDIVIDUALS OFTEN BYPASS SAFETY IN FAVOR OF SPEED**







INSIGHTS

# **CURRENT SOLUTIONS DON'T FIT INTO THEIR LIFESTYLE**





MARKET ANALYSIS



**DMI  
TRANSFER BOARD**

\$20

Plastic

- + Lightweight
- Flimsy



**BRIGGS  
TRANSFER BOARD**

\$30-70

Wood

- + Sturdy & Strong
- Very Heavy



**ETAC  
TRANSFER BOARD**

\$110-130

Plastic

- + Folding Back
- Prone to Pinching



**BEASLEY  
TRANSFER BOARD**

\$220

Plastic

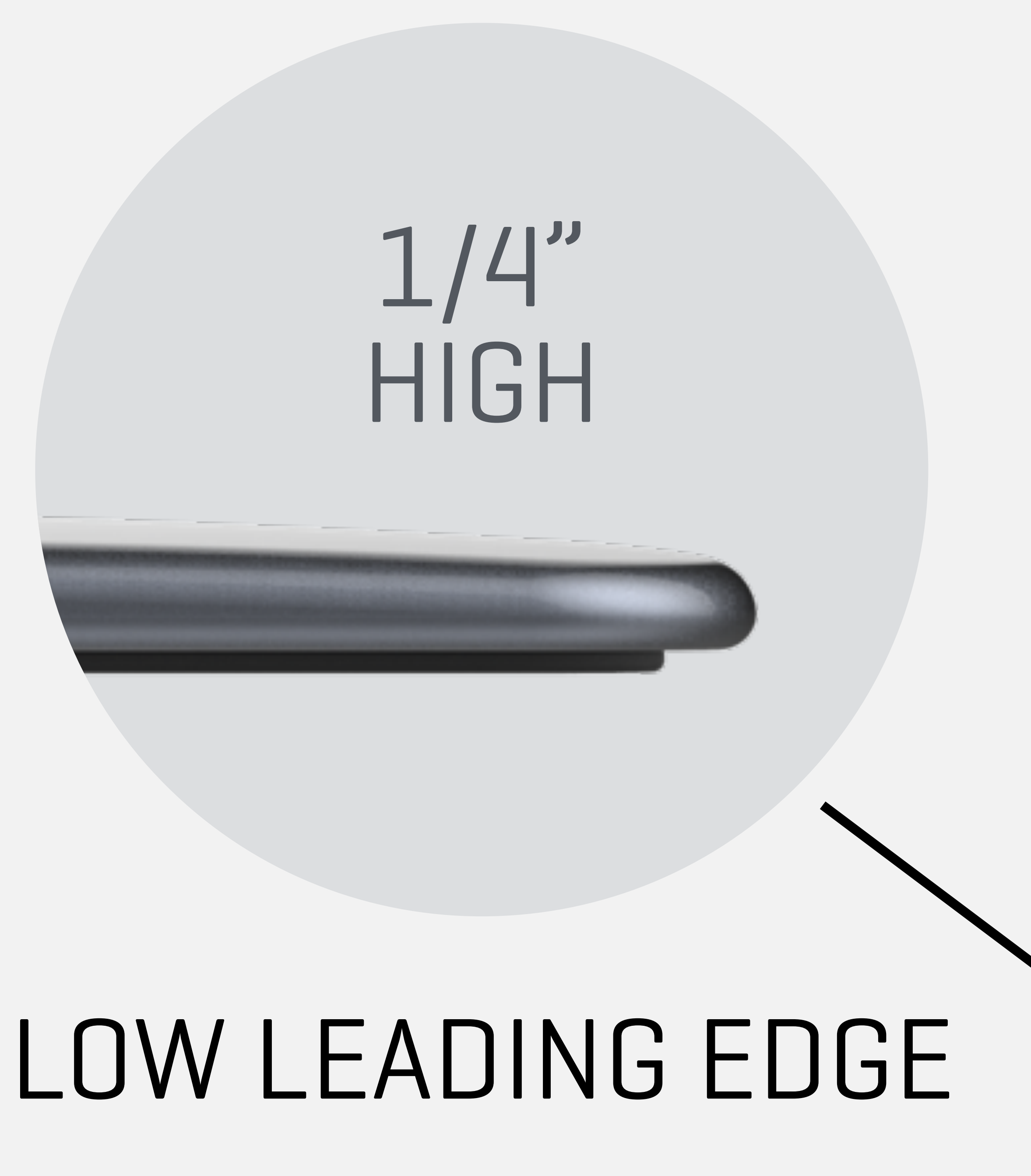
- + Sliding Seat
- Prone to Pinching





FOLDING WHEELCHAIR TRANSFER BOARD

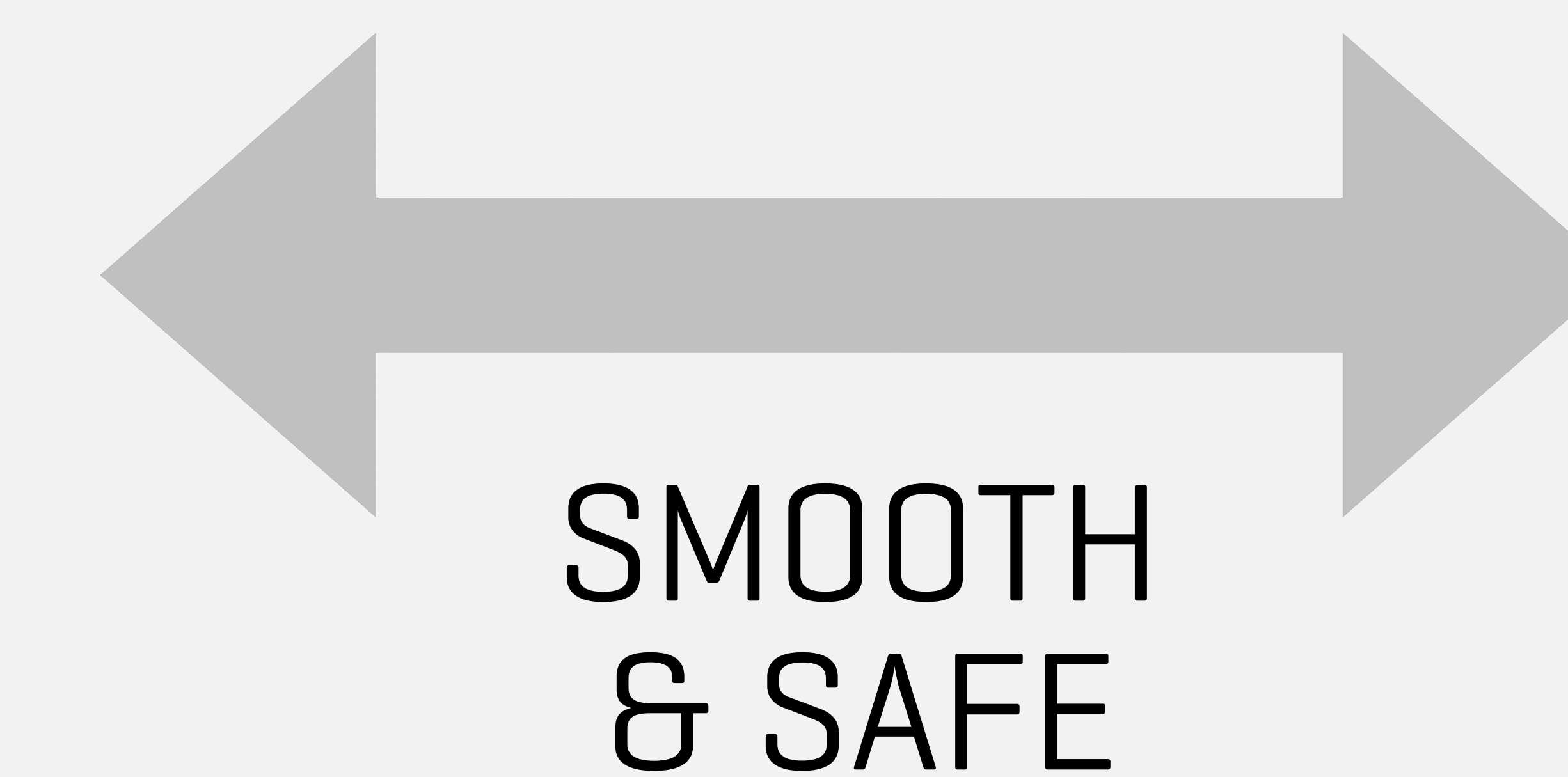




LOW LEADING EDGE

## SMOOTH TRANSFERS

Low friction surface prevents grabbing or pinching skin

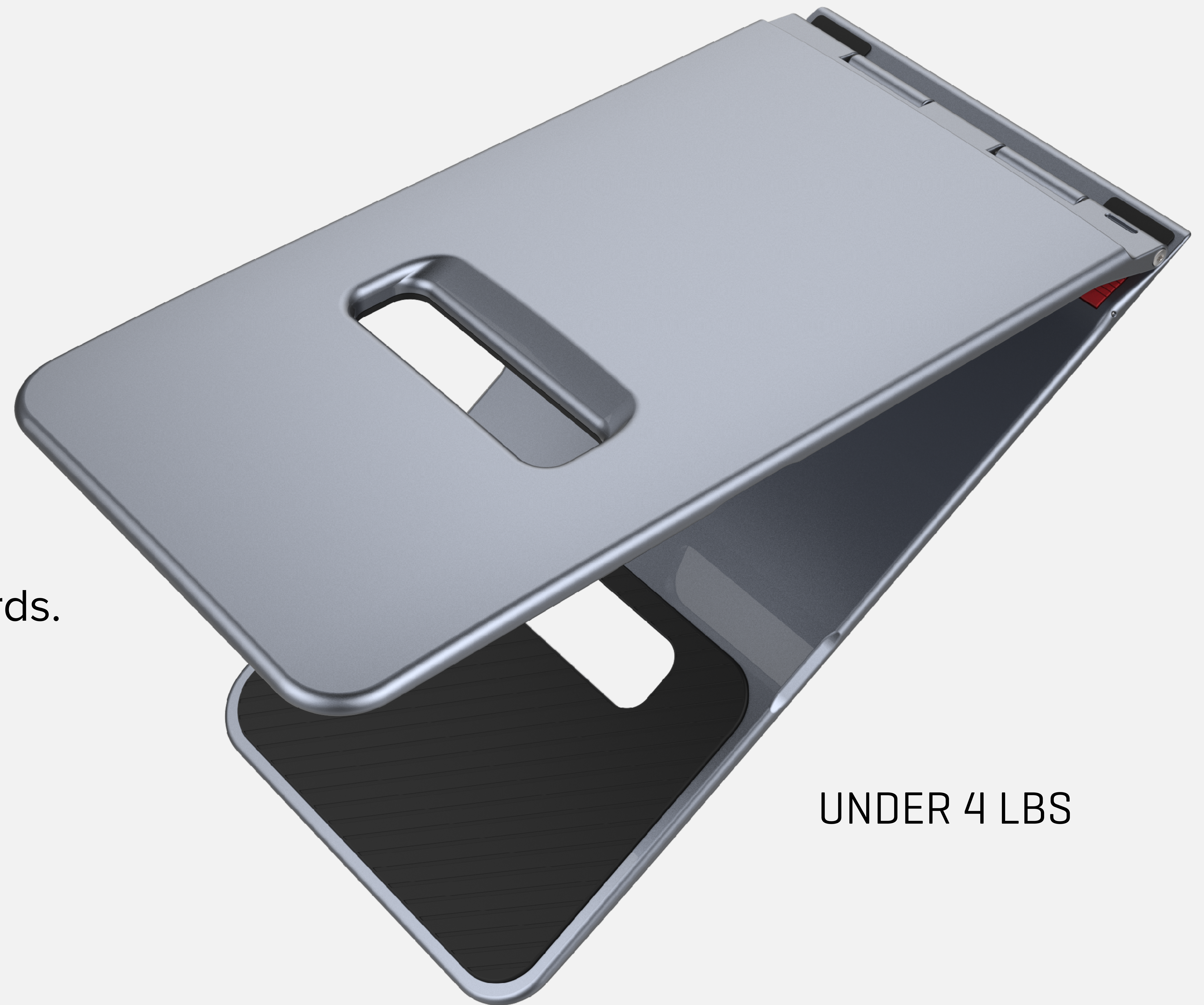




LIGHT WEIGHT

## ULTRA PORTABLE

The thin and sleek design makes AXIS lighter and more portable than any other transfer boards.



UNDER 4 LBS



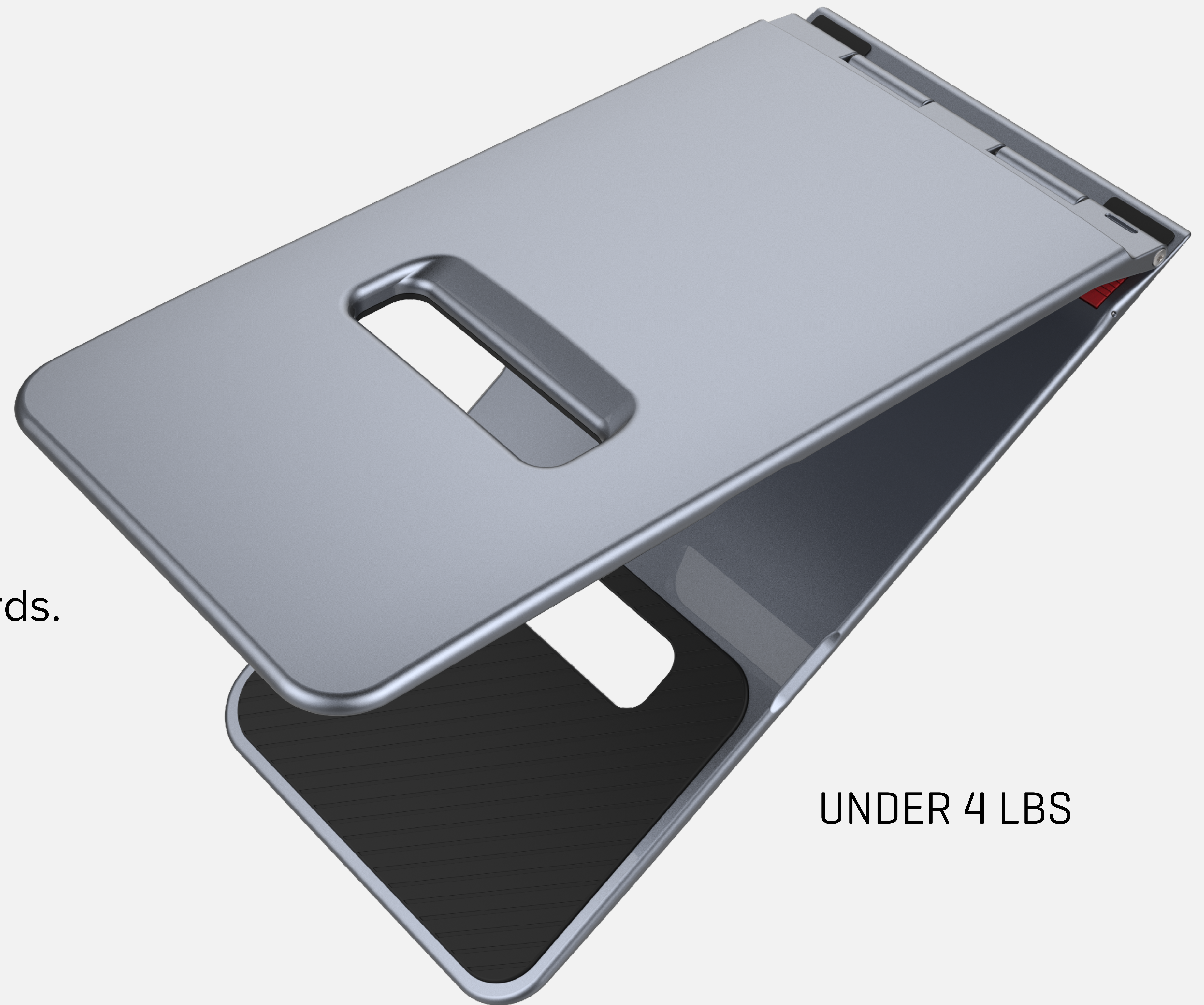
LIGHT WEIGHT

## ULTRA PORTABLE

The thin and sleek design makes AXIS lighter and more portable than any other transfer boards.



SLIM DESIGN



UNDER 4 LBS



COMPACT DESIGN



8" x 30"



3/8" THICK



COMPACT STORAGE

Means individuals can always have a transfer board available.



SAFE



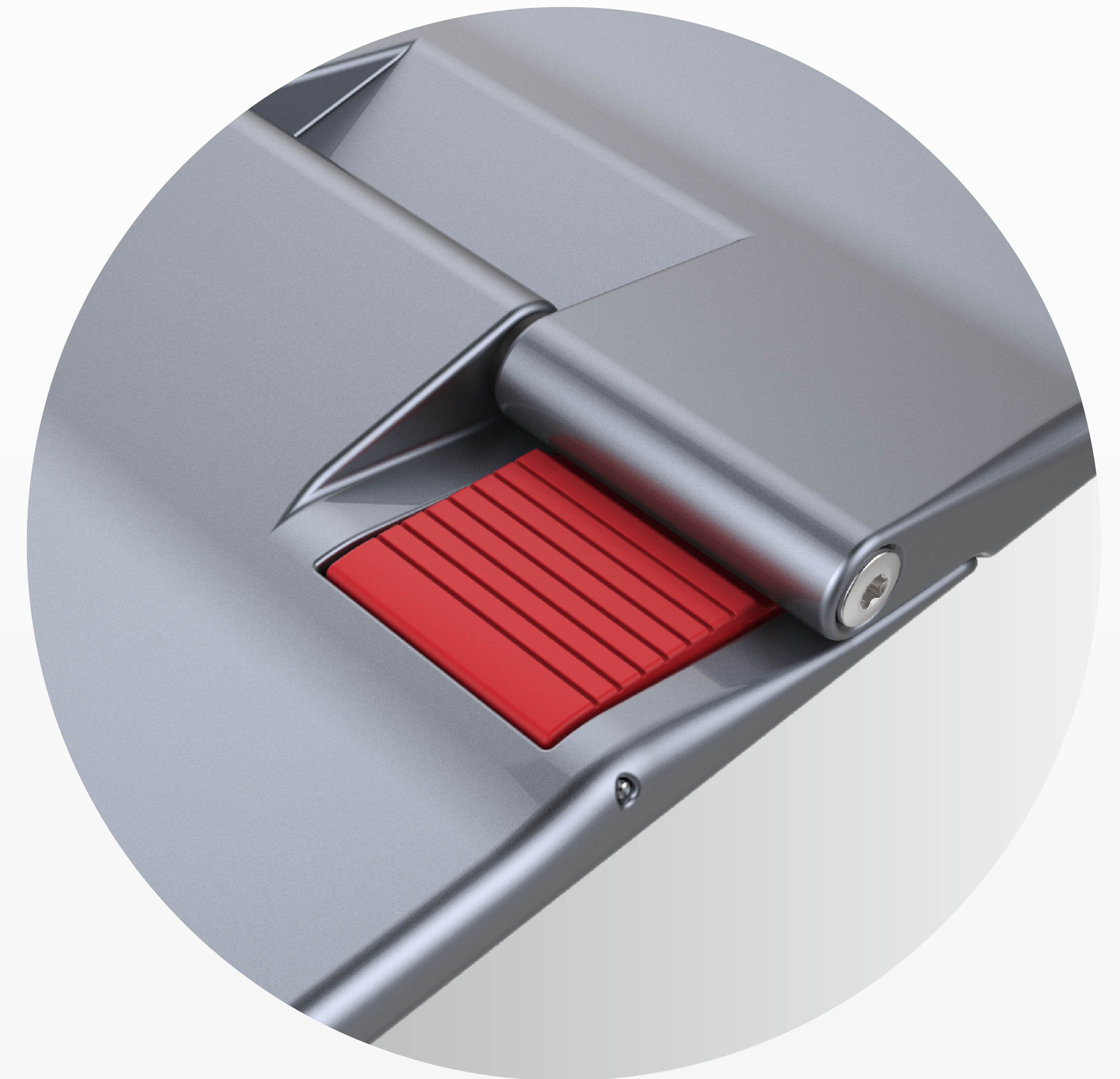
### **TRACTION GRIPS**

Prevent slipping even  
on smooth surfaces



### **SMOOTH EDGES**

Prevent pinching and  
injury during transferring

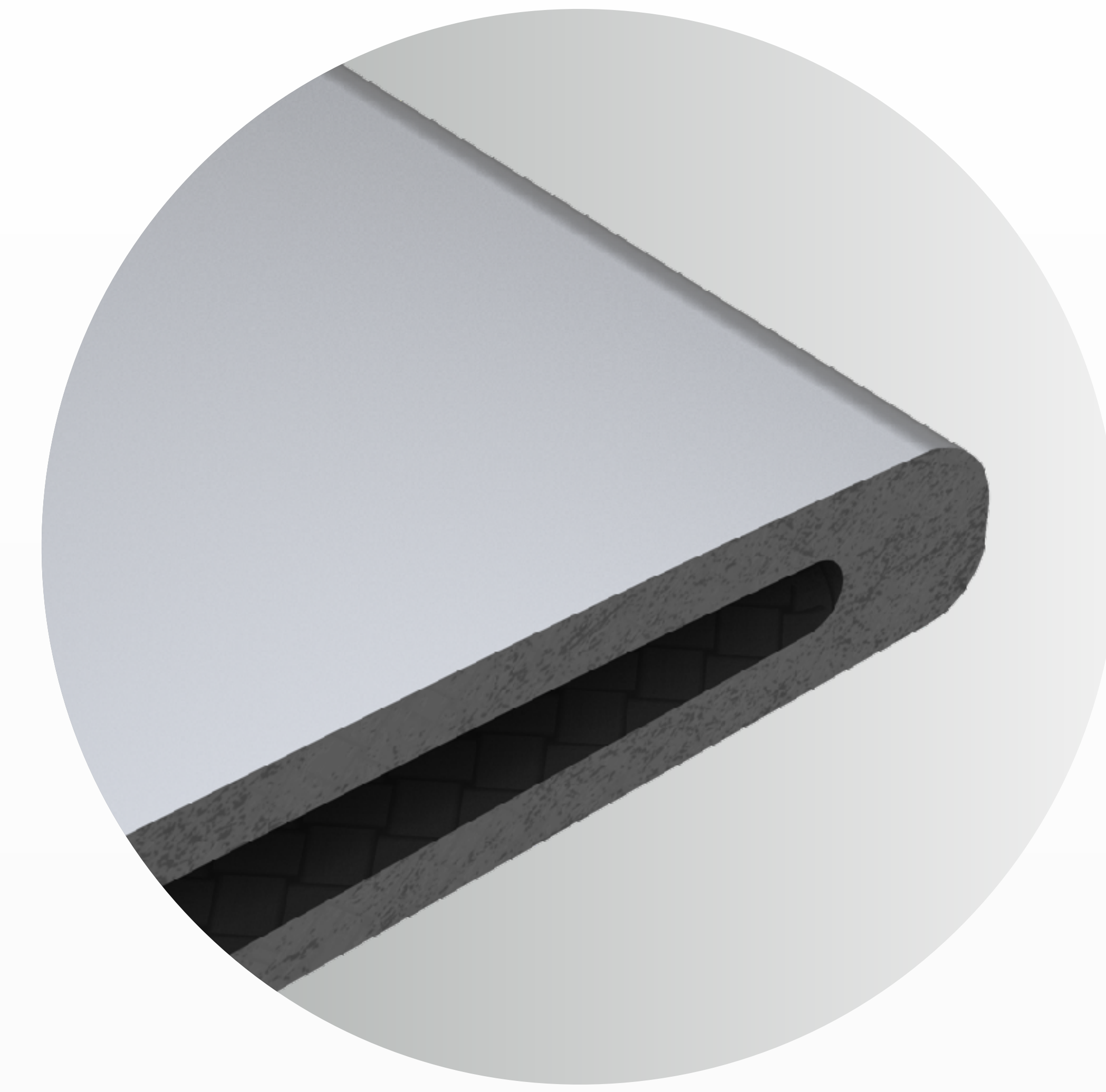


### **SAFETY LOCK**

Prevents accidental closing  
of the board while in use



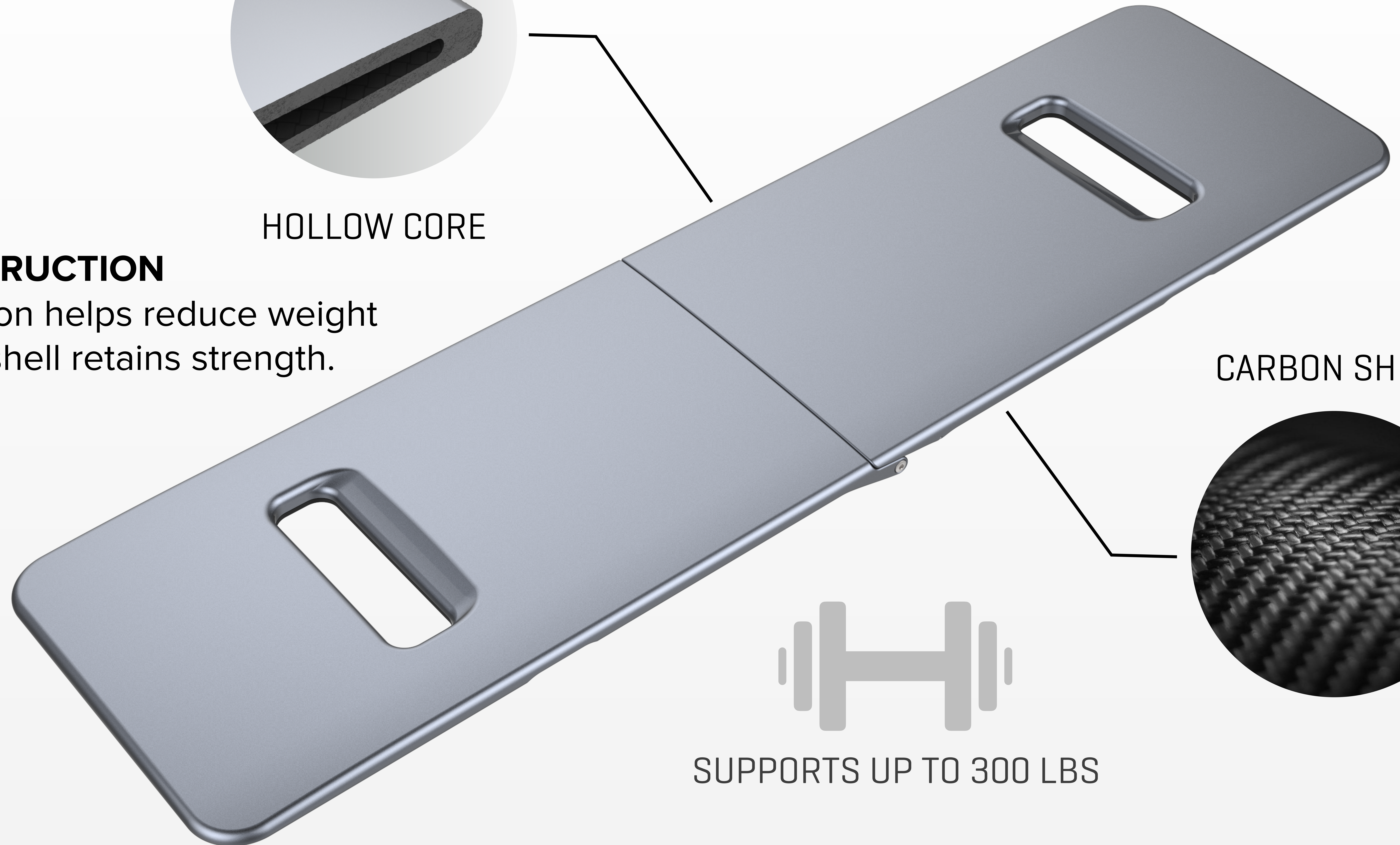
STRONG



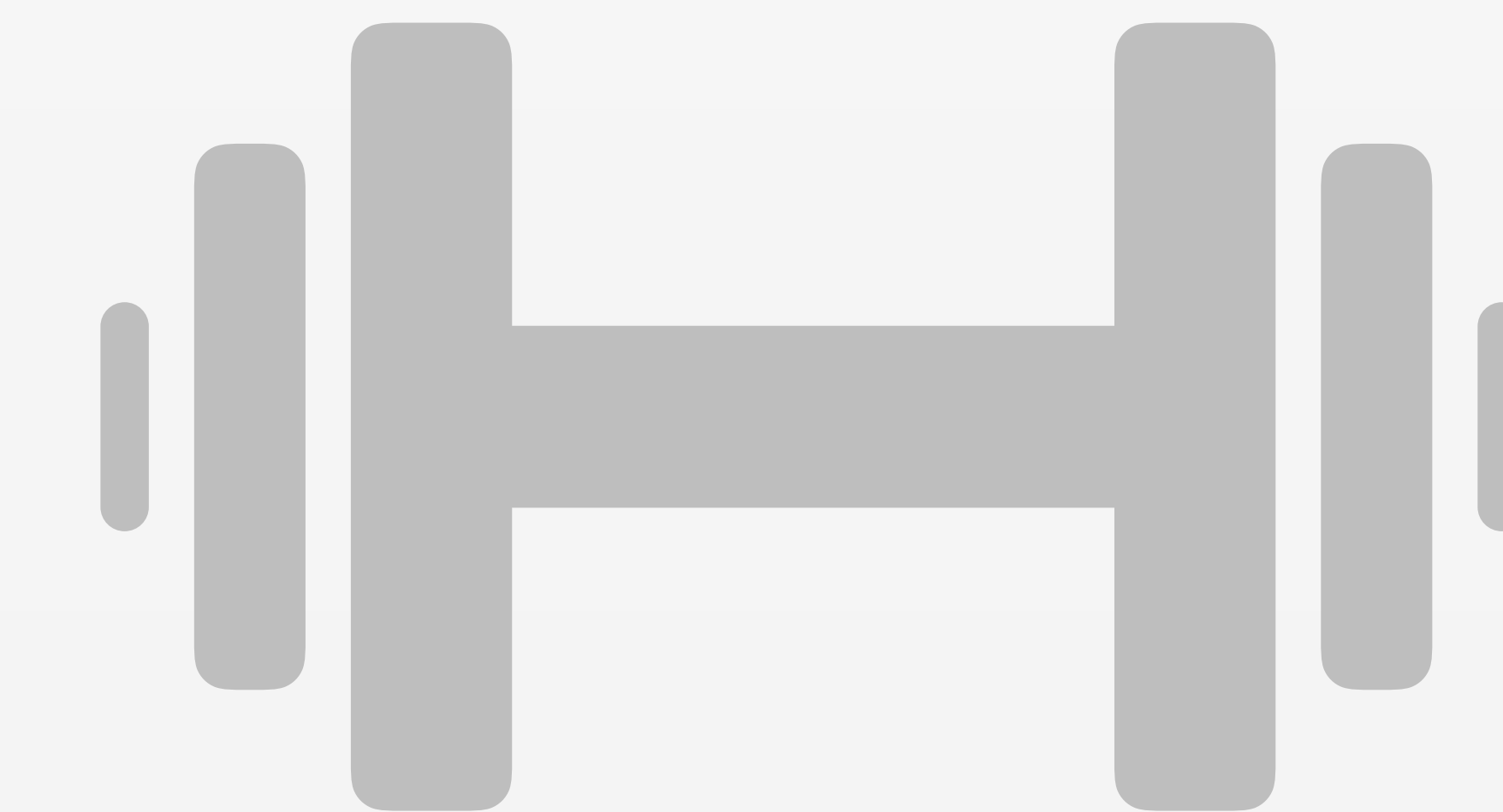
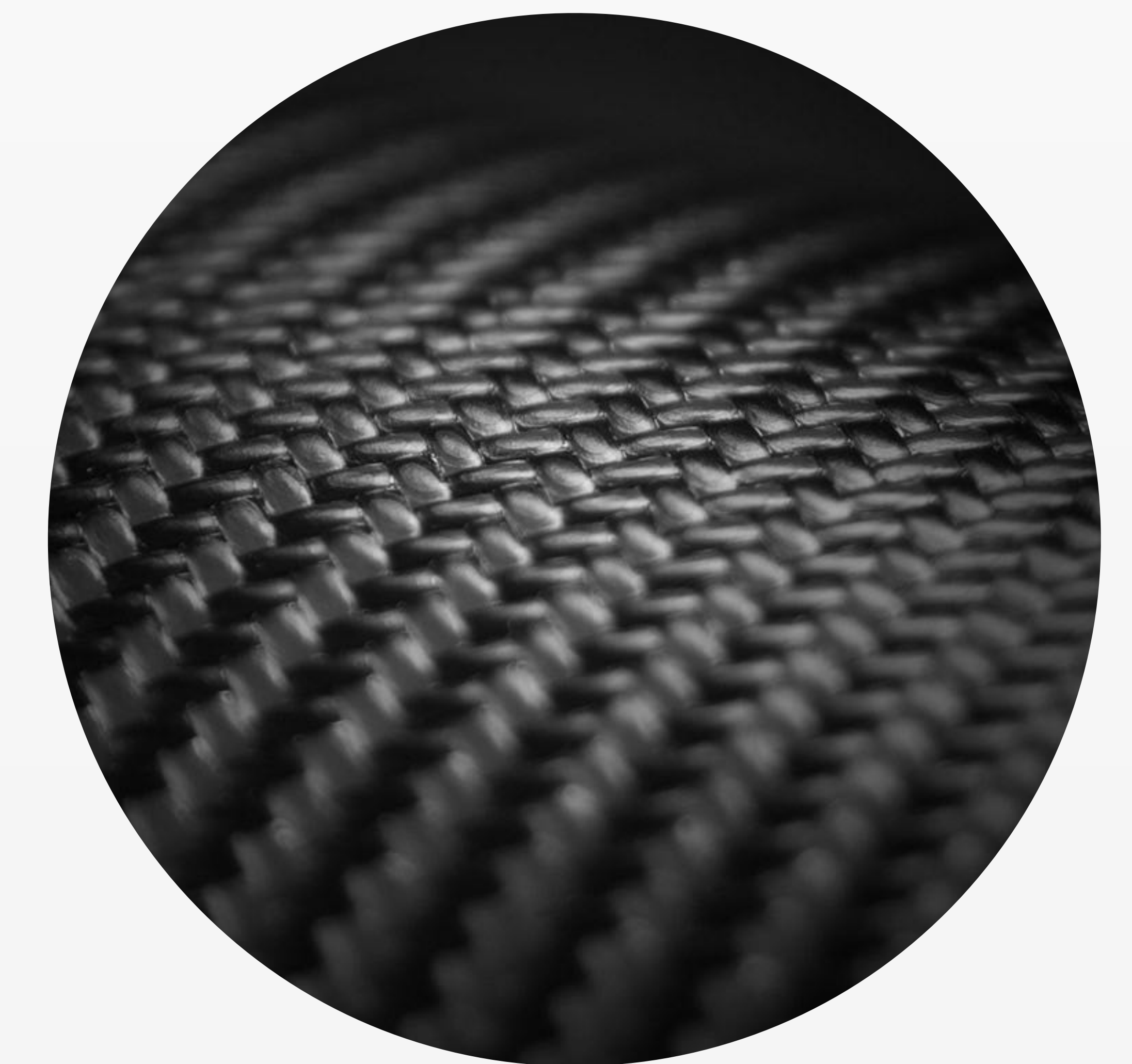
HOLLOW CORE

## CARBON CONSTRUCTION

Hollow construction helps reduce weight while composite shell retains strength.



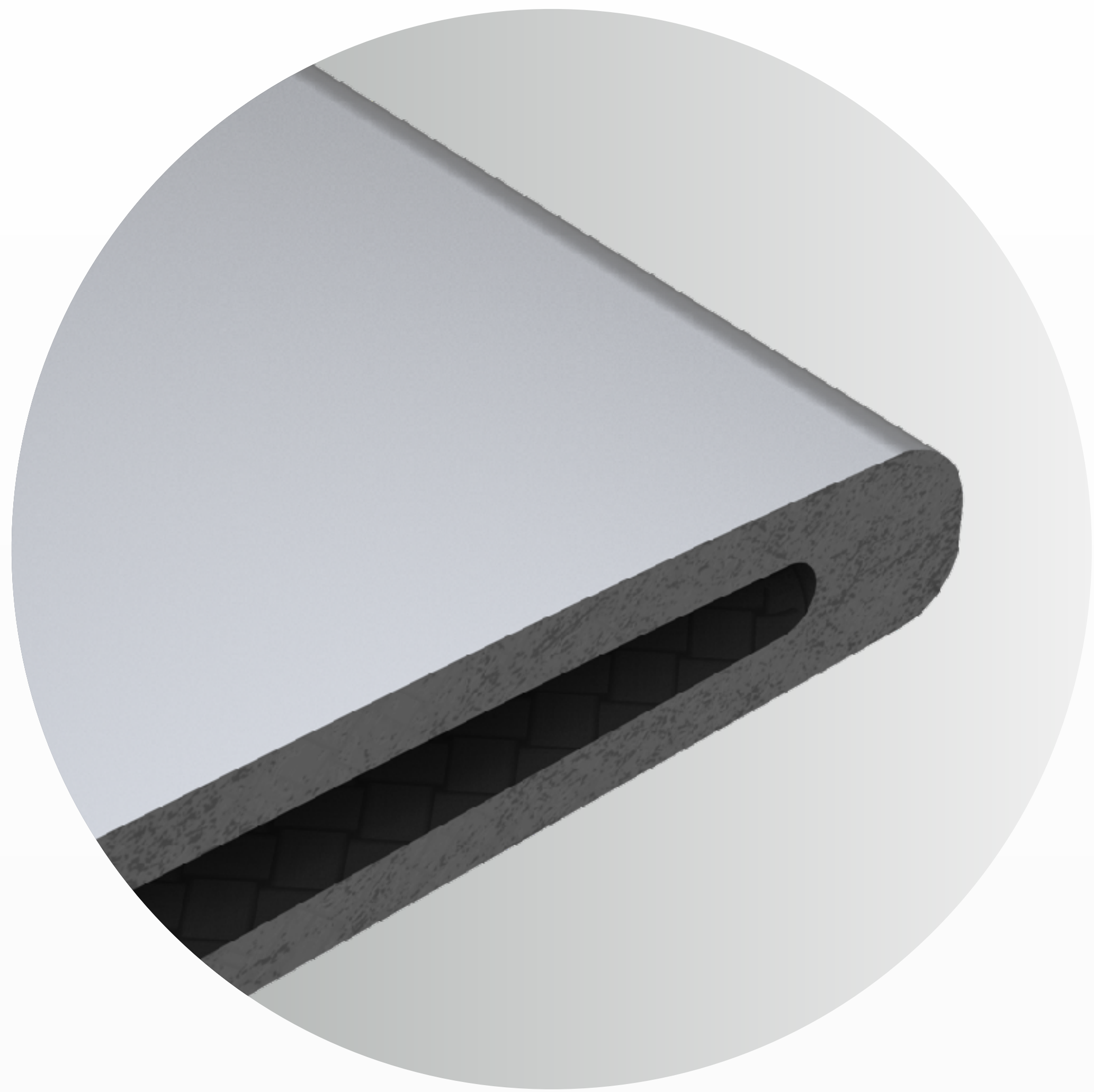
CARBON SHELL



SUPPORTS UP TO 300 LBS



STRONG



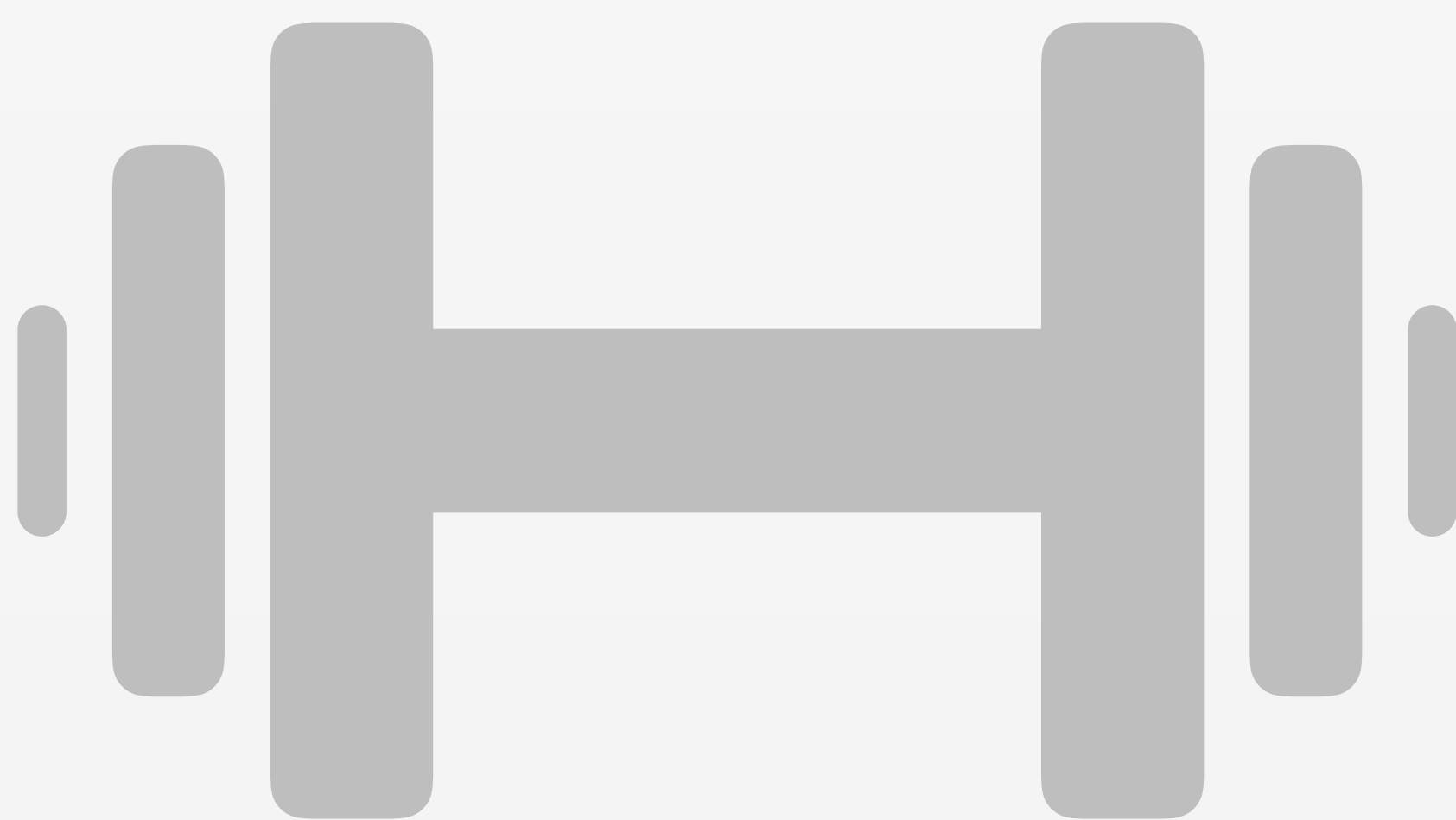
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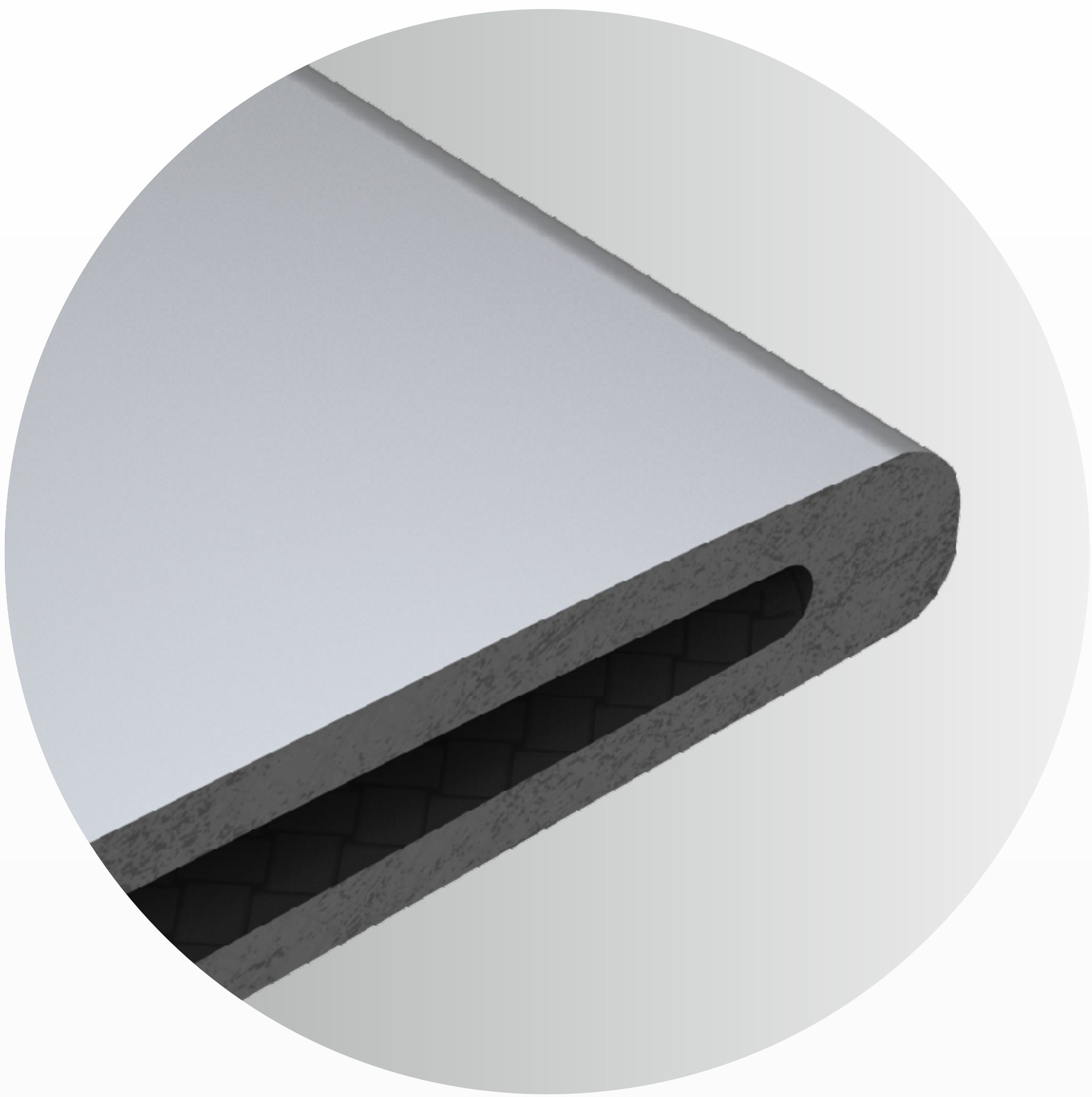
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SUPPORTS UP TO 300 LBS



STRONG

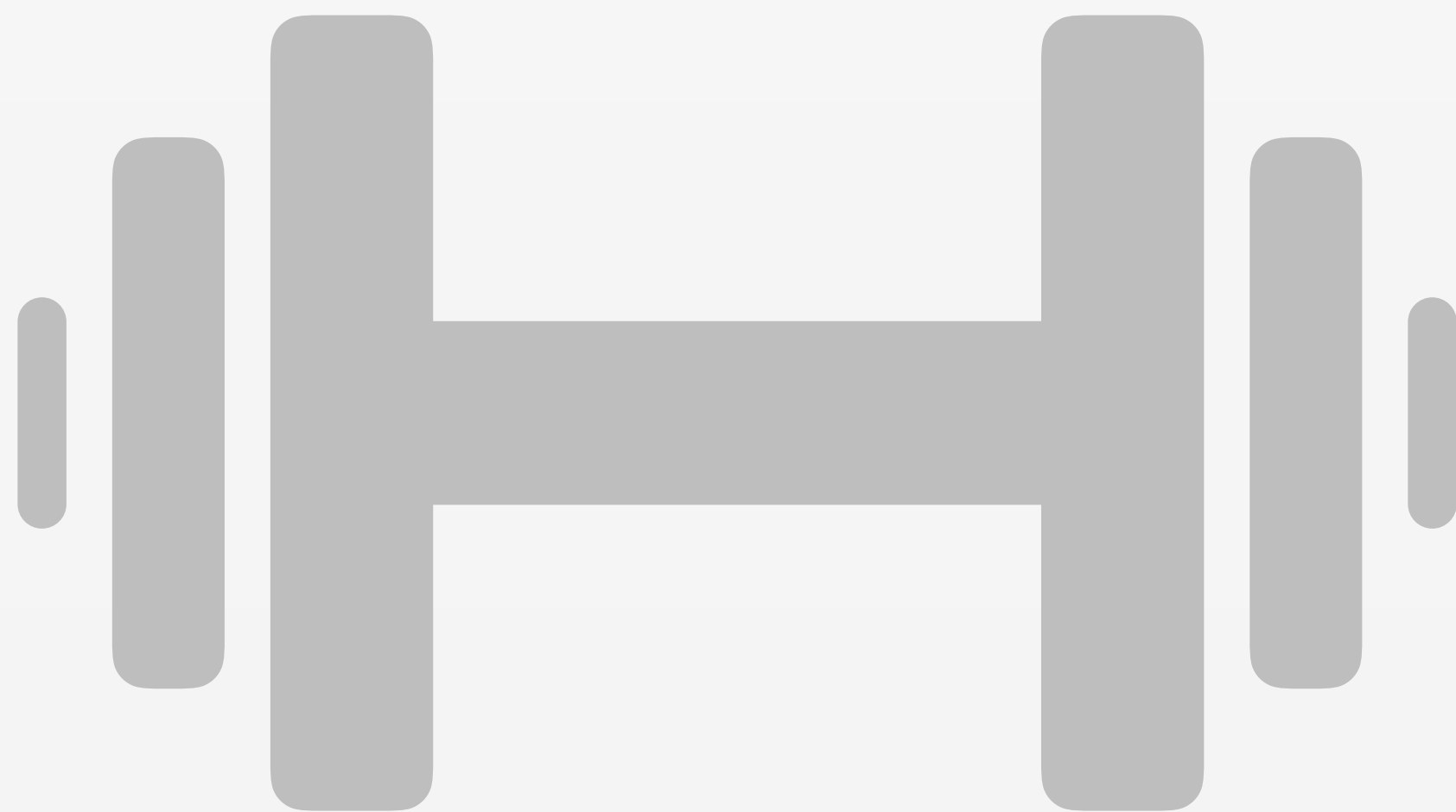
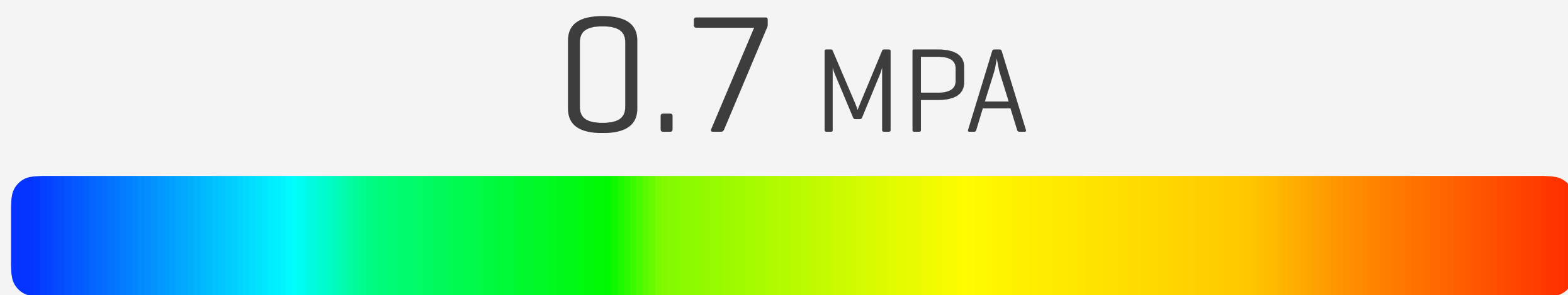


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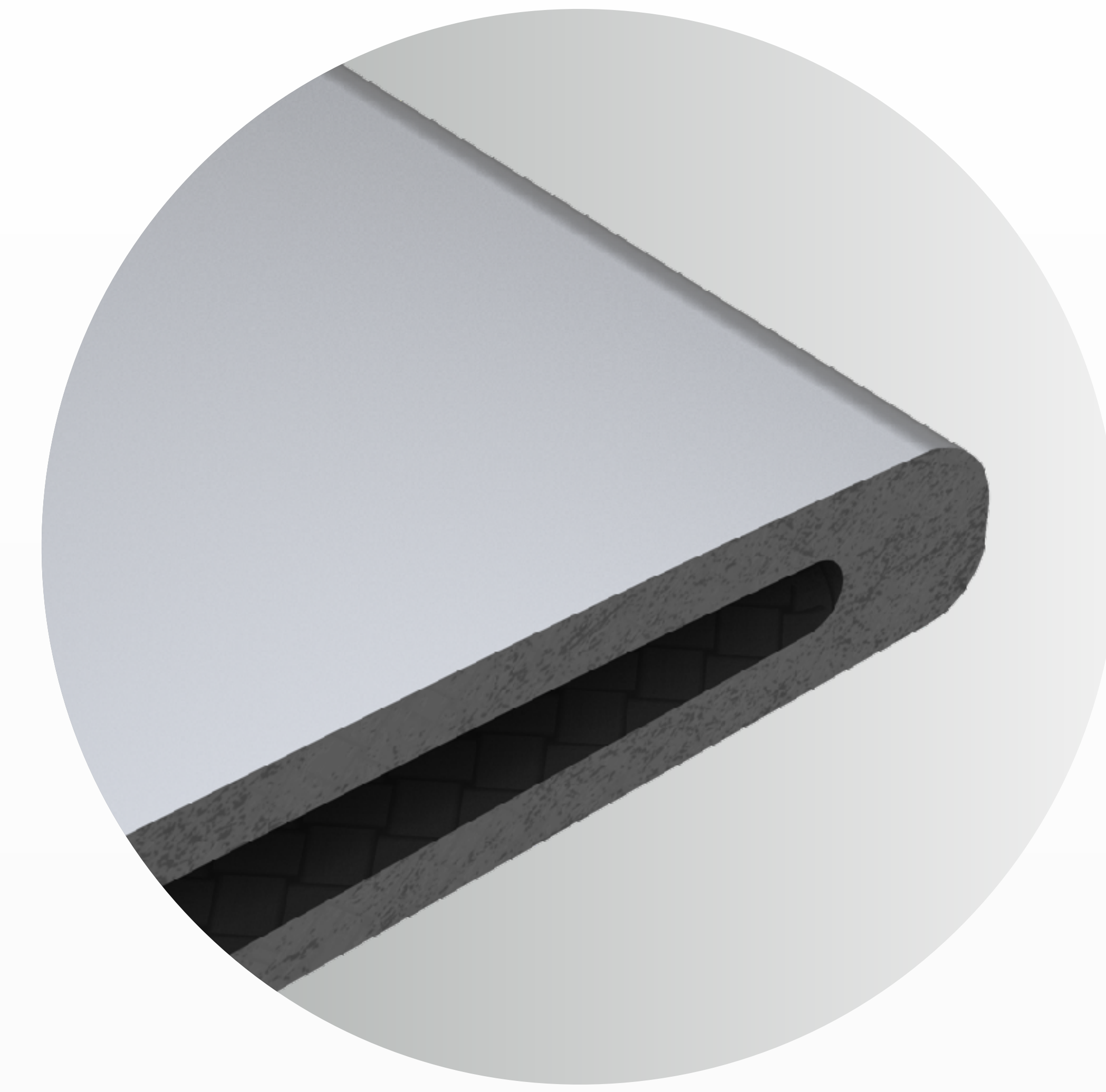
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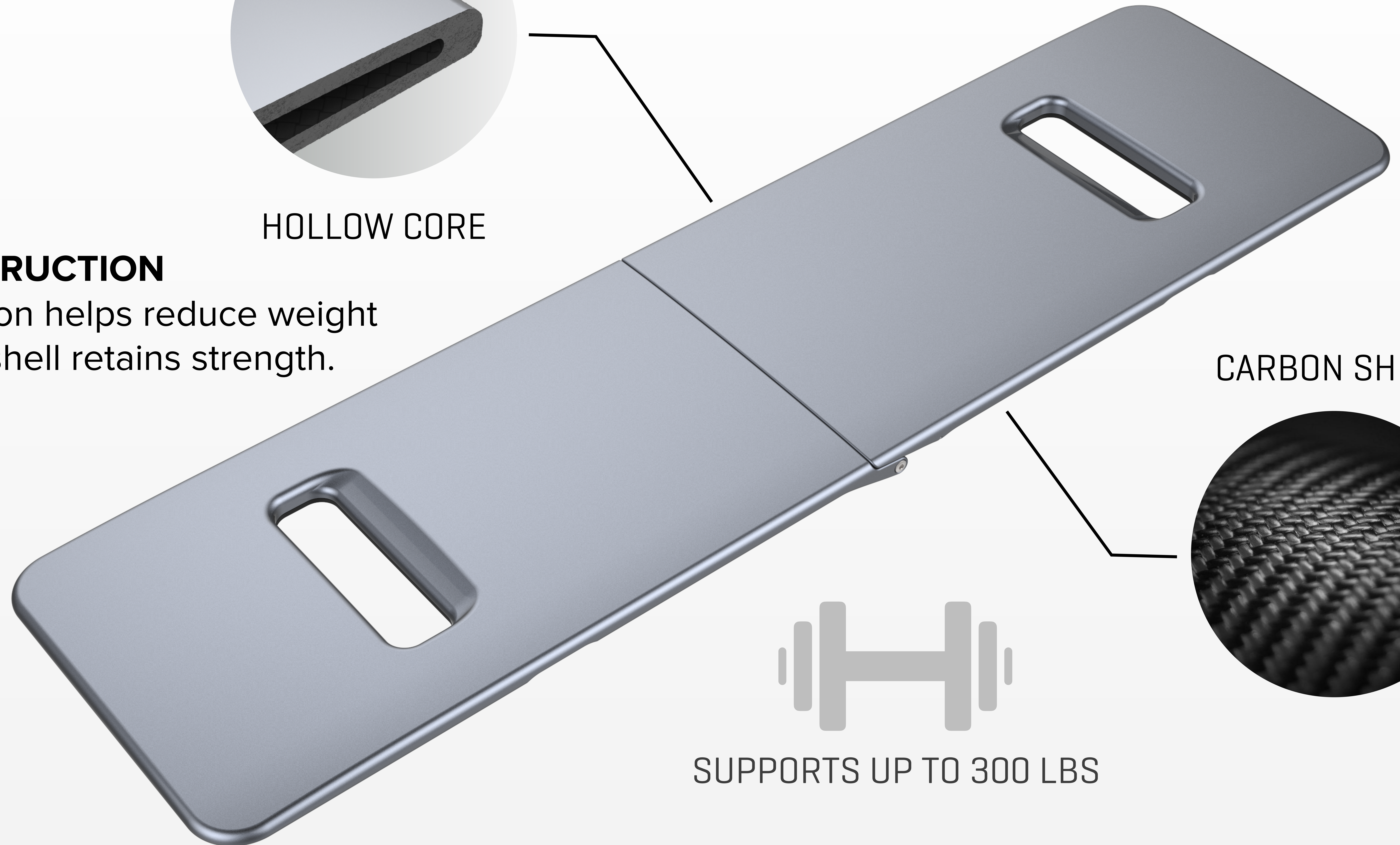
STRONG



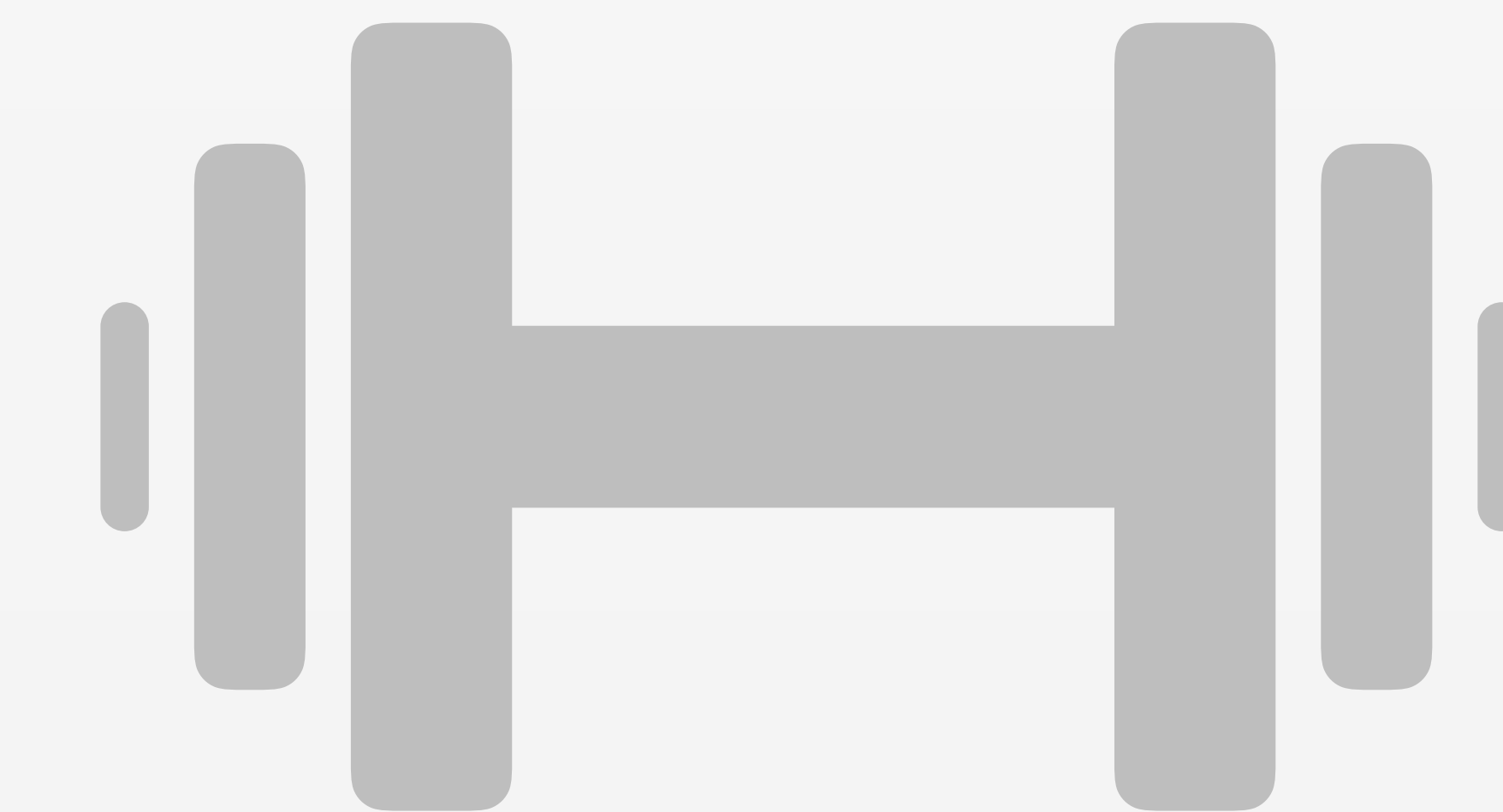
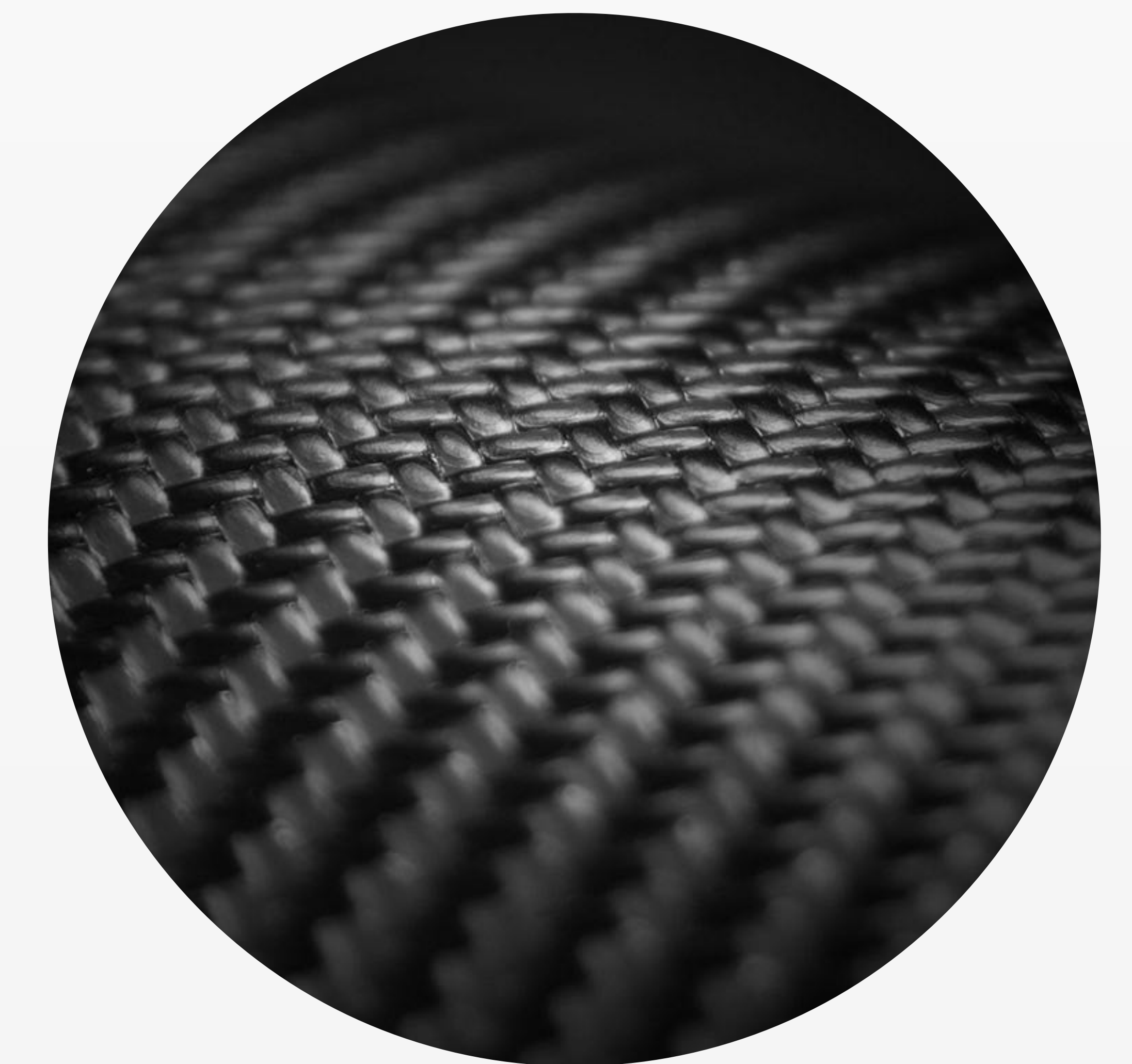
HOLLOW CORE

## CARBON CONSTRUCTION

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CARBON SHELL



SUPPORTS UP TO 300 LBS



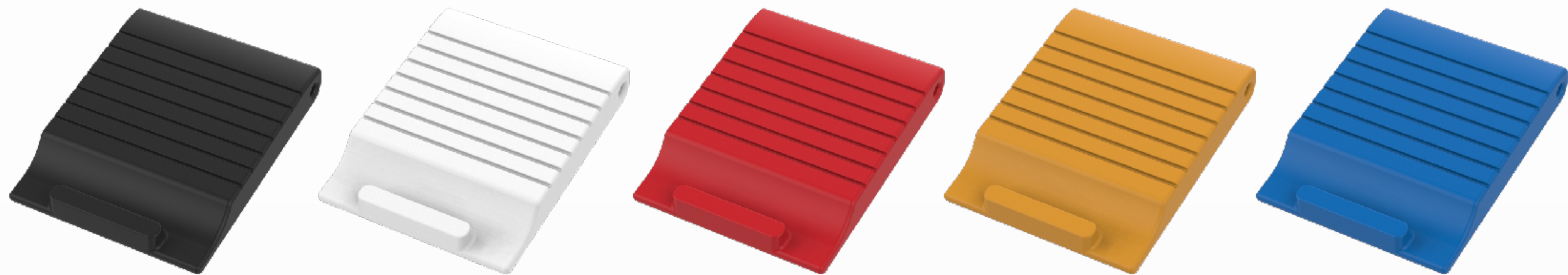
FULLY CUSTOMIZABLE



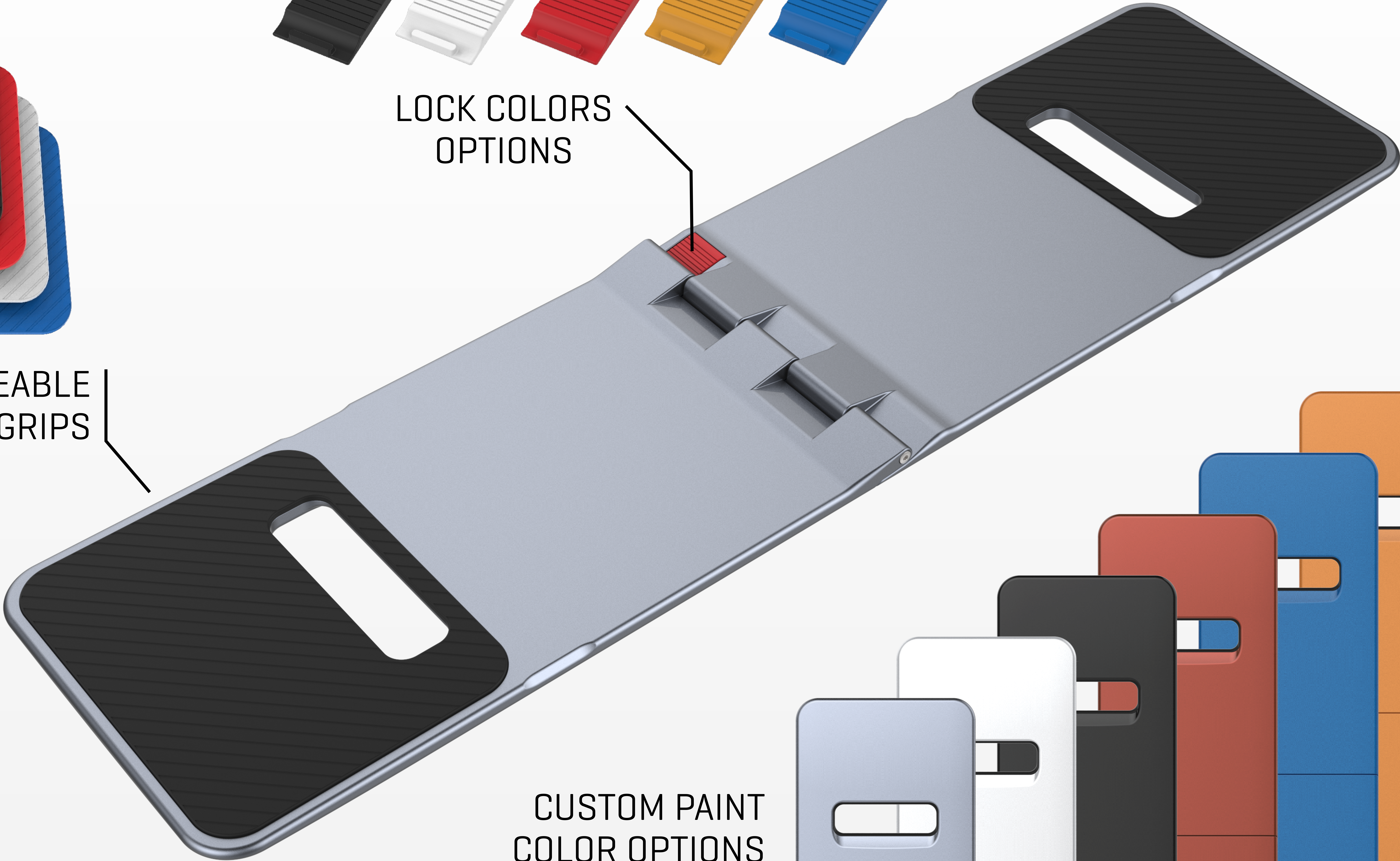
MODULAR, REPLACEABLE  
HIGH TRACTION GRIPS



SCREW COLOR  
OPTIONS



LOCK COLORS  
OPTIONS



CUSTOM PAINT  
COLOR OPTIONS





MARKET ANALYSIS



**DMI  
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BOARD**

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- + Lightweight
- Flimsy



**BRIGGS  
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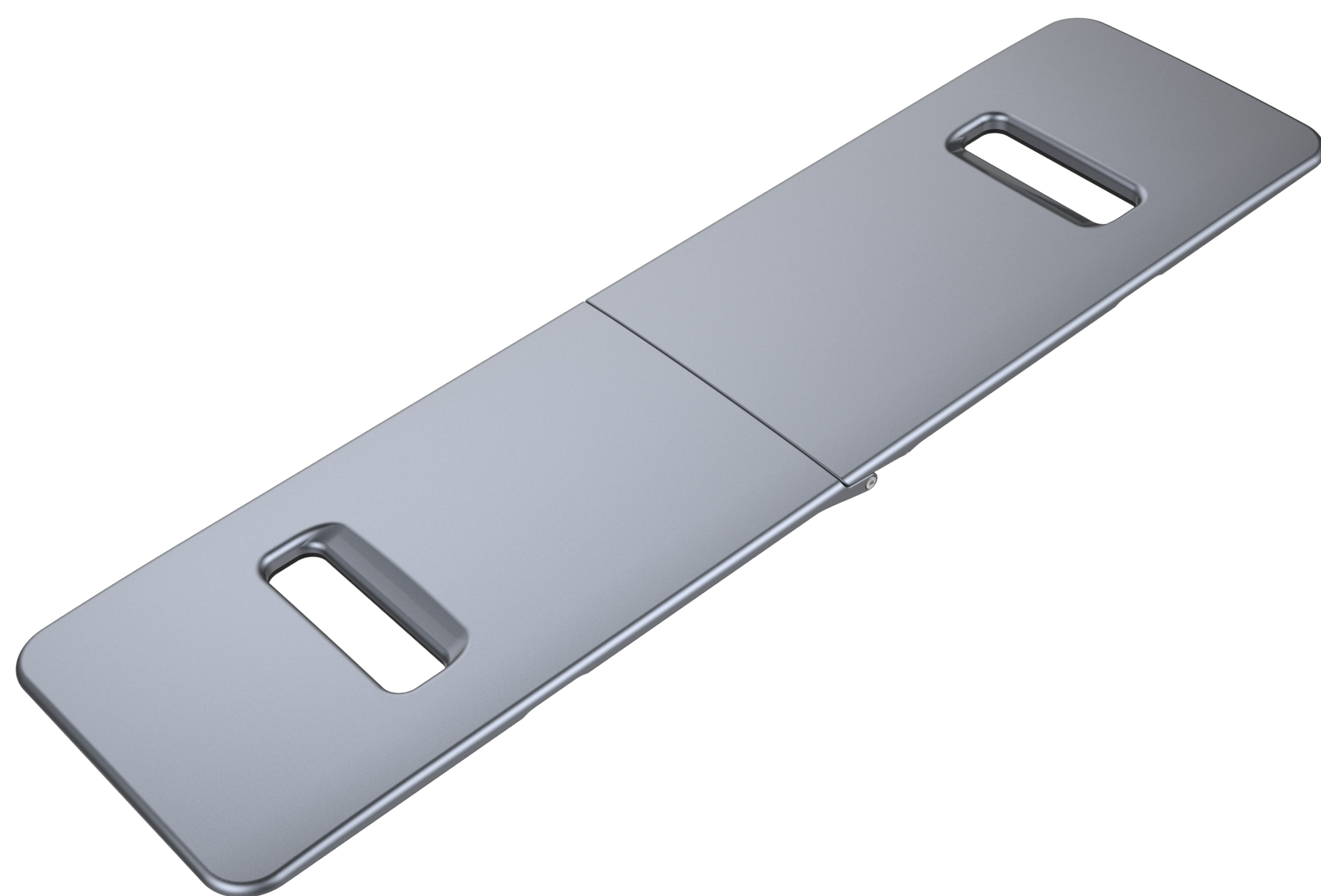
- + Sturdy & Strong
- Very Heavy



**ETAC  
TRANSFER  
BOARD**

\$110-130

- + Folding Back
- Prone to Pinching



**AXIS  
TRANSFER BOARD**

\$130-150

- + Folding Design, Light weight, Replaceable Grips & Custom Color Options



**BEASLEY  
TRANSFER  
BOARD**

\$220

- + Sliding Seat
- Prone to Pinching



BRANDING OPPORTUNITIES



New Orleans  
Saints



US Army



NIKE

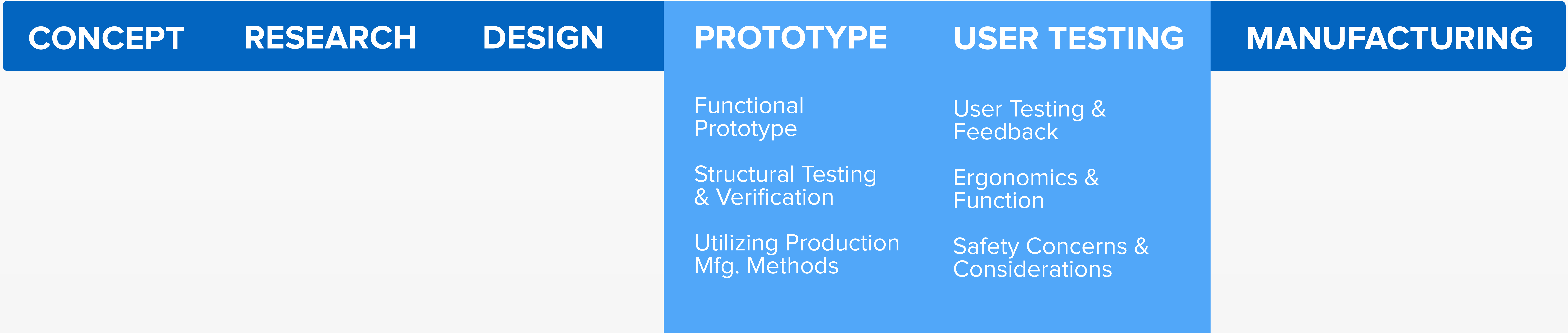


PROJECT TIMELINE





PROJECT TIMELINE





# AXIS

FOLDING WHEELCHAIR TRANSFER BOARD



OPENING UP NEW POSSIBILITIES  
IN INDEPENDENT TRANSFERS



MARY BOYAJIAN   ELLIOTT DAVIS   BOGDAN DIMITRIU   SHERRIE YANG



SPECIAL THANKS

**KEN PICKAR**  
*Caltech*

**JEFF HIGASHI**  
*ArtCenter College of Design*

**ANDY LIN**  
*Rancho Los Amigos National Rehabilitation Center*

**DENISE LAU, BOBBI TANBERG, MIKE & LUIS**  
*Rancho Los Amigos National Rehabilitation Center*



## SPECIAL THANKS



**RANCHO LOS AMIGOS**  
NATIONAL REHABILITATION CENTER

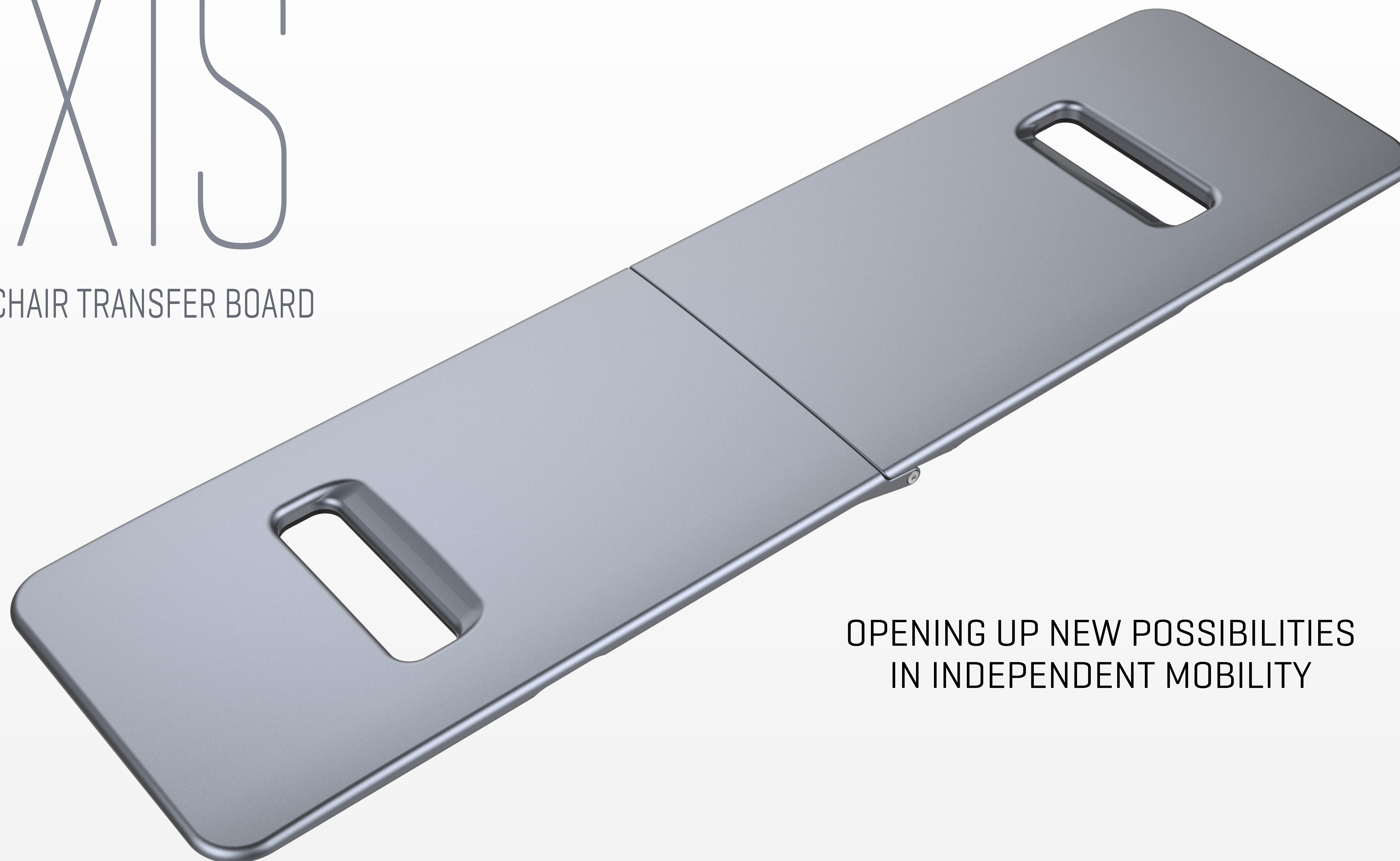
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**Caltech**  **ArtCenter**



# AXIS

FOLDING WHEELCHAIR TRANSFER BOARD



OPENING UP NEW POSSIBILITIES  
IN INDEPENDENT MOBILITY

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