

gear shift

gear shift

The Problem

Gear Shift exists in order to solve multiple problems that arise when cycle touring. These problems stem from **one issue**, having no way of separating your belongings from your bike.

This is inconvenient in several scenarios not least:

1. Using Public Transport
2. Facing obstacles such as stairs
3. Having no way of securing your belongings when away from bike.



Figure 1. shows an attempt at trying to remove and carry all of the goods from a packed touring bike.

As well as being as being precarious this is also not sustainable for any length of time



User Scenario:

Cycle tourist needs to leave bike to go to shops. They lock up their bike, decide what “valuables” are most important to them and coalesce this into a bag they can carry. The bicycle tourist then rushes through the process of going to the shops whilst trying to maintain eye contact with their belongings the whole time.

In no other context would it be deemed reasonable to leave your belongings unsecured away from your person. As these belongings are instrumental to the users holiday plans, potentially being their only bed for the next 2 weeks, there is extra importance placed on these items beyond their financial value.

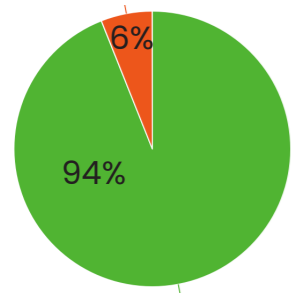
Other than just moments of anxiety when running essential errands this can also come to dictate what experiences the cycle tourist feels they can comfortably engage in.

This is the problem this project intends to solve.

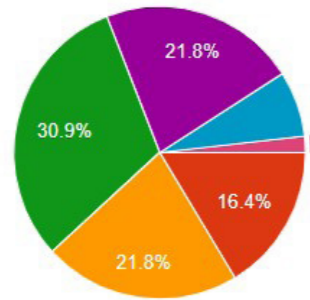
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Research & Product Overview

Key Survey Results:



worried when leaving bike and belongings unattended for any length of time

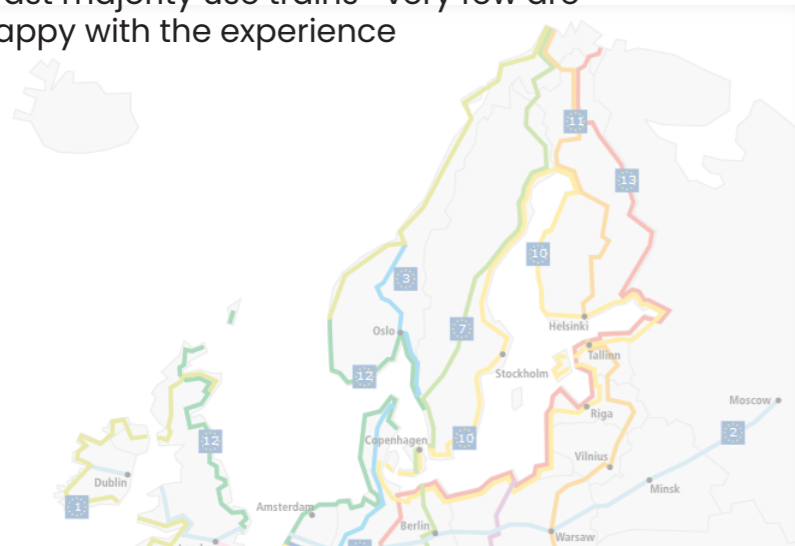


69.1% **under 20kg**

20kg was taken as the limit for comfortable carrying

- <5kg
- 5-10kg
- 10-15kg
- 15-20kg
- 20-25kg
- 25-30kg
- 30+ kg

75.4% use public transport while touring
Vast majority use trains- very few are happy with the experience



The vast majority of cycle tours happens within western europe.

It is an active travel discipline which combines culture, activity and experience of natural beauty



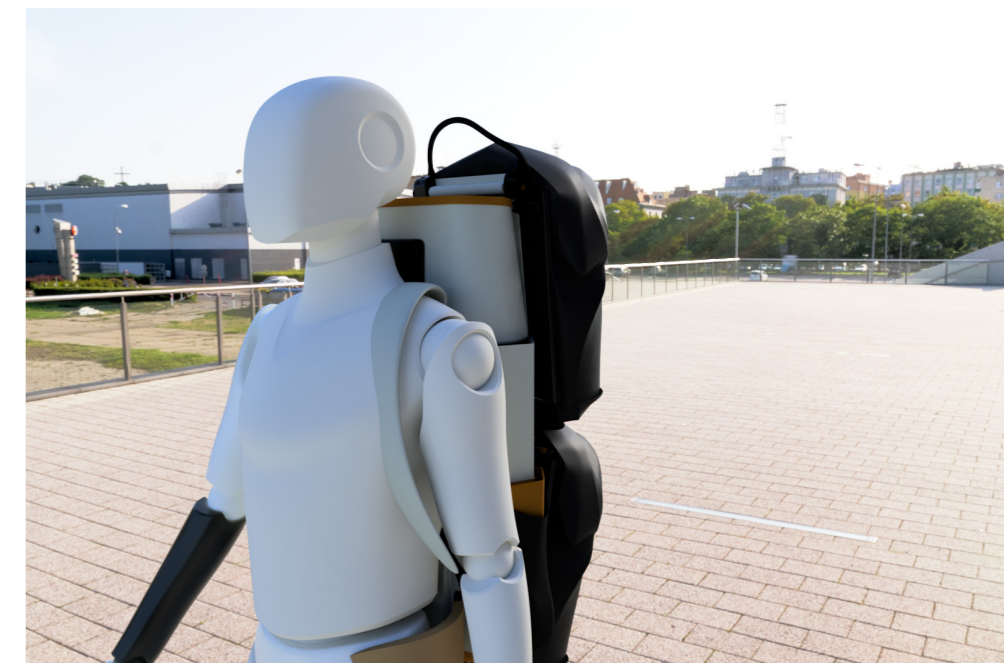
Cycle tourism is worth more than 2/3rd of the EU's bicycle industry.

The solution proposed to the problems outlined is a set of 4 bags which combine together to form a functional comfortable rucksack.

The system has a combined packed storage of **60L** with secure pockets for excess items. This is sufficient for the vast majority of medium to light weight tourers.

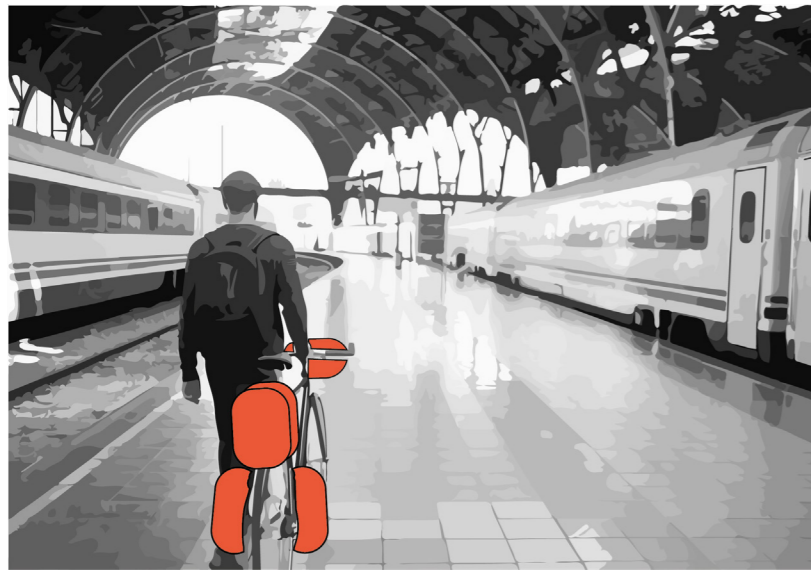


16kg of bike touring gear packed on bike and in 60L rucksack

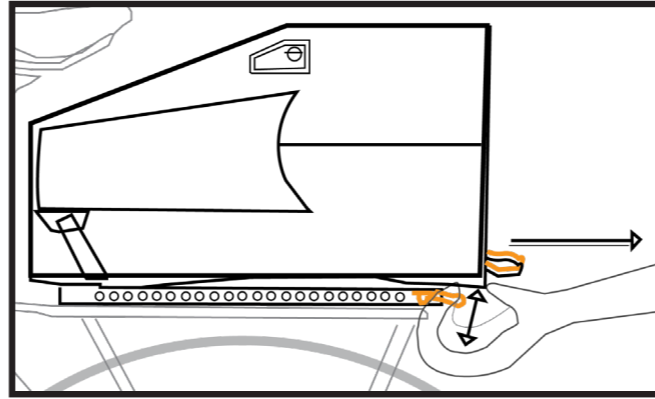


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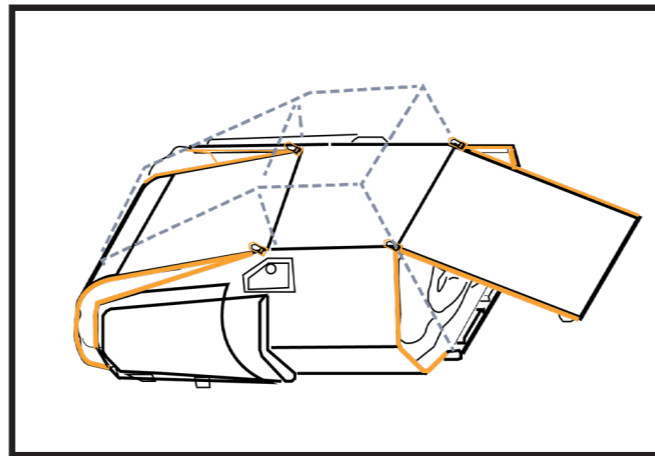
User Journey



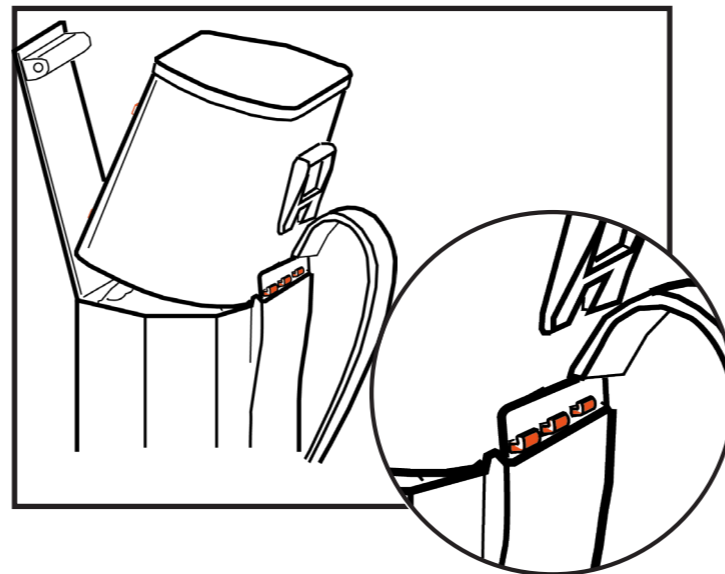
Remove RackBag from mounting plate



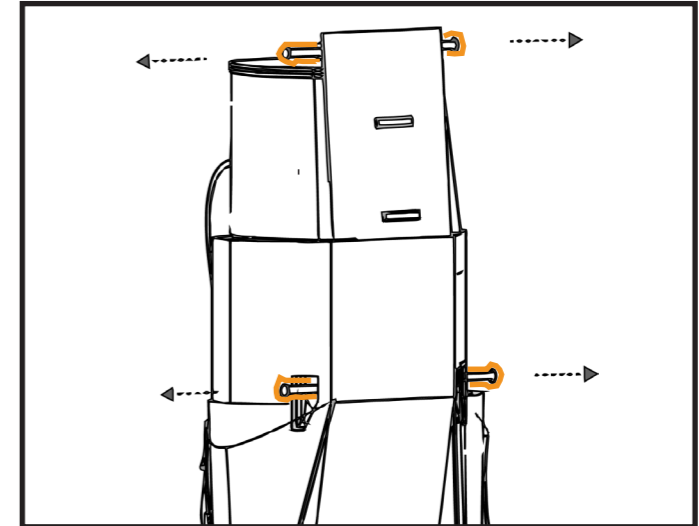
Unzip Rack Bag to change form



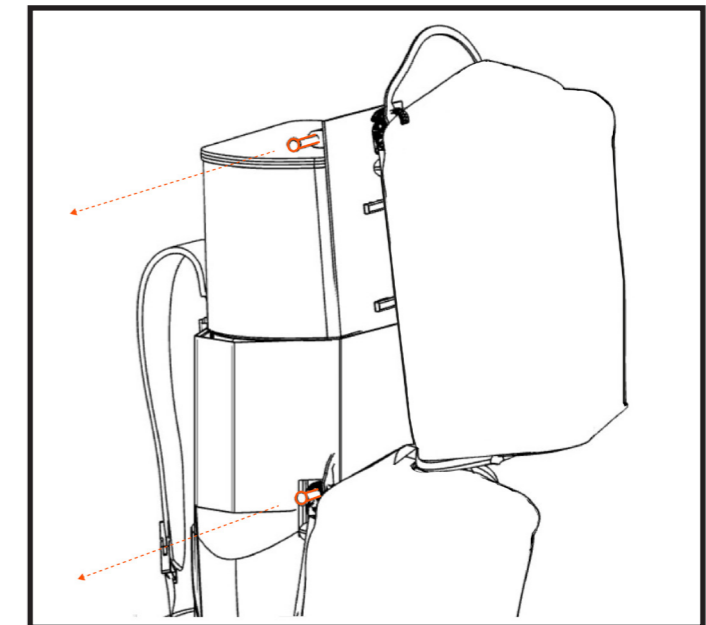
Remove Straps & Attach Front Bag via clasps



Pop-out pannier mounting bars

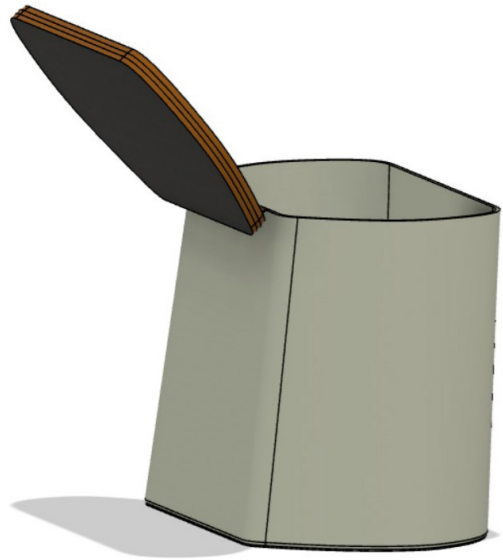


Mount Panniers to Bag



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On-Bike Spec. Pt1



Front bag:

The front bag accomodates 8L of storage.

The lid opens towards the front wheel of the bike to allow easy access whilst cycling and closed with an elasticated rubber seal to ensure waterproofing.

Attaches to the bike with a Universal KickFix handlebar mounting system which is detachable with the push of a button.



Panniers:

The system comes with 2 17L panniers. These panniers can be attached to the bike using either a rear or front rack.

The distance between the pannier clips is variable however the distance is required to be greater than 21cm for clipping onto the main bag when changing configuration.



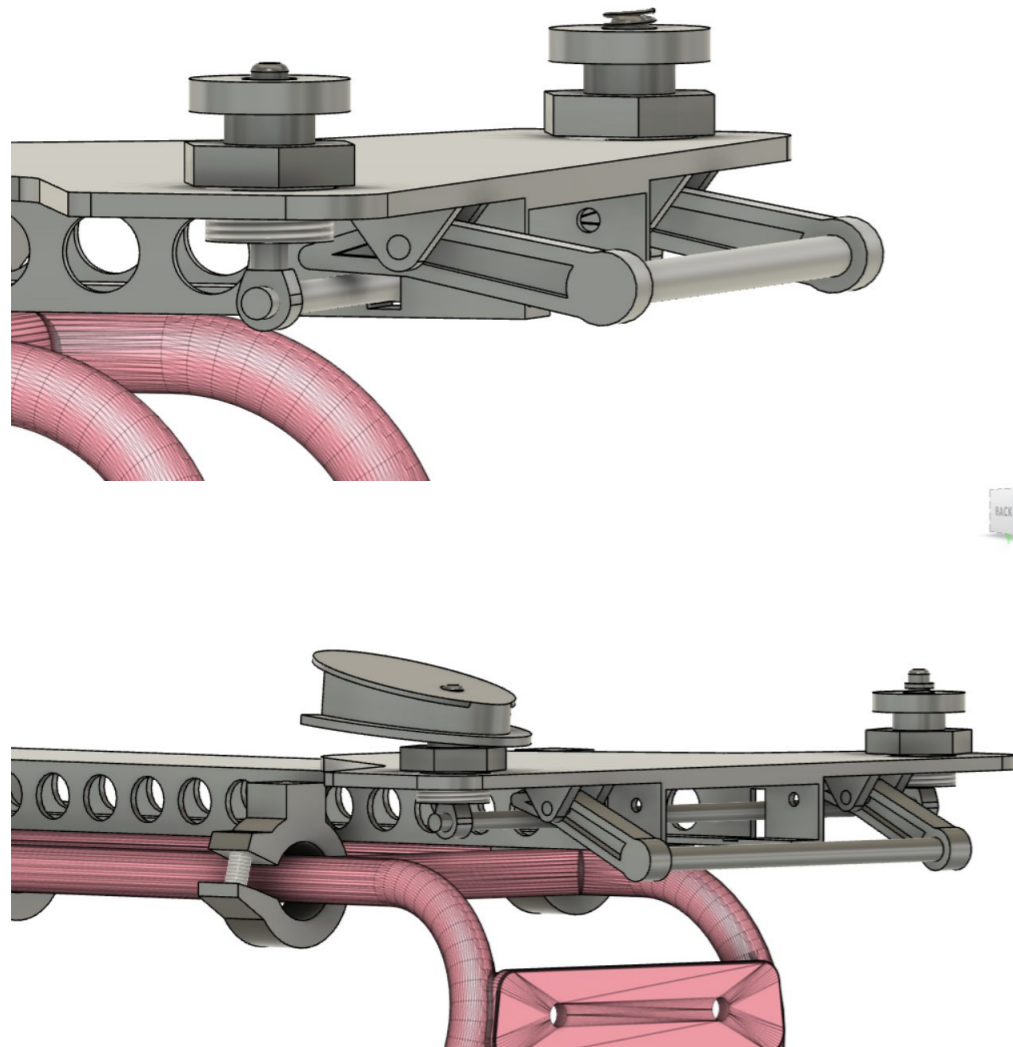
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On-Bike Spec. Pt2

Connecting Mechanism

The rack bag is attached and removed by way of lifting the release lever. This pulls down the pistons and allows the catch to slide out.

On the base of the rack bag there are 4 internal clasps with grooved channels which are pushed to lock in place, the lever then snaps up indicating that the bag is seated.

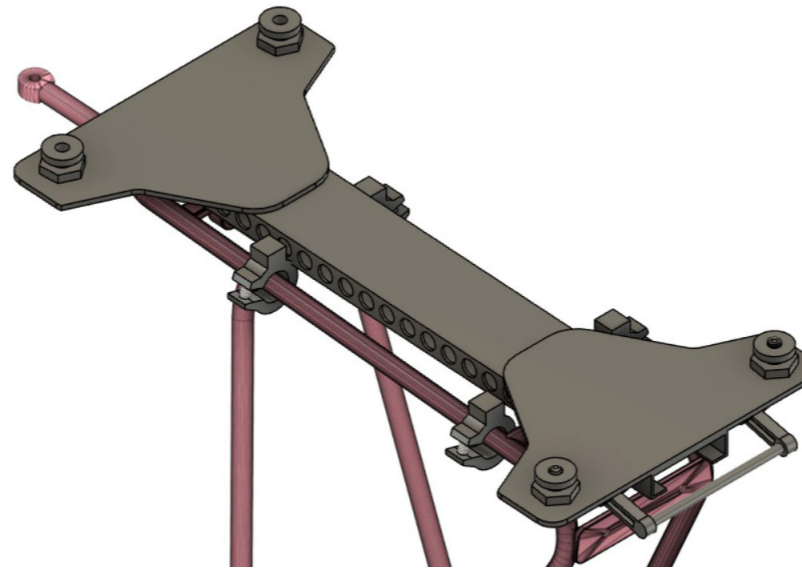


Rack Versatility

Mounting plate is designed to work with rack widths between 80-160mm.

Tubing Diameter range is 8-16mm

These sizes accommodate the vast majority of racks.



Rack Bag

18L bag of packed storage with large side pockets and straps for excess.

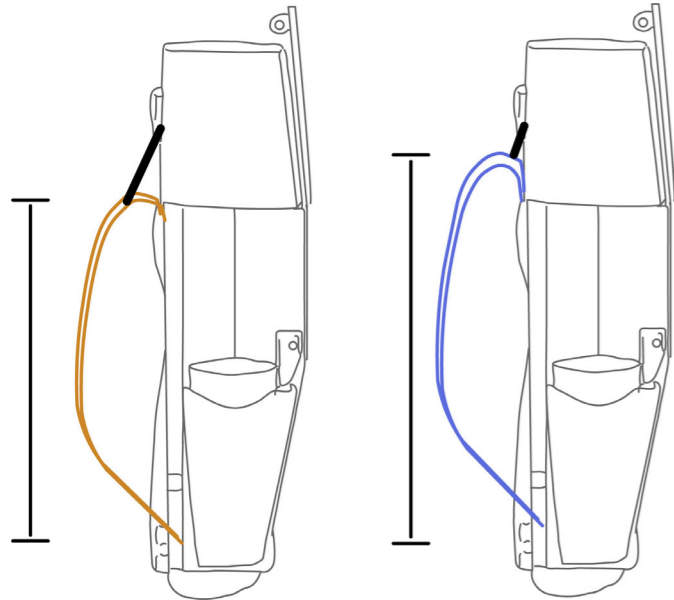
The hip straps for this design are stored within the orange pockets located on the side of the bag.

This creates a tapering form behind the rider which has been proven to provide cleaner airflow behind the bike when in motion reducing drag.

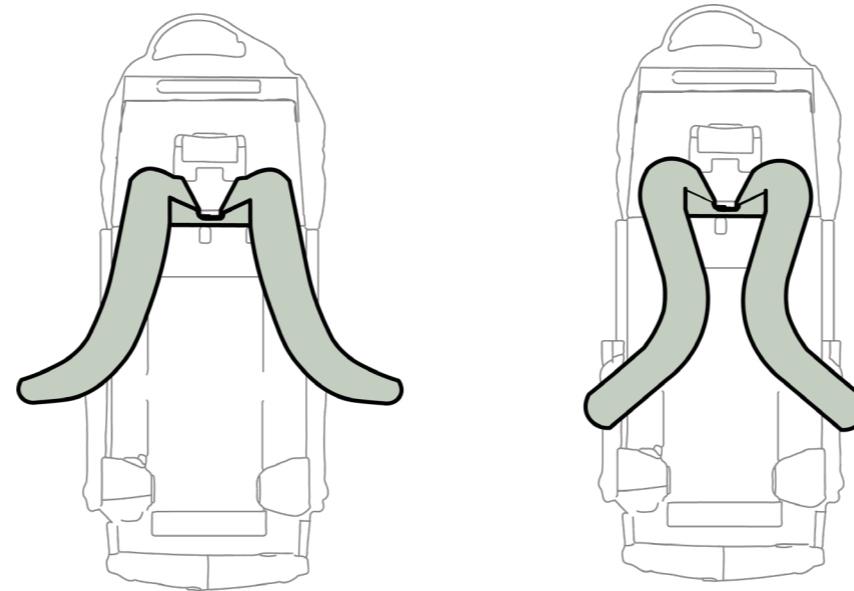


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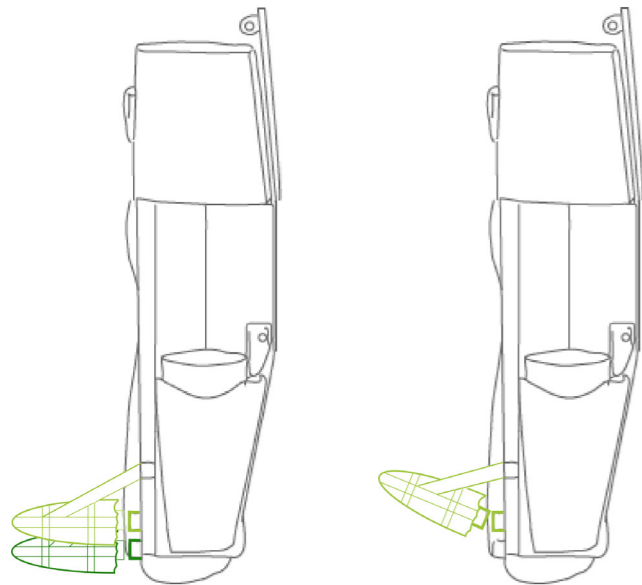
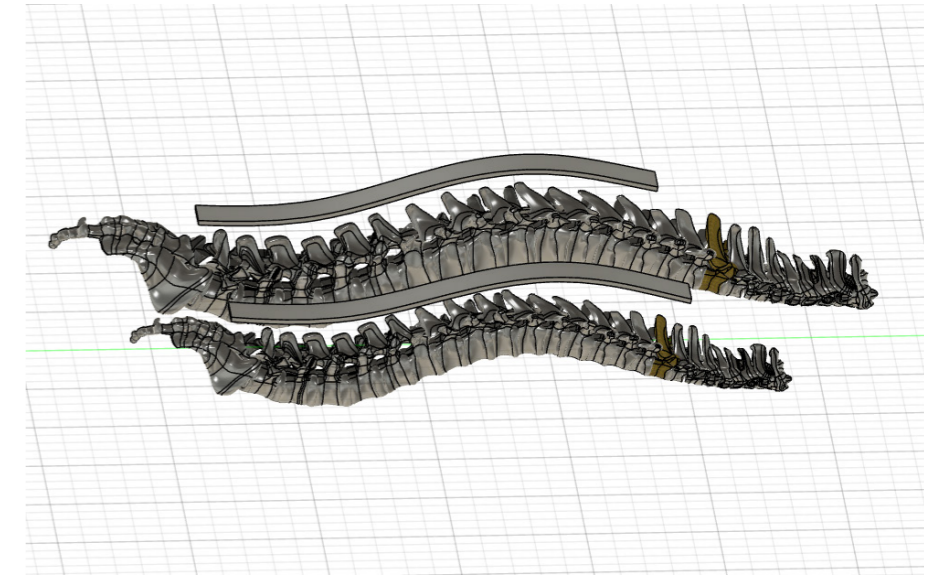
On-Back Spec.



The straps are attached to the front bag by an adjustable webbing length. This changes the effective back-length that the bag is able to comfortably accommodate.

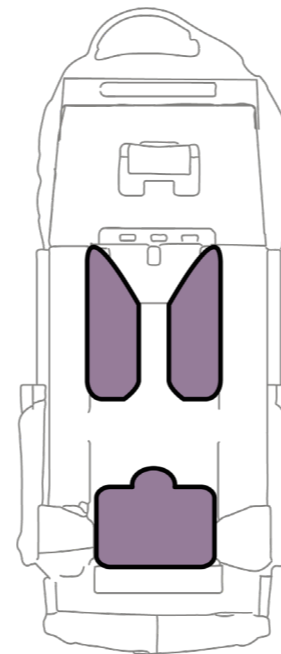


The straps of the product come in a J-variety and an S- variety to best accommodate both male and female body types respectively

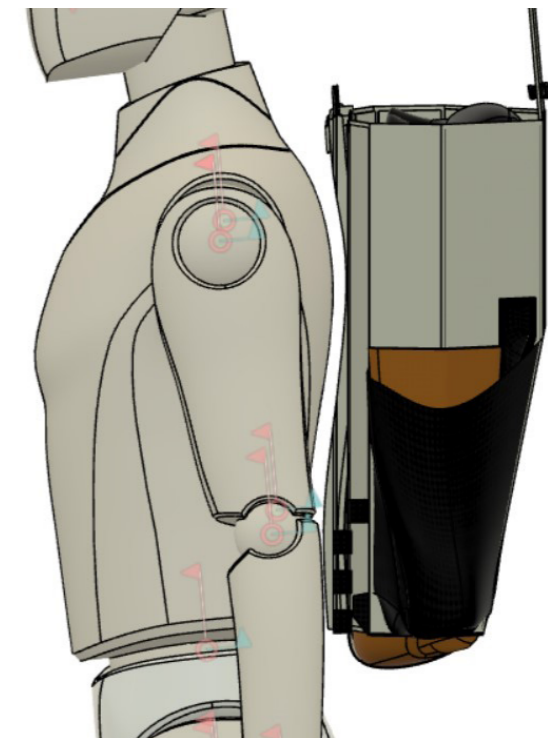


To facilitate ideal placement for the hip straps for different user sizes there are three webbing loops on the bag which the hip straps attach to via g-hook.

The tensioning strap is also used to adjust the angle of placement to accommodate different hip types



Thin padded sections were added to sections of the backplate, focusing on shoulderblade area and the base of the spine. Areas of high pressure identified previously during initial investigations and analysis.

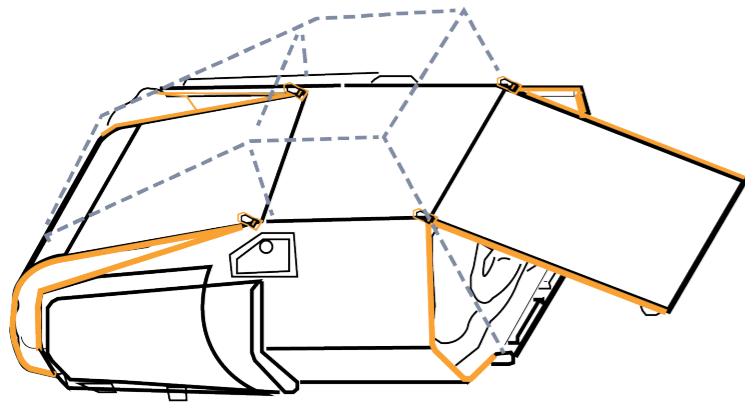


The curvature for the molded base plate of the rack bag was interpolated between spine models of a 95th percentile male and 5th percentile female, to provide the most optimal generalised fit.

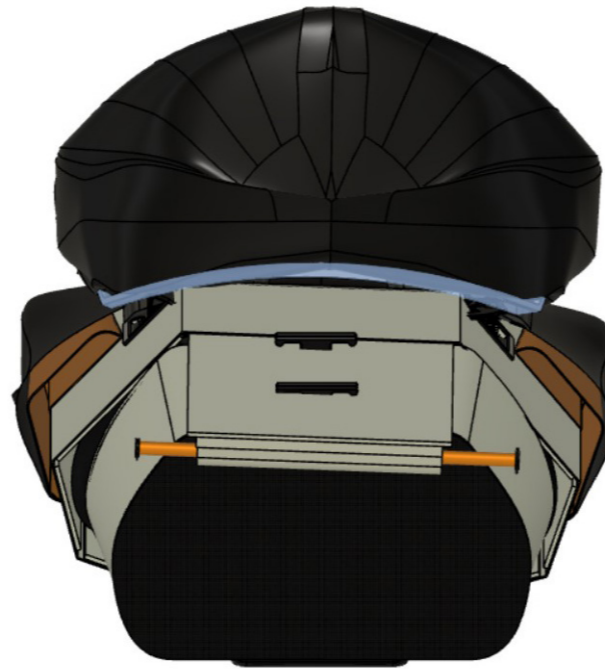
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On-Back Spec.

Using this configuration of having bags stacked on top of bag the primary comfort and ergonomic concern of this project was keeping the **centre of mass of the system as close to the body as possible.**

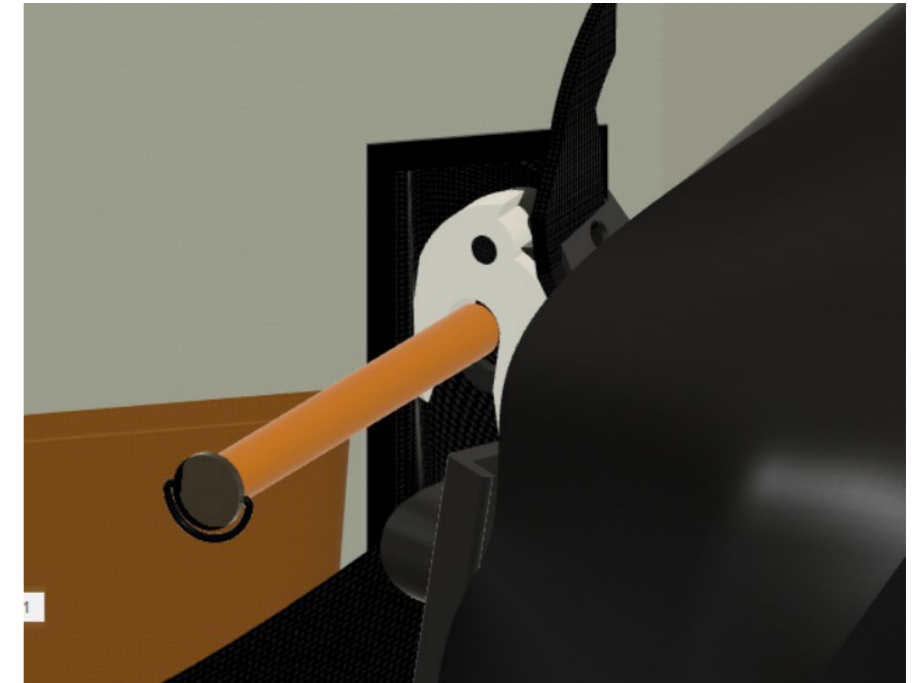


The compressibility of the rack bag from a 25cm height to a 17cm reduces this distance significantly.

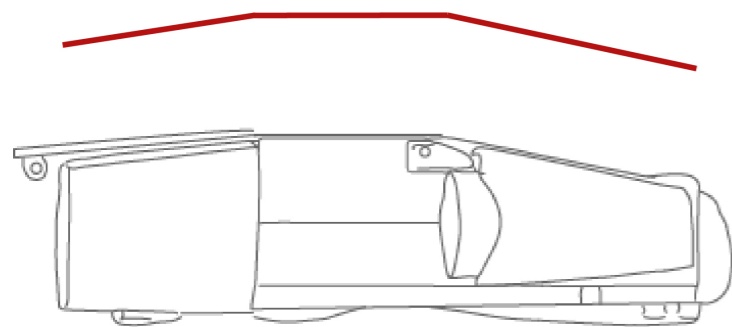


The profile of the pannier backplate is curved to allow the pannier to sit closer to the rackbag/ frontbag configuration.

This also helps to shift the centre of mass of the pannier closer towards the body of the user.

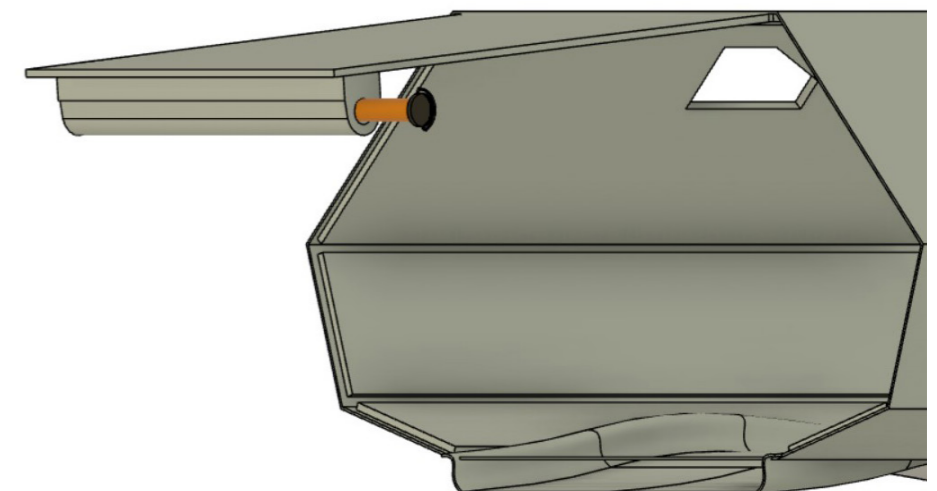


The offset between the panniers and the rest of the bag caused by the pannier clips was eliminated by allowing the pannier clips a sealed relief internally into the bag.



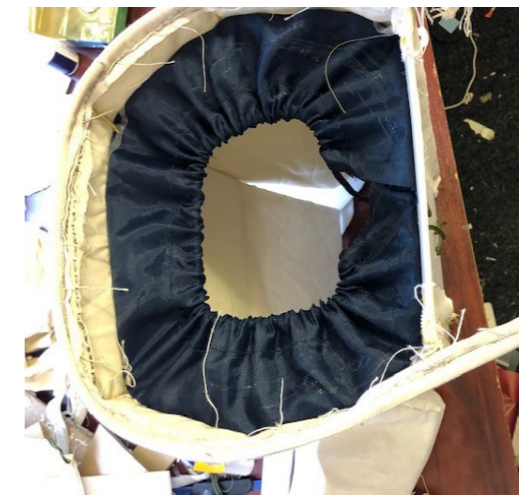
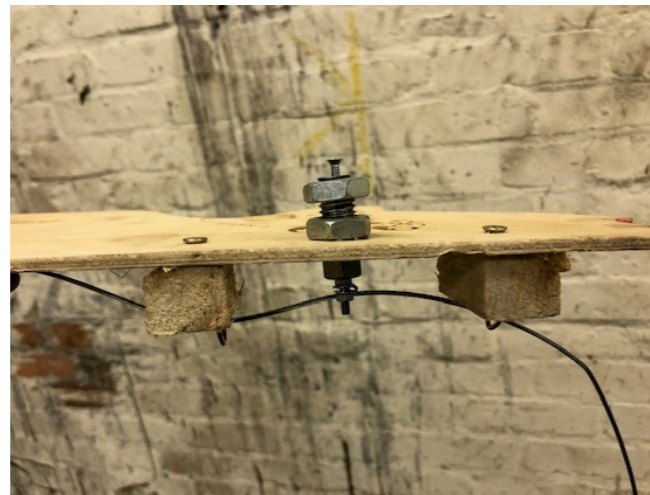
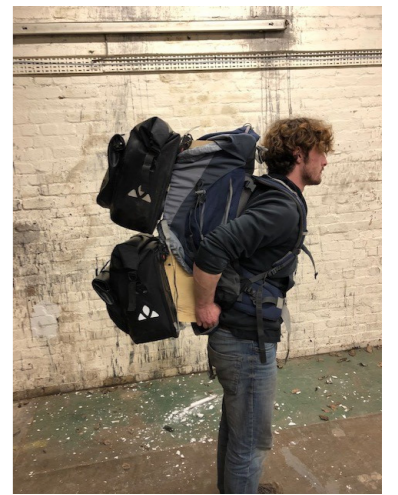
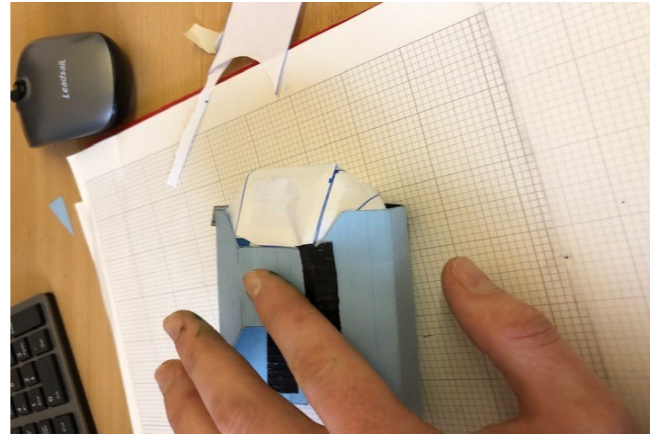
The profile of the combined shape puts the centre of mass of each of the panniers closer to the body than would be allowed if using a flat mounting profile

Offsetting the pannier mounting bar 2cm below the top surface of the Rack Bag works in conjunction with the curved baseplate of the pannier to again shift the mass of the system as close to the body as possible.



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Prototyping



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Prototype User Journey.

Using prototype materials the touchpoints required for the transition between bike form and bag form was mapped out and evaluated against an idealised time of two minutes with no greater than 15 touchpoints

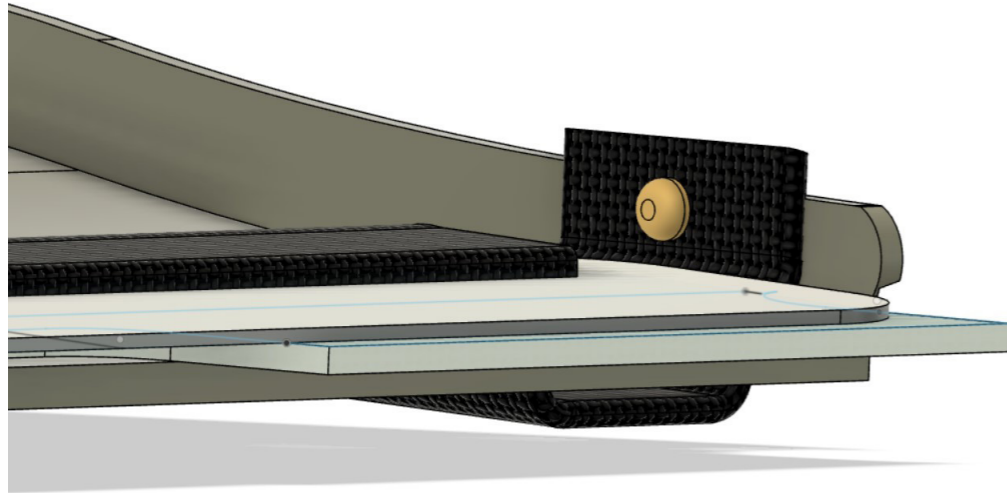
Although the materials used here were not the same as the ones used in the final solution, the final form factors were determined by these prototypes and the user experiences extracted from these interactions.

The detailing of these prototypes influenced the construction and manufacturing specifics proposed for commercial production.



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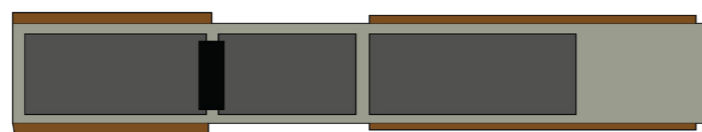
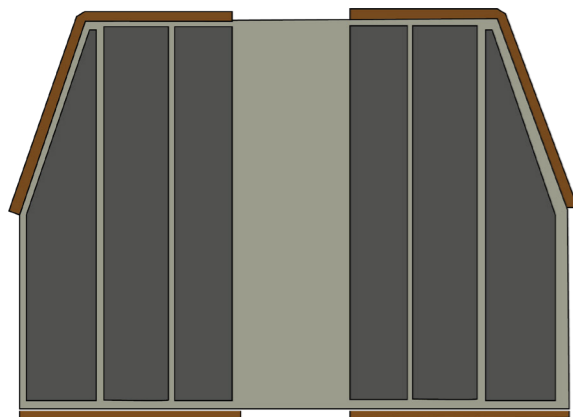
Construction



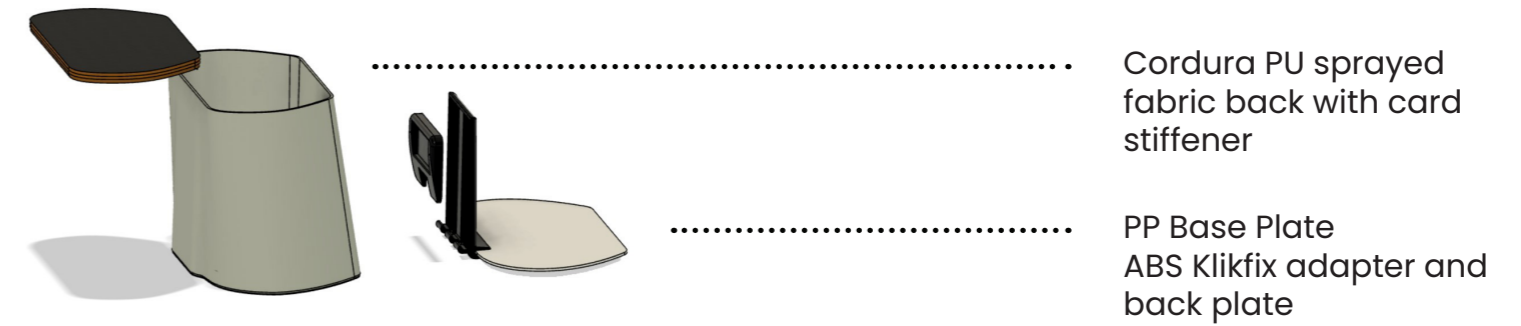
The top of Rackbag adjacent to the straps is the highest stress area of the bag and the stitches are re-inforced with brass riveting into the plastic base plate.

All other stitching is done with Bonded Nylon T70 thread.

Flat Pattern of Rack Bag

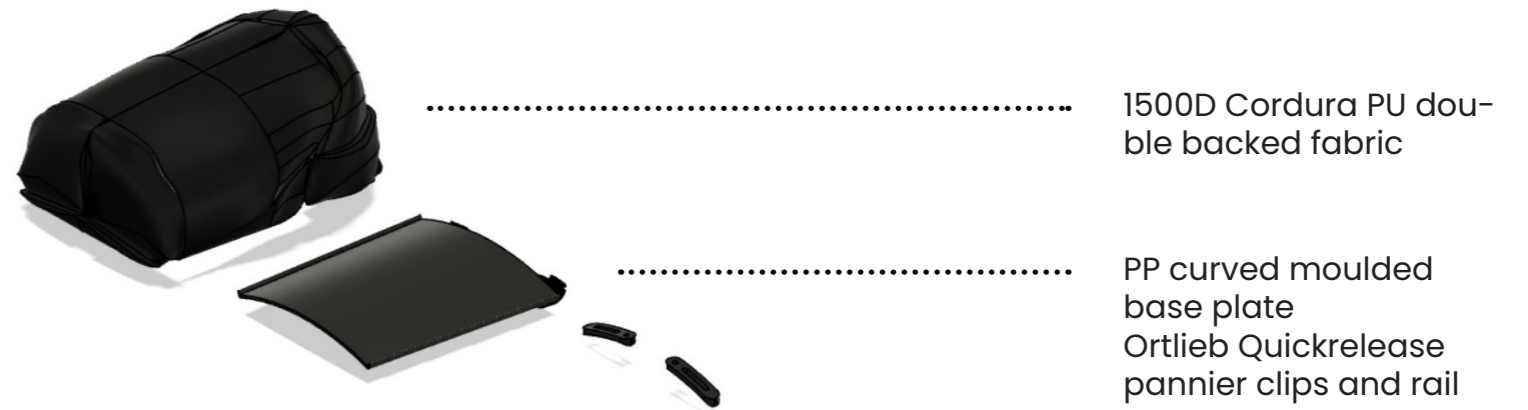


- Zips
- PP Panelling
- 1000D Cordura DWR
- 25mm Nylon Strapping



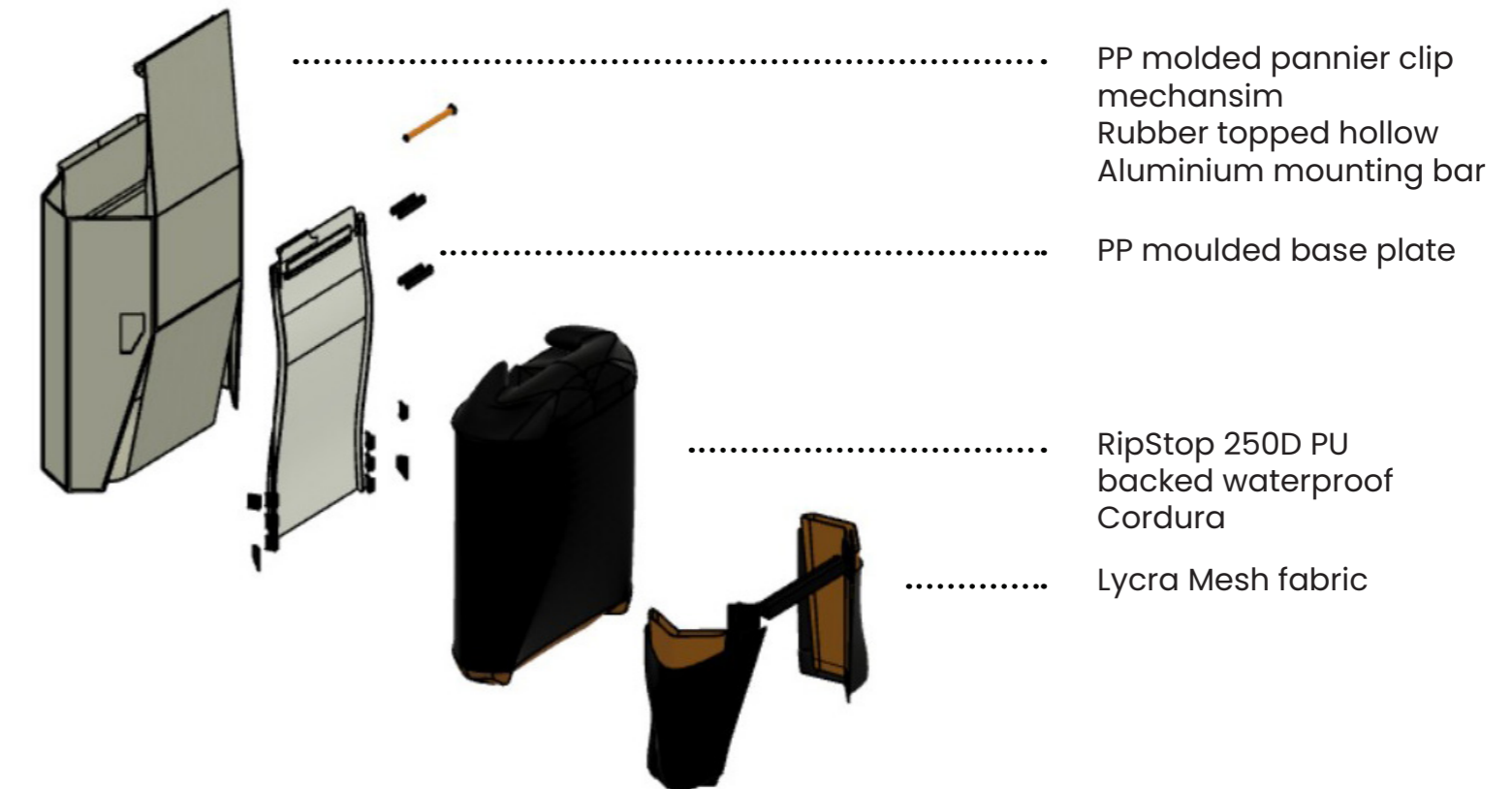
Cordura PU sprayed fabric back with card stiffener

PP Base Plate
ABS Klikfix adapter and back plate



1500D Cordura PU double backed fabric

PP curved moulded base plate
Ortlieb Quickrelease pannier clips and rail



PP molded pannier clip mechanism
Rubber topped hollow Aluminium mounting bar

PP moulded base plate

RipStop 250D PU backed waterproof Cordura

Lycra Mesh fabric