SDE Individual Design

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- **Product Analysis**
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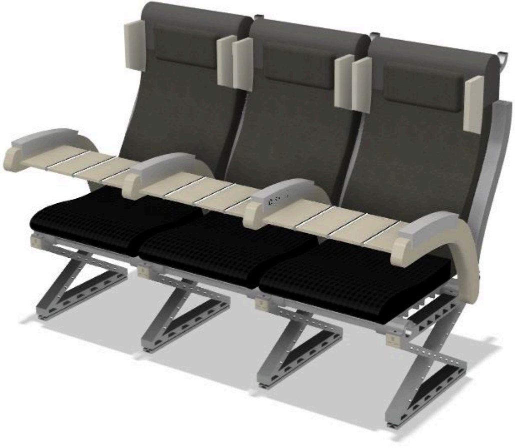
- **Appendix**



Yuxuan Zhou
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Product Definition

Context

Current **economy-class** seats aim to pass strict **safety** and **comfort** requirements by using **heavy frames**, **dense foams**, and complex **multi-material assemblies**. The extra mass **increases** fuel burn and the mixed materials make seats **harder to repair**, **upgrade**, or **recycle**. Airlines are also facing growing pressure to cut **emissions** and **cabin waste** without compromising passenger **comfort**, **safety**, or **durability**.

HMW reduce the **weight** of the seats by using different **materials, manufacture process** or different **designs** while keeping the identical level of **comfort and durability** to extend the **lifespan** and **reduce waste**?

User Research

- **Name**: Emma
- **Description**: An international student who flies long time journey twice a year.
- ‘My body feels really **sore** after a flight and I really want to have a good **sleep**.’ **Cares about Comfort**
- ‘The current Economy class is **affordable** for me and I **don’t** want to spend **extra money**.’

Insights from users

1. To ensure **business feasibility** and **consumer satisfaction**, sustainable seats must maintain the current standard of comfort otherwise it will be **rejected by the market**.
2. Improved neck and back support may result in a **premium product** that is currently **lacking**, which **if integrated** will make redesigned seats in **greater demand** thus resulting in greater sustainability impact.

Product Problem

- **Heavy structures**: Existing **frames an**
heavy.
- **Mixing Materials**: The seat **foams** and
different materials, making it **harder to**
- The seat size is too **thick** for space.
- Most of the **energy** of the seat is cons
(**>90%**), other energy like manufacturi
insignificant.
- There is a great amount of **waste** of m
manufacture

System Problem

- The **embedded electronics** like **radio**
the chair being replaced in a **high freq**
- The seats are difficult to **dissemble**, m
recycle.
- Aircraft and seats are retired in **region**
recycling for **metals** and **polymers** is
inconsistent.
- **Consumers** don’t care about sustaina
low profits.
- Airline companies seek for lowest cost

Design Variables

- End-Of-Life recycling Plan
- Design for easy disassembly
- Sustainability regulations

d arms used are very

cushions often **mix**
recycle.

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aking it hard to

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limited or

bility, there may be

, not sustainability.

- Seat width & thickness & armrest
- Seat tilting angle and space
- Different materials and manufacture processes for sustainability
- Cleaning and maintenance

Design Requirements & Co

Product Level

Geometry:

- Targeted seat **pitch** of **74–76 cm** to avoid **knees** touching the seat **in front**.
- Target seat **width** of **44–46 cm** per passenger.
- Target cushion **thickness** of **≥ 50 mm** per **seat**.
- Recline range of **20°** from upright.
- Pressure distribution: Mean interface pressure for **4–7 kPa** and local peaks for **< 9 kPa**

Structure & Durability:

- Seat mass per passenger place: **≤ 10 kg** per passenger
- Design life: **≥ 50,000–60,000** flight cycles
- Recyclable mass fraction: **≥ 70%** of seat mass
- Meet up with **ergonomic** designs and requirements
- Body supports like **neck** and **pillows** should be included to improve **user experience**
- Be as **modular** as possible for easier disassembly

Disassembly:

- Should be **easy** to **disassemble** in short period of time
- Can make the seat into **modular**
- Use **less screws** to save the time
- **Labels** for all parts of the seats
- Cushions should be removed **easily without using tools**
- There is **no permanent joints** between components

Accessories:

- The accessories should **enhance the convenience** for users
- The accessories should **satisfy** the entertainment **requirements** from users

nsiderations

System Level

Life-cycle & circularity:

- Core frame reuse rate: expected to be greater than **80%**
- Recycling: **>90%** of the seats can be recycled & **75%** of seat mass be recycled
- Reduce **CO2 emission**
- There should be a **system recovery plan** for defined EoL values and further recovery of the components.

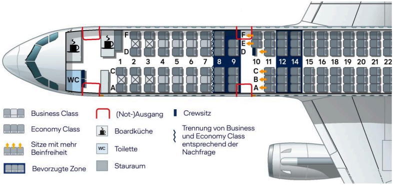
Business factors:

- The **cost** of **refurbishing or recycling** should be **low** to attract companies

Information:

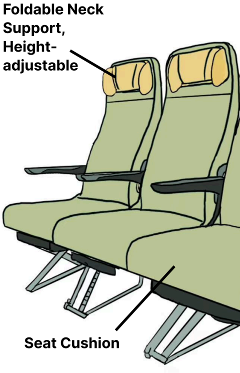
- A system of collection of all the **labels** of the parts for the seat for easier **sorting job**
- **Engineers** can know about all the **information** through the labels in **5 mins**.
- All the **labels** should include: **mass, materials, number of serviced flights and when to refurbish.**

Target Type of Plane



Target application: **high-density economy cabins** on **A320/A321** and **B737** families, optimised for **1–3 hour** short-haul missions. The product is design to be suitable for **low-cost carriers** and **hybrid airlines**, but it can also be used by legacy airlines on domestic which cares about **easy maintenance**.

Ideations of



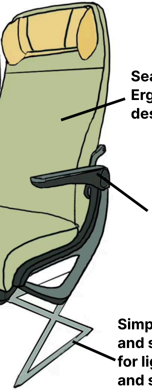
Design brief

This is a sketch of a row of economy class to reach the goal of being **lightweight** whi **comfort.**

The seats include several features:

- Height-adjustable neck support for peo
- Foldable neck support to improve user
- Simpler, lighter frame for larger space
- Rotatable armrest
- Ergonomically designed seat cushion
- Space mesh for better breathability
- Interactive buttons for multiple purpose

f seats



Seat Cushion Ergonomically designed

Armrest

Simpler frame and structure for light weight and stability

seats. The new designed seats aim
le keeping the **identical level of**

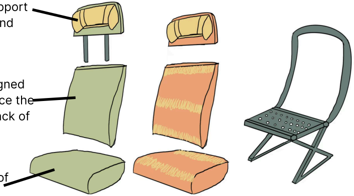
ple in different heights
experience and privacy

es

Top:
Curved, foldable Neck support for ergonomic purposes and privacy

Body:
Curved, spine-shaped designed cushion to maximumly reduce the fatigue of the spines and back of the users.

Bottom:
Curving to follow the shape of thighs and soft texture to improve user experience.



Mass

9.3 kg per passenger **-48.3%**

Energy

1500 MJ per life **-51%**

Carbon Footprint

120 kg per life **-42%**

Eco Audit Analysis

Assumes the new seat provides equivalent safety and comfort, that total energy and CO_2 scale approximately with mass, and that generic EduPack data and estimated part masses give conservative, order-of-magnitude values rather than precise certified results.

Material Selection

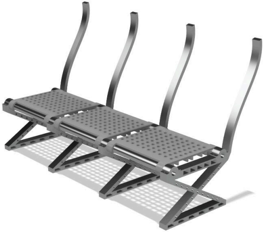
Seat Cover: FR recycled polyester fabric, space mesh, and **durable FR coated fabric** for easy cleaning. Made via fabric weaving.
Seat Cushion: Dual-density FR PU foam to Keep interface pressure in **4–7 kPa** with reduced total thickness. Made via polymer foam moulding.
Seat frame: High-recycled **6061-T6 aluminium** extrusions for main hoop and legs. Made via aluminium extrusion.
Armrest: Internal beam uses **GF-thermoplastic** and outer shell uses **injection-moulded thermoplastic**.

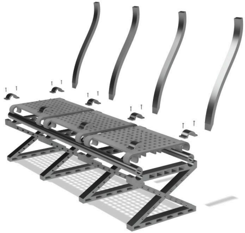
Seat Primary System Design

Fusion 360 is used to create a detailed model of the seat base. The models are created after combining ideas and feedback from users and include several features. This page focuses on the **base structure** of the seat.

Product Overview

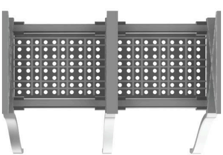
This is the overview of **3** economy seats in one row.
The seat base and legs use high-recycled **6061-T6 aluminium** extrusions, creating a **stiff, lightweight** load path into the floor rails while keeping almost all metal in a **single** alloy family that is easy to **remelt and reuse**. **Extrusion** and simple **CNC drilling** replace heavier welded **steel** frames, reducing **part count**, **cutting forming** and **welding energy**, and simplifying **end-of-life separation**.
On top, the perforated seat pan is a **ribbed** glass-fibre reinforced **thermoplastic** panel that replaces a thick solid metal plate: it uses **less** material for the same **stiffness**, avoids structural adhesives, can be **snapped off** the frame for repair, and can enter a **clean thermoplastic recycling stream** at end-of-life.



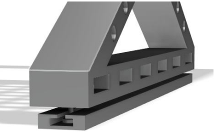


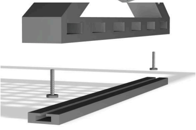
Overall Dimension & Specification

In full scale, the three-seat row is approximately **1750 mm** wide, **780 mm** deep and **1150 mm** high, with around **470 mm** seat width **per passenger** and a seat height of about **450 mm** from the floor. Each component is **labelled** for easy disassembly.
The seat geometry is tuned for a backrest angle of around **106–108°** and a slight **3–5°** seat pan tilt, which falls within typical ergonomic recommendations for short-haul economy seating.



Some **ribs** are attached to the **bottom** of the **pan** so passenger loads from the cushion are carried into the **aluminium frame** with **low deflection** even though the plate itself is thin and perforated. This allows us to **reduce sheet thickness** and **overall mass** while avoiding a heavy solid metal plate. The pan can be **easily** installed and uninstalled by clip-fit mechanism.



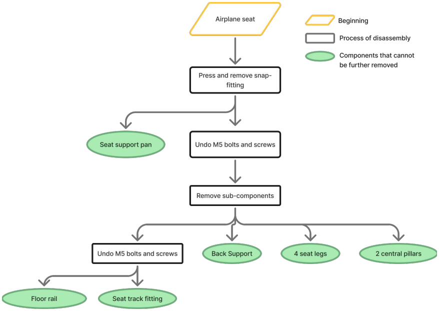


A number of **holes** are punched into the structures to **reduce** the weight and material, but keeping a **sufficient** level of **energy**. The seat is fixed to the ground through the **floor rail**, with screws installed inside, which makes them easy to **disassemble** for **repairing and recycling**.

Seat Primary System Design

Disassembly Trees

Complete Disassembly tree


Airplane seat

Press and remove snap-fitting

Seat support pan

Undo M5 bolts and screws

Remove sub-components

Undo M5 bolts and screws

Back Support

4 seat legs

2 central pillars

Floor rail

Seat track fitting

Beginning

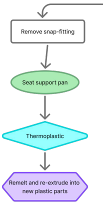
Process of disassembly

Components that cannot be further removed

Complete Disassembly tree for the seat base:
This tree focuses on the **physical disassembly** steps needed to separate the base into its main **sub-components**. Seat support pan is released by pressing the **snap-fits**, then **M5 bolts and screws** are undone to remove the remaining sub-components. The whole **frame** and **structure** are all exposed as separate modules, making **maintenance, replacement and material sorting** for recycling more straightforward.

Complete Disassembly tree for recycling:
This diagram shows how the redesigned seat can be separated into **clean material streams for recycling**. The snap-fit seat support pan can be **remelted** and **re-extruded** into new plastic parts. The remaining structure is divided into **6061-T6 aluminium** and **steel & aluminium**, which enter appropriate metal recycling routes, while the floor rails **stay** in long-life reuse and are only recycled when the airframe itself is dismantled.

Complete Disa


Remove snap-fitting

Seat support pan

Thermoplastic

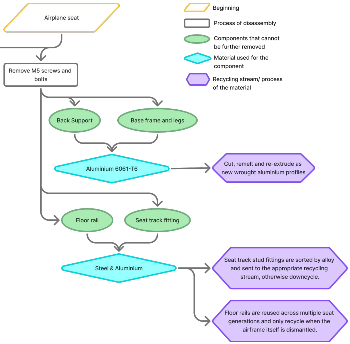
Remelt and re-extrude into new plastic parts

Product

- **Mass reduc**
be **5.7kg**, a
- The materia
is **270MJ**, a
- The aluminiu
same frame
cushions an
once or twic
- The **pan** car
touching the
can be deta
saving time

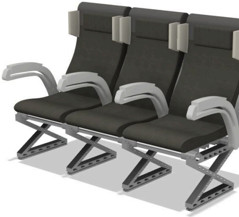
Seat Second

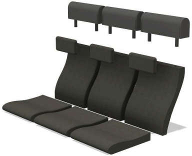
assembly tree for recycling


Airplane seat
Beginning
Process of disassembly
Components that cannot be further removed
Material used for the component
Recycling stream/ process of the material
Remove M5 screws and bolts
Back Support
Base frame and legs
Aluminium 6061-T6
Cut, remelt and re-extrude as new wrought aluminium profiles
Floor rail
Seat track fitting
Steel & Aluminium
Seat track stud fittings are sorted by alloy and sent to the appropriate recycling stream, otherwise downcycle.
Floor rails are reused across multiple seat generations and only recycle when the airframe itself is dismantled.

Analysis

tion: The current mass of the base is estimated to **43%** reduction compared to the original Weber 5751. l, manufacturing and transport **energy** for the base **40%** reduction compared to Weber 5751. um base is targeted for at least **20 years**, so the and legs can support **two or three generations** of d shells, with the thermoplastic seat pan replaced **ce** over the seat’s life if required. n be removed in **2–3 minutes** per seat-place **without** e main frame, while the complete three-seat base ched from the floor rails in around **20–30 minutes**, compared to 5751.





ary System Design

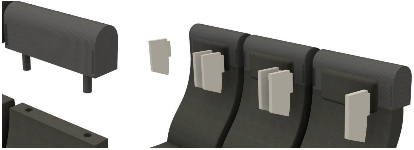
Product Overview

All **secondary system components** – cushions, covers, tray skins, armrest sleeves and pockets – are designed as **modular** kits that are easy to **detach**. From the user research, it is found out that most users **complain** about **body sores** and show strong demand for **ergonomic** design. Injection moulding, polymer foam moulding and fabric weaving is used.
Dual-density FR cushions and a more open **FR knit** cover work with the perforated seat pan to improve **pressure distribution** and **breathability** on short-haul flights.

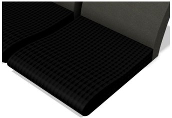
Ergonomic Design and Experience

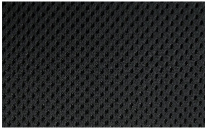
Perceived comfort:
The seat uses **soft**, **ergonomic** shapes and a **slim** automotive-inspired profile so it looks **supportive and comfortable**.
Initial comfort:
A compliant top layer of **dual-density FR foam** and a **soft knit cover** lets the passenger gently **“sink in”** on first contact, while the firmer sub-layer quickly supports the body.
Medium comfort:
For **1–3 hour** flights, the sculpted cushion and perforated, **ribbed GF-thermoplastic** seat pan work together to spread **pressure** and improve **breathability**, reducing **hot spots** and heat build-up.
Long-term comfort:
A long-life **aluminium** base and reinforced seat pan act as **stable** structure, while modular cushions and covers can be **replaced or laundered**, preventing permanent **sagging** and maintaining **comfort** over the seat’s service life.

Detailed Features



- The neck support can be **inserted** into the back support. The height is **adjustable** to satisfy needs from users of **different height**, inspired from the neck support of car seats.
- The side support can be **attached** and **detached** easily from the side of **neck pillow**, which allows user to lean for **sleeping** or to ensure their **privacy** when they want to and helps users to **communicate** easier once removed.



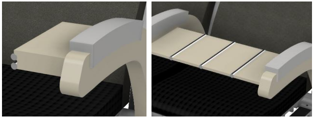


- Inspired from the texture of **sneakers**, a **zoned FR mesh** is used in the side panels of the cushion cover to **improve airflow** without exposing passengers to a rough open mesh surface. The structure allows **warm, moist air** to **escape** through the sides of the cushion and the perforated seat pan, reducing **heat** build-up and humidity on short-haul flights while the top surface remains a **soft**, closed **FR knit** for comfort and easy cleaning.
- The mesh zones dry **faster** after cleaning and **reduce sweat** accumulation in the foam, helping **hygiene** and slowing down foam degradation over time.

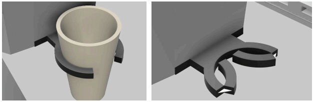
Seat Accessories Design

Overview

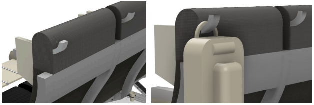
This design **removed** some current accessories on the seat and **added** some **different** features including **different table, cup holder, device charger, bag hooks and interactive buttons.**



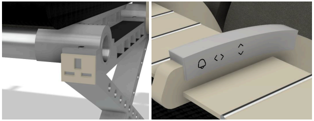
Classic design of putting the table at the back of the seat is **removed**. The new design makes the table **foldable** and can be placed inside the **armrest**, saving **space** and improving **convenience**.



The drinks are originally put on the table an it is likely to fall down during the flight. A **foldable cup holder** is added to the seat to **fix** the drinks.

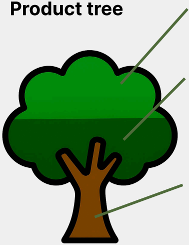


There is a **high possibility** that users will need to take things out of their bags during the flight. It can be **inconvenient** since bags are under the seat, so a hook is created to **hang** the bags during the flight.



A **charging socket** is installed, allowing users to charge their devices during long-haul flight. The old design of radio is **replaced** by **interactive buttons** to **control** the back support and neck support or **ask for assistance**.

Product tree



New Ideas (Leaves)
- Bag hook under armrest.
- Cup holder integrated in armrest endcap
- Modular headrest pillow with washable cover

Primary Features (Branches)
- Foldable tray table with single-hand latch, soft-drop hinge, 2-position (meal / device).
- Power module, sharing a 60 W seat box
- Seatback control: simple 2-button for recline, raised icons, tactile feedback.
- Attendant call button on armrest top.

Core Features (Trunk)
- Power + data routed through left leg harness with keyed connectors
- Headrest height adjustment, pillow attaches to existing Velcro/hidden studs.
- Cup holder/Bag hook occupy standard accessory rail to avoid new drilling.

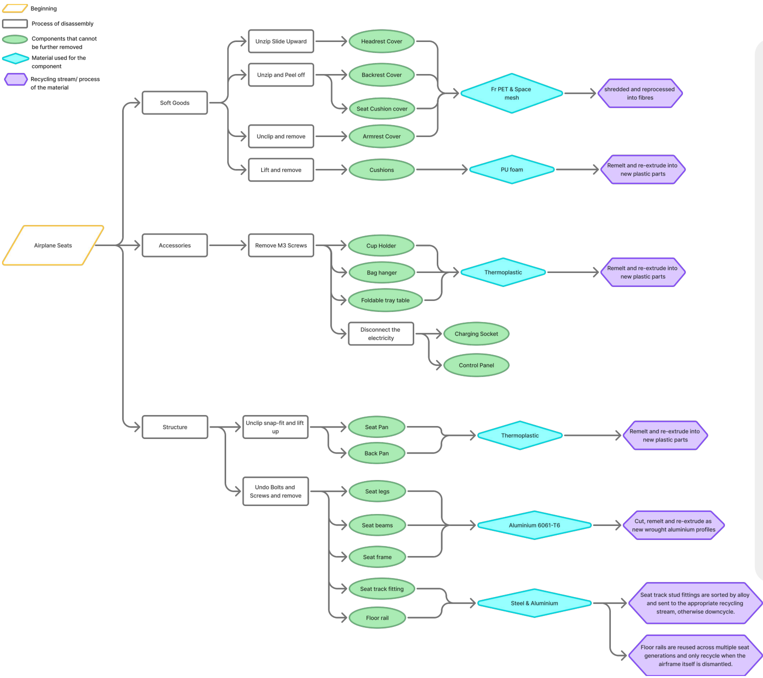
Environmental Analysis

Our accessory set cuts **mass, materials, and waste**. A single USB-C PD power module **replaces** heavy seat-back electronics, so passengers use their **own devices**—no built-in screens, less wiring, lower energy.

Components mount to common hard-points with tool-light swaps: only **worn** items (tray, pillow cover, hook, cup holder) are **replaced**. The foldable tray uses **thermoplastic** with **ribs** for stiffness at low weight. **Hollow stems, snap-fits, and fewer fasteners** speed assembly and disassembly.

Headrest & covers adopt **FR rPET + 3D spacer "space texture" knit**: **highly breathable, fast-drying, washable**; enables **thinner foams, fewer laminates, better recyclability, and lower cleaning energy/water**. Smooth radii and open geometries shorten cleaning time and cut chemicals.

Seat Disassembly Tree



- ▱ Beginning
- ▭ Process of disassembly
- ⬭ Components that cannot be further removed
- ◇ Material used for the component
- ⬡ Recycling stream/ process of the material

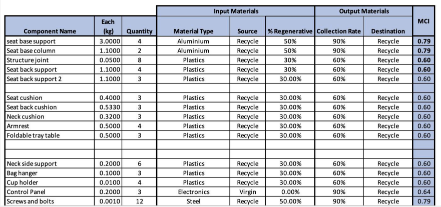
- Airplane Seats
  - Soft Goods
    - Unzip Slide Upward → Headrest Cover
    - Unzip and Peel off → Backrest Cover, Seat Cushion cover
    - Unclip and remove → Armrest Cover
      - Headrest Cover, Backrest Cover, Seat Cushion cover, Armrest Cover → Fr PET & Space mesh → shredded and reprocessed into fibres
    - Lift and remove → Cushions → PU foam → Remelt and re-extrude into new plastic parts
  - Accessories
    - Remove M3 Screws
      - Cup Holder, Bag hanger, Foldable tray table → Thermoplastic → Remelt and re-extrude into new plastic parts
      - Disconnect the electricity → Charging Socket, Control Panel
  - Structure
    - Unclip snap-fit and lift up → Seat Pan, Back Pan → Thermoplastic → Remelt and re-extrude into new plastic parts
    - Undo Bolts and Screws and remove
      - Seat legs, Seat beams, Seat frame → Aluminium 6061-T6 → Cut, remelt and re-extrude as new wrought aluminium profiles
      - Seat track fitting, Floor rail → Steel & Aluminium
        - Seat track stud fittings are sorted by alloy and sent to the appropriate recycling stream, otherwise downcycle.
        - Floor rails are reused across multiple seat generations and only recycle when the airframe itself is dismantled.

The seat has been designed with a **clear, top-down** disassembly sequence so that **high-wear parts** can be removed **first** and the long-life structure is only exposed when necessary. **Soft goods** such as **headrest, backrest and seat covers, armrest sleeves and cushion cores** are detached **tool-lessly** using zips, Velcro and snap-fits. **Accessories** including the **foldable tray, cup holder, bag hook, power outlet and control panel** are then removed with a small Torx/hex driver and unplugged via quick electrical connectors. After this, the **back shell, side trims, armrest beams and the perforated snap-fit seat pan** are taken off to reveal the aluminium back frame and shared base frame, which are finally separated from the floor via **M5/M6 bolts** and **seat-track fittings**.

This sequence also separates the seat into a small number of **clean material streams**. **Textiles** are grouped for **textile recycling** or **energy recovery**, while **PU foams** are handled as a dedicated foam stream. **GF-thermoplastic seat pans, shells and accessories** are collected as a mono-material thermoplastic stream for **shredding and remelting**, and all **6061-T6 aluminium frame** members are recovered as a clean **extrusion scrap stream**. Small steel fasteners and fittings go into the **steel scrap flow.** As a result, around end-of-life most of the seat mass is either reused as metal scrap or enters defined recycling loops rather than mixed landfill.

Product Analysis

MCI Analysis



			Input Materials			Output Materials		MCI
Component Name	Each (kg)	Quantity	Material Type	Source	% Regenerative	Collection Rate	Destination	
seat base support	3.0000	4	Aluminium	Recycle	50%	90%	Recycle	**0.79**
Seat base column	1.1000	2	Aluminium	Recycle	50%	90%	Recycle	**0.79**
Structure joint	0.0500	8	Plastics	Recycle	30%	60%	Recycle	**0.60**
Seat back support	1.1000	4	Plastics	Recycle	30%	60%	Recycle	**0.60**
Seat back support 2	1.1000	3	Plastics	Recycle	30.00%	60%	Recycle	0.60
Seat cushion	0.4000	3	Plastics	Recycle	30.00%	60%	Recycle	0.60
Seat back cushion	0.5330	3	Plastics	Recycle	30.00%	60%	Recycle	0.60
Neck cushion	0.3200	3	Plastics	Recycle	30.00%	60%	Recycle	0.60
Armrest	0.5000	4	Plastics	Recycle	30.00%	60%	Recycle	0.60
Foldable tray table	0.5000	3	Plastics	Recycle	30.00%	60%	Recycle	0.60
Neck side support	0.2000	6	Plastics	Recycle	30.00%	60%	Recycle	0.60
Bag hanger	0.1000	3	Plastics	Recycle	30.00%	60%	Recycle	0.60
Cup holder	0.0100	4	Plastics	Recycle	30.00%	60%	Recycle	0.60
Control Panel	0.2000	3	Electronics	Virgin	0.00%	90%	Recycle	0.64
Screws and bolts	0.0010	12	Steel	Recycle	50.00%	90%	Recycle	0.79

A MCI analysis is carried out for the seat, the seat has an **overall** MCI value of **0.686** and an average mass per seat of **10.6kg**, significantly more **circular** than a typical legacy economy seat. The aluminium base supports and structural joints have the **highest circularity**, using about **50%** recycled aluminium and achieving **90–95%** collection at end of life. Most plastic parts such as the seat pan, cushions, covers and tray table sit around **0.6–0.7** due to moderate **recycled content** and realistic **collection rates**, while textiles, foams, electronics and screws score slightly lower.

Influence & Challenges

The key changes are a mainly mono-material **6061-T6 aluminium frame** with around **50%** recycled input and **removable GF-thermoplastic** pans and shells, plus **modular** cushions and covers. These keep the long-life base in service for up to **~60,000** flight cycles while only soft goods are replaced, lifting the overall MCI to **0.69**.
The main challenge is using **high-recycled aluminium** and **PET textiles** without compromising certification, and ensuring airlines and MROs actually follow the designed disassembly and collection routes.

Eco audit analysis

Mass

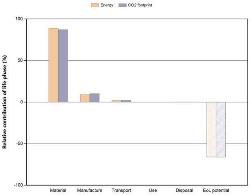
10.6 kg per seat -41.1%

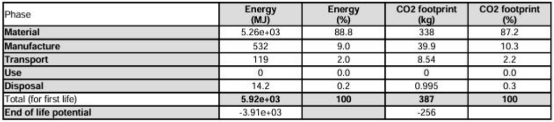
Energy

1973 MJ per life -34%

Carbon Footprint

129 kg per life -38%





Phase	Energy (MJ)	Energy (%)	CO2 footprint (kg)	CO2 footprint (%)
Material	5.26e+03	88.8	338	87.2
Manufacture	532	9.0	39.9	10.3
Transport	119	2.0	8.54	2.2
Use	0	0.0	0	0.0
Disposal	14.2	0.2	0.995	0.3
Total (for first life)	**5.92e+03**	**100**	**387**	**100**
End of life potential	-3.91e+03		-256	

The Eco Audit shows that the **material** stage accounts for about **89%** of the total energy use and **87%** of the **387 kg** CO_2 footprint. Manufacturing adds a further **9%** of **energy** and **10%** of **CO_2**, while **transport** and **disposal** together contribute less than **3%**. There is a large **end-of-life credit**, reflecting the high recycling potential of the **aluminium and thermoplastic** parts, which significantly reduces the net life-cycle impact of the seat.

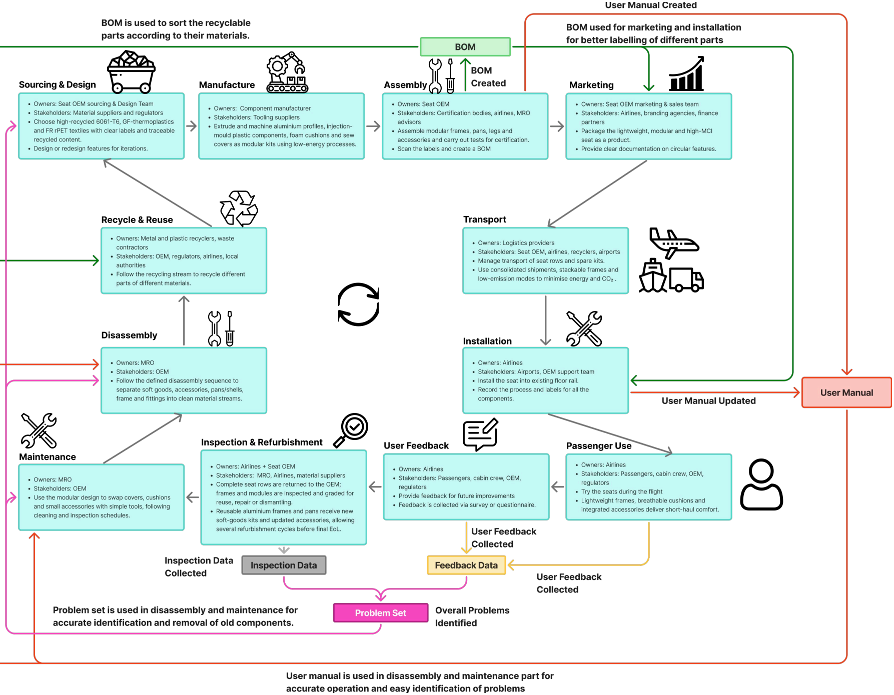
Future Improvements

- **Further light-weighting of the frame:** Optimise aluminium profiles and joint geometry to remove non-critical material, and standardise fasteners to reduce metal mass and simplify assembly.
- **Improve circularity of soft goods:** Explore foam concepts that are easier to separate and recycle.
- **Enhance disassembly guidance:** Provide a simple disassembly guide for MROs to increase the real collection rate.

Produ

Problem set is used in redesign for better product iterations

ct System & Stakeholder Mapping



User Manual Created

BOM is used to sort the recyclable parts according to their materials.

BOM used for marketing and installation for better labelling of different parts

BOM

BOM Created

Sourcing & Design

- Owners: Seat OEM sourcing & Design Team
- Stakeholders: Material suppliers and regulators
- Choose high-recycled 6061-T6, GF-thermoplastics and FR rPET textiles with clear labels and traceable recycled content.
- Design or redesign features for iterations.

Manufacture

- Owners: Component manufacturer
- Stakeholders: Tooling suppliers
- Extrude and machine aluminium profiles, injection-mould plastic components, foam cushions and sew covers as modular kits using low-energy processes.

Assembly

- Owners: Seat OEM
- Stakeholders: Certification bodies, airlines, MRO advisors
- Assemble modular frames, pans, legs and accessories and carry out tests for certification.
- Scan the labels and create a BOM

Marketing

- Owners: Seat OEM marketing & sales team
- Stakeholders: Airlines, branding agencies, finance partners
- Package the lightweight, modular and high-MCI seat as a product.
- Provide clear documentation on circular features.

Recycle & Reuse

- Owners: Metal and plastic recyclers, waste contractors
- Stakeholders: OEM, regulators, airlines, local authorities
- Follow the recycling stream to recycle different parts of different materials.

Transport

- Owners: Logistics providers
- Stakeholders: Seat OEM, airlines, recyclers, airports
- Manage transport of seat rows and spare kits.
- Use consolidated shipments, stackable frames and low-emission modes to minimise energy and CO_2 .

Disassembly

- Owners: MRO
- Stakeholders: OEM
- Follow the defined disassembly sequence to separate soft goods, accessories, pans/shells, frame and fittings into clean material streams.

Installation

- Owners: Airlines
- Stakeholders: Airports, OEM support team
- Install the seat into existing floor rail.
- Record the process and labels for all the components.

User Manual

User Manual Updated

Maintenance

- Owners: MRO
- Stakeholders: OEM
- Use the modular design to swap covers, cushions and small accessories with simple tools, following cleaning and inspection schedules.

Inspection & Refurbishment

- Owners: Airlines + Seat OEM
- Stakeholders: MRO, Airlines, material suppliers
- Complete seat rows are returned to the OEM; frames and modules are inspected and graded for reuse, repair or dismantling.
- Reusable aluminium frames and pans receive new soft-goods kits and updated accessories, allowing several refurbishment cycles before final EoL.

User Feedback

- Owners: Airlines
- Stakeholders: Passengers, cabin crew, OEM, regulators
- Provide feedback for future improvements
- Feedback is collected via survey or questionnaire.

Passenger Use

- Owners: Airlines
- Stakeholders: Passengers, cabin crew, OEM, regulators
- Try the seats during the flight
- Lightweight frames, breathable cushions and integrated accessories deliver short-haul comfort.

User Feedback Collected

Inspection Data Collected

Inspection Data

Feedback Data

User Feedback Collected

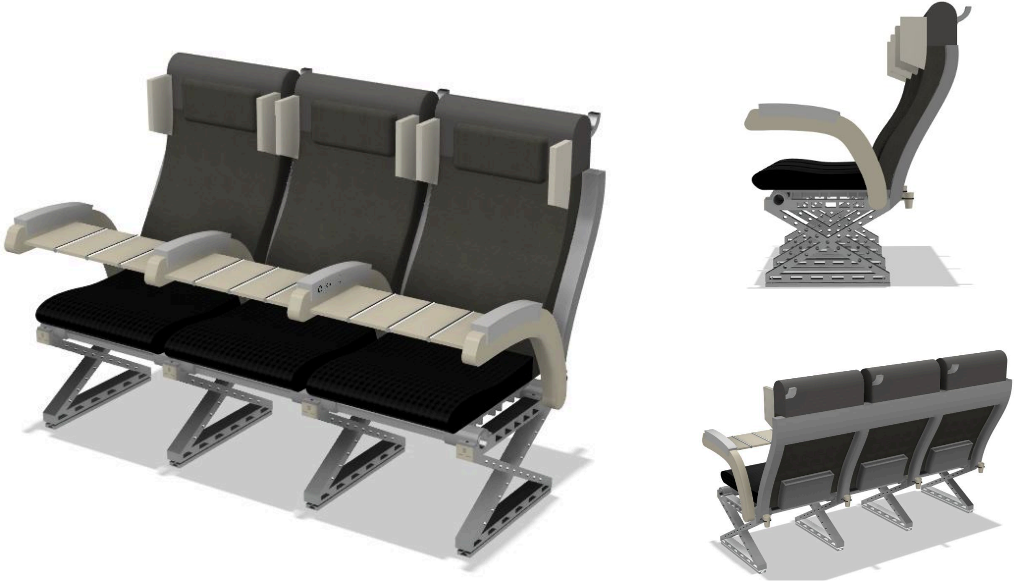
Problem Set

Overall Problems Identified

Problem set is used in disassembly and maintenance for accurate identification and removal of old components.

User manual is used in disassembly and maintenance part for accurate operation and easy identification of problems

Final Product



Appendix

- All the eco audit reports are made using Granta Ansys EduPack, all the 3D modelling are done using Fusion 360, sketches are drawn using Procreate and the MCI calculation is made using the template received from Outlook.

- Eco Audit Report for Webber 5751 : https://drive.google.com/file/d/1jDurRlbfl3XTfixaNgTuhpDv-4gbwWUD/view?usp=drive_link

- Eco Audit Report for new design : https://drive.google.com/file/d/1MdmwlNklIuT5TDpovI2HWpB_m4XuQ3lY/view?usp=drive_link

- Design model STL file: https://drive.google.com/file/d/1rZBMlnPI9IZTRfQS5JDVqKgfFp398mdP/view?usp=drive_link

- The icons are downloaded and used from flaticon: Vector Icons and Stickers - PNG, SVG, EPS, PSD and CSS