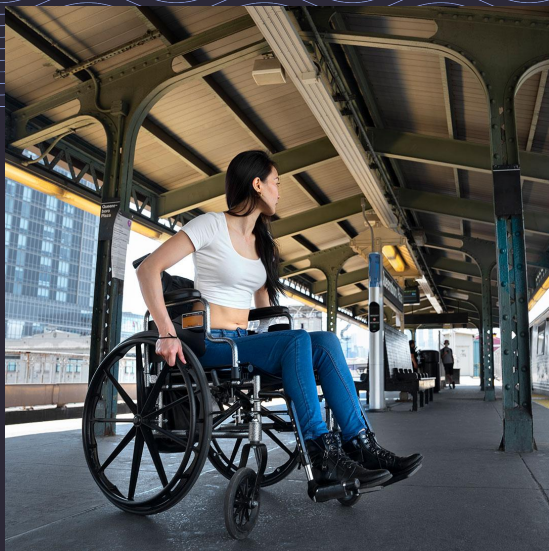


MANUAL WHEELCHAIR REDESIGN

Sonoma Miller INFO 200





PRODUCT OVERVIEW

- Lightweight aluminum
- Foldable

Some models feature:

- Adjustable footrests
- Large treaded pneumatic tires

Wheelchair & Accessories
AMERICAN STYLE



Wheelchair & Accessories
EUROPEAN STYLE



Wheelchair & Accessories
TRANSPORT CHAIR



STAKEHOLDER ANALYSIS



WHEELCHAIR USERS

Direct stakeholder: For many Americans, a wheelchair is an essential tool. Because they represent a minority, they are often overlooked



MEDICAL COMPANIES

Direct stakeholder: Responsible for assisting wheelchair users, hospitals and nursing homes often supply wheelchairs. The market for wheelchairs is expanding.



URBAN PLANNERS

Indirect stakeholder: Planners must now comply with ADA regulations which account for slopes in the US.

STATS ABOUT STAKEHOLDERS

1:12

ADA COMPLIANT SLOPE (INCHES)

However, infrastructure built before 1990 when the Americans with Disabilities Act was passed may not comply

55

MILLION AMERICANS

Use wheelchairs – around 17% of all Americans. Over 90% of these are manual.

DESIGN CRITIQUE



WHEELS

"This wheelchair is not all terrain, not even a little bit. I bought this chair specifically for being able to go out and walk with my dogs. It can't do it."



BRAKES

"It is not very sturdy have already had to have the brakes worked on. My husband fell because they didn't hold."



DESIGN CRITIQUE



USABILITY

Some users report tipping backwards in their chairs due to a weight imbalance



ACCESSIBILITY

Wheels are not all-terrain, according to Amazon and Reddit users. Many slopes in the US are too steep for manual wheelchairs



LACK OF FEATURE

Lack of ventilation in seat rest



DESIGN CRITIQUE

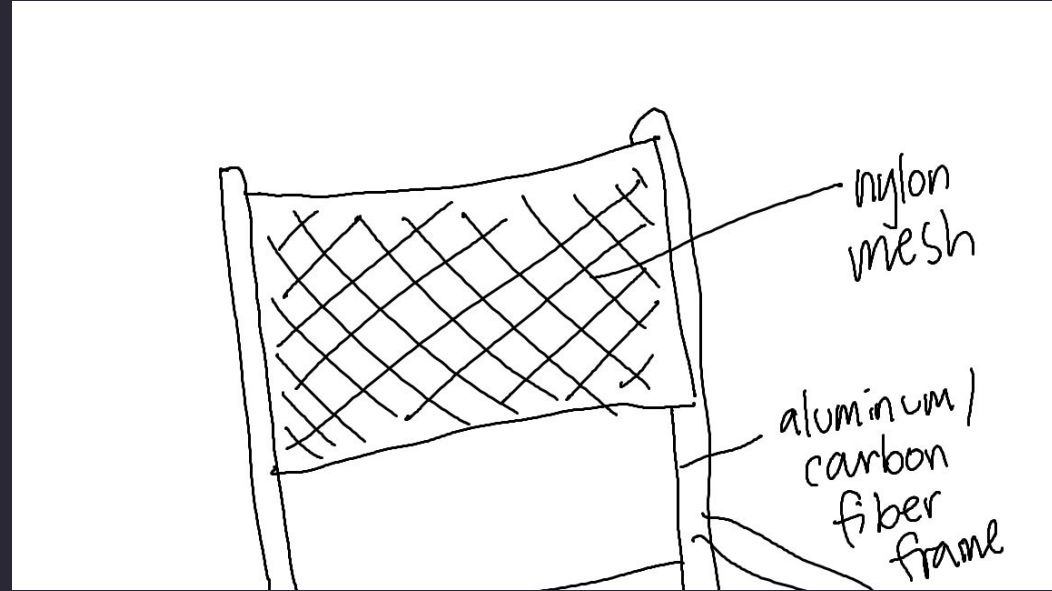
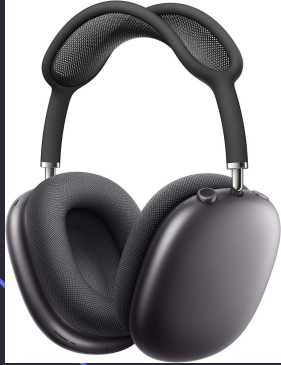


Many hills, such as those in San Francisco, are much steeper than 8.33%

Common vinyl upholstery is sticky, heavy, and not breathable



VISUAL REDESIGN



Used for wheelchair backing. Lightweight, breathable recycled nylon

VISUAL REDESIGN

AirScape™

Our AirScape™ backpanel with foam ridges for comfort and fit set a new industry standard for comfort and performance. AirScape™ keeps the weight close and comfortable whilst providing airflow and is featured on both lightweight daypacks and large backpacking packs.

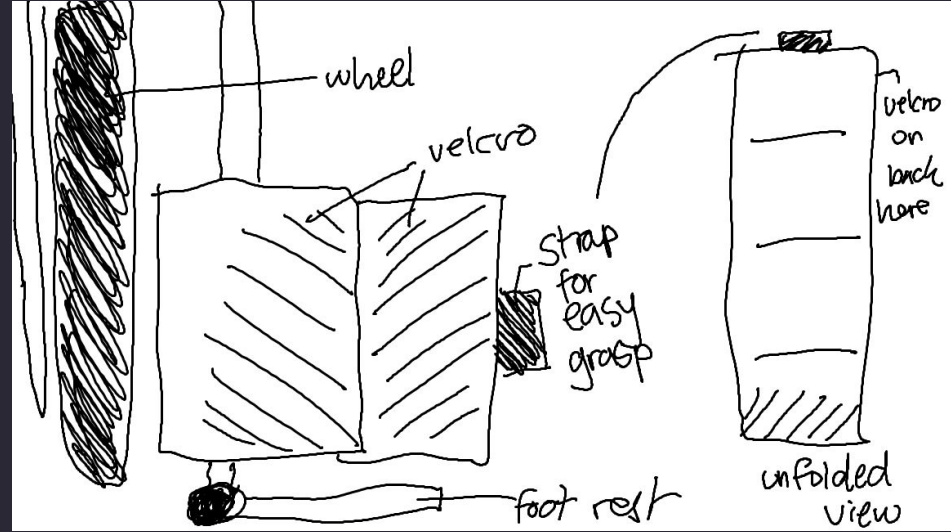


Used for wheelchair backing. Lightweight, breathable recycled nylon

REDESIGN EXPLANATION

- Nylon more breathable than vinyl; sweat-wicking
- High tensile strength, chemical and UV resilience
- Additional processing or additives may be required to achieve the desired flexibility for certain applications

VISUAL REDESIGN



Detachable weight to adjust center of gravity.

REDESIGN EXPLANATION

This weight is a simple addition. The center of gravity of a wheelchair user sits further back, and is prone to tilting backwards, especially when on an incline. Although it requires more force to push upwards, this small weight makes a big difference, allowing wheelchair users to feel more balanced.

VISUAL REDESIGN



Coaster brake on bike

Anti-reverse switch on fishing rod



One-way brake for going up hills.

REDESIGN EXPLANATION

Inspired by coaster brakes on bikes (bear mechanical similarities to manual wheelchairs), fishing rods with one-way brakes, and front seat adjusting mechanisms on cars. It would require further engineering and design.

When going up hills, this would allow wheelchair users to push forwards, but not backwards; it could easily be switched on and off. Additionally, it would counteract the weight added by the previous feature.

This is helpful for not just wheelchair users but wheelchair assistants as well, such as nurses that push wheelchairs uphill.



CONCLUSION

In order to improve comfort and breathability of wheelchairs:
nylon mesh upholstery to replace vinyl

In order to balance the weight of gravity in wheelchairs,
especially while scaling upward slopes: detachable weight to
front of chair

In order to make ascending steep slopes easier for
wheelchair users and assistants: one-way brake

REFERENCES

- • [Hot Item] China Aluminium Alloy Light Weight Non Electric Foldable Manual Wheelchair. (n.d.). Made-In-China.com. Retrieved April 17, 2024, from <https://maxmedical.en.made-in-china.com/product/kylNvGYsJhp/China-China-Aluminium-Alloy-Light-Weight-Non-Electric-Foldable-Manual-Wheelchair.html>
- • Amazon.com: Voyager self Propel Outdoor All Terrain Wheelchair - Choice of Sizes and Colors (Black, 18" Seat Width) : Health & Household. (n.d.). Www.amazon.com. Retrieved April 17, 2024, from https://www.amazon.com/Elite-Care-Voyager-Outdoor-Wheelchair/dp/B004TG8XH8/ref=cm_cr_ar_p_d_product_top?ie=UTF8&th=1
- • European Accessibility Act (EAA). (n.d.). Level Access. Retrieved April 17, 2024, from <https://www.levelaccess.com/compliance-overview/european-accessibility-act-eaa/#:~:text=What%20is%20the%20timeline%20for>
- • How to Use This Checklist - ADA Checklists for Existing Facilities. (n.d.). Www.adachecklist.org. Retrieved April 17, 2024, from <https://www.adachecklist.org/howto.html#:~:text=For%20a%20ramp%20the%20maximum%20running%20slope%20allowed%20is%208.33>
- • National Archives. (2016, August 15). 25th Anniversary of the Americans with Disabilities Act. National Archives. <https://www.archives.gov/calendar/ada25#:~:text=Signed%20on%20July%2026%2C%201990>
- • Topaz_24. (2024, January 27). Manual Wheelchair? https://www.reddit.com/r/disability/comments/1ac4vt6/manual_wheelchair/

REFERENCES

Manufacturing, G. (2023, May 8). *Nylon vs. Vinyl*. Gary Manufacturing.

<https://www.garymanufacturing.com/nylon-vs-vinyl/>

North America Wheelchair Market Size & Share Report, 2030. (n.d.). Wwww.grandviewresearch.com.

<https://www.grandviewresearch.com/industry-analysis/north-america-wheelchair-market-report>

IMAGES

Standard wheelchair:

https://www.amazon.com/Elite-Care-Voyager-Outdoor-Wheelchair/dp/B004TG8XH8/ref=cm_cr_arpd_product_top?ie=UTF8

<https://www.quickie-wheelchairs.com/Ultra-Light-Wheelchairs/Ultralight-Folding-Wheelchairs/Quickie-Xenon-FF-Fixed-Front-Ultralight-Folding-Wheelchair/43151p>

Osprey backpack:

<https://terradrift.com/osprey-atmos-ag-50l-backpack-osprey-atmos-review/>

Osprey materials:

<https://www.osprey.com/gb/osprey-technologies-2/materials-construction>

<https://www.osprey.com/gb/osprey-technologies-2/backsystems#AirScape>

San Francisco:

<https://www.sfgate.com/local/article/san-francisco-hills-17700185.php>

Spinning rod:

<https://tailoredtackle.com/how-to-use-a-spinning-reel-learn-to-spool-cast-and-service-a-reel/>

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