Report On The Manufacturing Process Of Wheelchairs At NeoMotion Assistive Technologies Chennai India

(As part of my Internship at NeoMotion)

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Picture 1: Me at NeoMotion Assistive Technologies, Chennai

Abstract

During the summer break of 2024, I got a chance to work at NeoMotion Assistive Technologies, Chennai. NeoMotion has made a name for itself through its innovative bolt-on battery-operated scooter as compared to a regular wheelchair, which makes it outdoor mobile. The user can travel up to 30 kms.

At their Chennai plant, I studied the process by which these wheelchairs are manufactured which I have covered in my report. Additionally, I also got a chance to work on other projects.

1. Competition analysis of other assistive technology companies and added to NeoMotion database
2. Found a chemical test to conduct the fire retardant test for the new product NeoPower
3. Created a user manual for the new product NeoPower
4. Brainstormed ways to reduce costs for NeoPower

Acknowledgements

I would like to thank Mr Ashish Sharma, Mr Siddharth Daga and Mr Swostik Dash, co-founders of NeoMotion, for allowing me to intern at NeoMotion and spend two weeks at their factory. A special thank you to Mr Ashish Sharma, whose guidance enabled me to learn and make my internship a very hands-on and wholesome learning experience.

I would also like to thank the management team and the workers of NeoMotion, for being generous with their time to explain the processes to me. A special thank you to Mr Paarth Asthana, for clearing all my doubts.

Most of all, I would like to thank Professor Ashok Jhujhunwala, President of IIT-Madras Research Park, for being a mentor to me throughout my internship. His expert planning and insightful guidance made my internship highly effective and meaningful.

This internship has been extremely inspiring for me and has made me determined to use STEM as a way of making a positive impact in the world.

Picture 2: Me with Prof. Ashok Jhunjhunwala at his office in the IIT Madras Research Park

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Introduction To NeoMotion

NeoMotion is an IIT Madras Research Park incubated startup which creates and manufactures customised wheelchairs and attachable electric scooters to help the disabled and the elderly is mobile and independent. Founded in May 2016, the start-up has since grown by leaps and bounds, even appearing on Season 2 of Shark Tank India in 2023 and getting funding from Lenskart founder, Peyush Goyal, at a valuation of nearly US$12 Million. Their vision is to create a profound impact in the lives of people with mobility issues while maintaining a sustainable business. Their products are technologically driven and include automation in the lives of everyday wheelchair users. Their mission is to ensure that every wheelchair user lives life to the fullest.

Here's the story of NeoMotion as covered by The Better India.
https://thebetterindia.com/web-stories/bagging-rs-one-cr-on-shark-tank-iit-grads-electric-wheelchairs-can-be-gamechangers/

Products Manufactured By NeoMotion

NeoMotion offers a diverse range of products catering to different needs of disabled people. Each wheelchair, besides being built for a specific purpose, is customised according to the needs of the person. Furthermore, each wheelchair is engineered in such a way that it allows more of the person to be seen rather than the wheelchair. Some of their products are also automated. The products manufactured by NeoMotion are:

1. NeoFly
2. NeoBolt
3. NeoPower

NeoFly: Their first product, this is a custom wheelchair which is easy to manoeuvre and lightweight in nature.

Neo Bolt: This is an electric scooter which can easily be attached to NeoFly to enable a disabled person to move around. It is battery-operated and allows the wheelchair to move on all possible terrains.

Picture 3: NeoBolt

Neo Power: This is a joystick-operated wheelchair which allows people with severe spinal cord injury/limited movement of their limbs to move around and be independent. The wheelchair also has a manual override option.

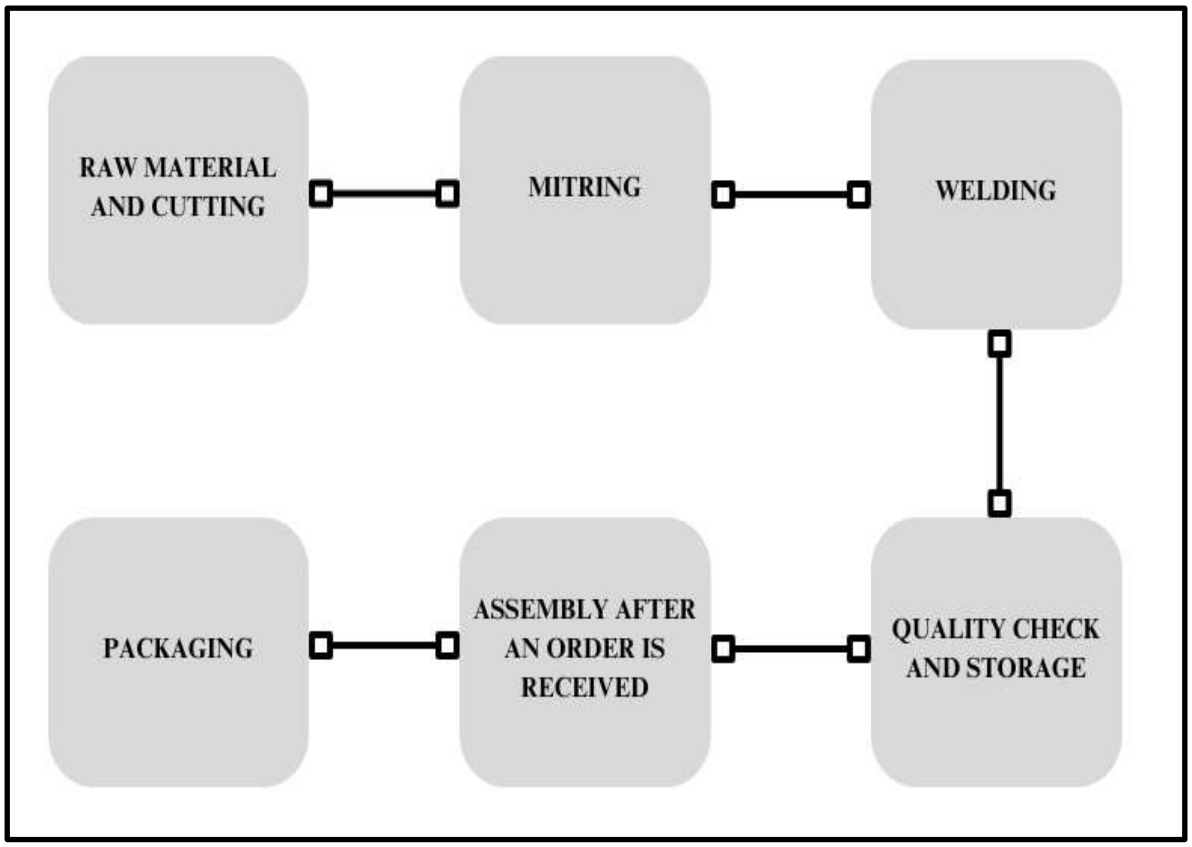
Picture 4: NeoPower

Why Do We Need Assistive Technologies?

71% of people with disabilities in India do not have access to assistive technologies. 26.8 million People in India live with disabilities, out of which 20% have mobility issues. That makes it approximately 5 million wheelchair users. Yet, only about 1.6 million people have access to a wheelchair. Add to this the elderly population, and we realise that a very small proportion of wheelchair-needing people in the country actually have access to them.

In India, it is difficult for wheelchair users to be independent. Only around 3% of the buildings in India are wheelchair-friendly, making it arduous for wheelchair users to access them. People with disabilities deserve to live a normal life; hence we need assistive technologies, catering to every kind of disability possible.

Manufacturing Process Flow Chart



Picture 5: Manufacturing process flow chart

Manufacturing Stages

Stage 1: Raw material and cutting

The raw material is received at the factory in Chennai in the form of long rods made of aluminium and steel. Depending on the part being made, an aluminium or steel rod is chosen and then sent to the cutting machine for cutting it into smaller pieces. The rod is inserted into the cutting machine and is then cut according to the length required.

Raw material bay

Picture 6: Raw material stocking area containing rods

Cutting machine

Picture 7: Cutting machine

Stage 2: Mitring

The cut rods are then sent to an outsourced manufacturer for bending the rods. After this, the rods are received back at the factory and then sent into the mitring machine. The machine clamps the rod with a force of 8000 N. It then cuts the bent rod in a way that it fits into another piece to form a metal framework.

Picture 8: Bent rods part of wheelchair framework

Picture 9 & 10: Mitring machine

Stage 3: Welding

After mitring, the mitered rods are then fixed into welding fixtures. Depending on whether the part is for a trial piece or not, it is put into the expensive or inexpensive welding fixture and is then sent for tig welding or mig welding. Tig welding is done if the part is made of

aluminium and mig welding is done if the part is made of steel. Tig welding is primarily done for the framework of the wheels, whereas mig welding is done for the wheelchair.

Pictures 11 & 12: Welding fixtures

Tig welding and mig welding

Picture 13 & 14: Tig welding and mig welding

<u>Stage 4: Quality check and storage</u>

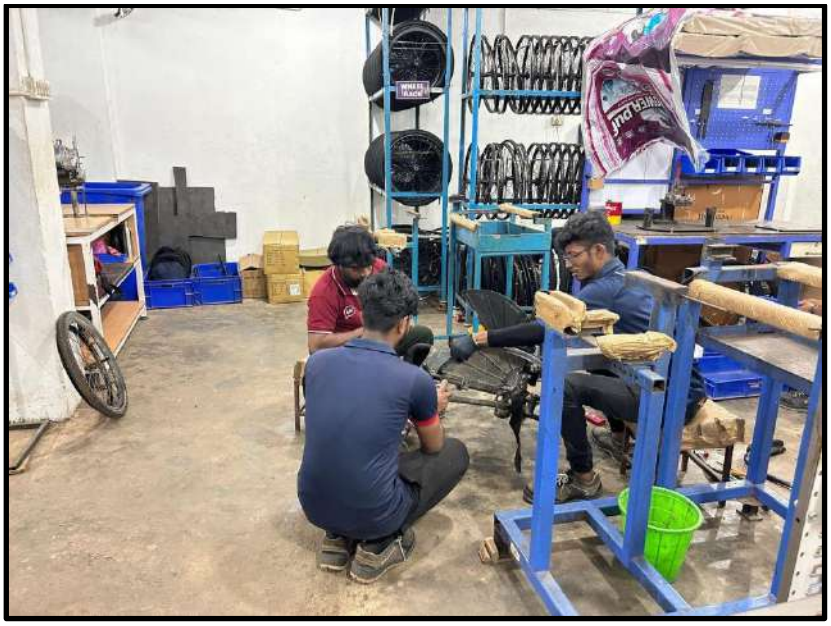
Using a vernier calliper and special gauges designed to test the wheelchair frameworks and other parts, the welded parts are checked for any errors in measurement. If an error is found, the part is sent into scrap, and recycled as raw material again. Otherwise, the part moves into storage. The manufactured parts are logically stored until an order for a wheelchair is received. Then, the right parts are chosen and the wheelchair is sent for assembly.


Pictures 15 & 16: Quality check


Picture 17 & 18: Storage

<u>Stage 5: Assembly</u>

An important thing to note about the assembly of wheelchairs is that it is done by speech and hearing-impaired individuals. They communicate with each other through sign language and are highly adept at their job. Each part is joined together, tightened, and then polished. Every tiny detail, from the castor wheels at the back of the wheelchair to the velcro of the cushion, is taken care of.



Picture 19: Speech and hearing disabled workers assembling a NeoFly

Pictures 20 & 21: Worker disassembling a NeoFly

Stage 6: Packaging

After assembly, the wheelchair is folded and packed into a cardboard box. The corners of the box are fitted with cut triangular pieces, to provide cushioning for the wheelchair and ensure that it does not break. A checklist for operating the wheelchair and maintenance of the wheelchair is fitted underneath the cushion before it is packed. A tool kit for minor repairs to the wheelchair is also provided inside the box.


Picture 22 & 23: Packaging boxes

Picture 24: Tool kit which is provided for assembling/disassembling along with the packaging

Conclusion

The six weeks that I spent with NeoMotion during my summer internship were the most enlightening and enriching in several ways. For one, I did get to see how passion for serving a higher cause fuels innovation at scale. I worked on creating a user manual for their newest product and tried to reduce their costs. I also got a chance to test their products for fire safety and worked on competition analysis. This well rounded and hands on experiential learning have been most valuable in my journey towards appreciating and understanding engineering and technology. I do believe that as I pursue my quest for mechanical engineering, I will be able to put technology to the greater good of humanity.

References

1. All pictures related to the manufacturing process were taken by me, during the course of my internship
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