

Integrated Modelling and Design for Realizing a Two-Wheeled Wheelchair for Disabled persons using Solidworks

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Abstract. This work presents another plan of two-wheeled wheelchair that can adjust on two wheels to make it reasonable in the restricted zones, particularly in the homegrown conditions; it can expand the stature of the seat to assist the client with acting autonomously in the life for instance, in the library to pick and put books on the racks. The 3D model has been developed utilizing SolidWorks Software. These days, SolidWorks climate is considered as an incredible asset that is assisting architect with planning items and accomplish its presentation before actual model stage. SolidWorks reproduction model has been utilized to test the casing of the wheelchair under the heaviness of the human body and the upper piece of the wheelchair. The static examination has been done on the casing utilizing steel and aluminum; nonetheless, the aluminum material has been chosen because of its light weight.

1. Introduction

There is a proceeded with pattern in increment of number of wheelchair clients because of one or the other maturing or handicap. The principal clients are among the old who experience issues in strolling, and among the handicapped who have

lasting or transient wounds on their lower limits because of mishaps at work or sport, or because of different exercises. Studies in USA have demonstrated that the older is required to be around 87 million by 2050. Subsequently, impressive quantities of studies have been done in the field of encouraging wheelchair clients because of the normal hop in their number and the references in that. One of the destinations of the exploration around there is to assist these individuals with having autonomous and typical life so they won't thoroughly rely upon human associates more often than not. The truth of the matter is that the accessible wheelchair plans and control calculations of controlled (electric) wheelchairs don't give adequate abilities to the clients to be free in their everyday exercises. For example, the element of lifting the seat is accessible in certain plans in four-wheeled design which make them inadmissible for use in restricted spaces. Then again, a few wheelchairs on two wheels are accessible yet for various targets, i.e., to be utilized as seats that can be situated underneath the table.

Numerous business plans have showed up in the last few years. iBot is a fuelled wheelchair with a ton of capacities chipping away at 4 wheels,

adjusting on 2 wheels, climbing step and enabling clients to join eye-to-eye discussion with individuals yet lamentably the organization has quit creating it. Genny is another two wheeled wheelchairs, it can adjust on 2 wheels yet it doesn't can lift the seat.

Global Organization for Standardization (ISO) has done norms that are identified with the working region of wheelchairs. These principles can assist the structures with planning the houses to be reasonable for the clients of wheelchairs, ISO 7176-5:2008 standard was engaged in the assurance of measurements, mass and moving space. As to ISO 7176-5 most extreme involved length of manual and controlled wheelchair must be 1300mm, involved width of manual wheelchair must be 800mm yet electrical sort must be 700mm, and ISO expressed that the greatest turning breadth must be 2000mm for manual wheelchair and 2000 to 2800 in fuelled wheelchair.

These days, planning such mechanical plan has gotten simpler than past on the grounds that numerous products has been discovered to help designing in planning and testing the items. SolidWorks is viewed as one of the amazing assets to plan and re-enact the mechanical plans and items. Utilizing SolidWorks, specialists can abbreviate the necessary planning time, and upgrading and approving the plan to arrive at the ideal plan as could be expected. SolidWorks reproduction another significant apparatus is remembered for SolidWorks programming. It can help in executing numerous tests on the plan to guarantee the wellbeing of this plan and to test the plan under the outer powers.

This work presents the 3D plan of two-wheeled wheelchair configuration utilizing SolidWorks. Which is the plan cycle is following the methodical

strides for planning utilizing CAD programming. Limited component examination has executed on the edge of the wheelchair to test it under the outer loads and select the ideal material for making the weight is appropriate.

2. Solidworks Overview

SolidWorks is an outstanding 3D design tool. It gives designers the ability to sketch out ideas, experiment with features and dimensions and produce models and detailed drawing. 3D design approach is used in SolidWorks.

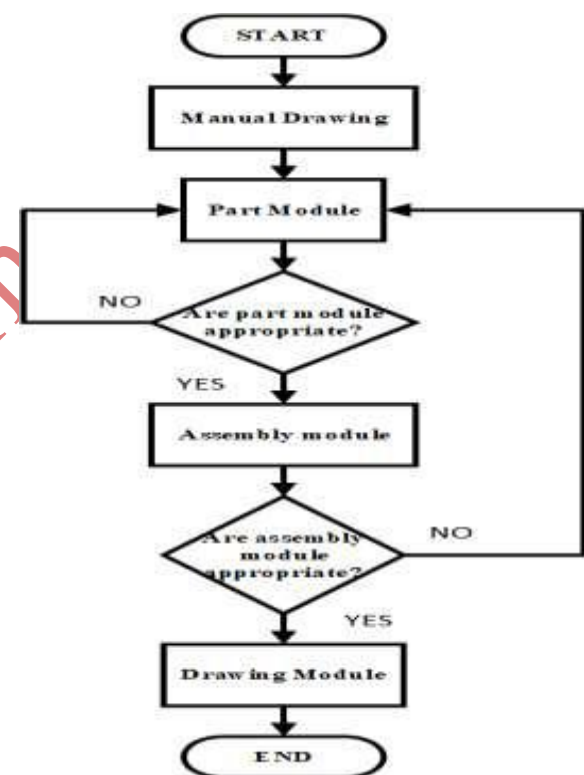


Figure 1. Systematic steps in designing using SolidWorks

It is start from introductory sketch on papers at that point going to SolidWorks climate to fabricate the parts from the underlying representation after that joining the parts together in one gathering to come out with the last plan. 2D drawing is the last advance prior to sending the plan to the workshop

to fabricate the genuine model. Figure 1 shows the four significant segments of SolidWorks.

3. Three-Dimensional Design of Two-Wheeled Wheelchair

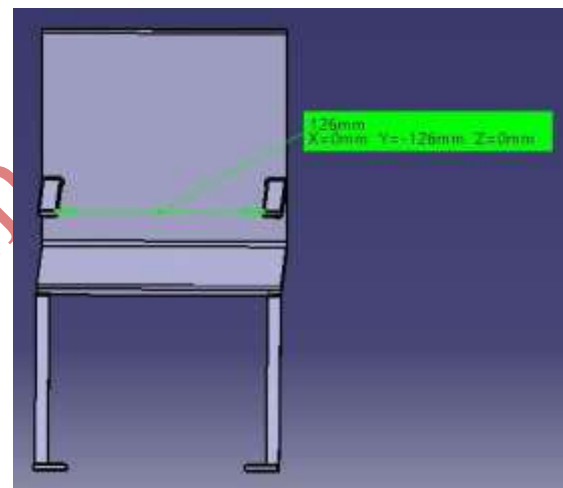
The control of a two-wheeled wheelchair is an intriguing and testing control issue, and considered as a profoundly nonlinear and unsteady control issue. It is a complex nonlinear framework, whose input-yield conduct is unusual and totally insecure with no control. The enormous test, along these lines, is in the demonstrating, plan, and the usage of reasonable control systems for two-wheeled wheelchair that can perform similarly to the standard four-wheeled wheelchairs.

Planning steps are following the stream outline in figure1. In the first place, choosing the components of each part to come out with reasonable plan and to accomplish the ISO-standard qualities. Second step is demonstrating each part separately. The wheelchair is separated into three sections; back tires, the casing and casters. Notwithstanding the parts, there are two subassemblies, the lifting instrument - lifting component and the seat with human body.

Subsequent stage is to consolidate all parts and subassemblies together to fabricate the last plan. In this progression, base up procedure is utilized, which it begins by building the parts at that point coordinate these parts together utilizing mates. Mates make the mathematical relations, for example, correspondent, opposite and digression. These mates help in confining the development of the parts.

4. Working Area and Dimensions:

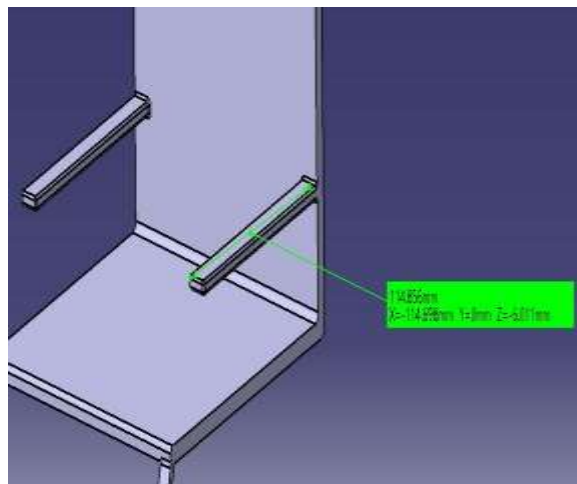
Worldwide Organization for Standardization (ISO) has set the standard measurements and turning sweep of controlled wheelchairs. While the most extreme involved length and width ought to be 1300mm and 700mm separately. While the greatest turning span ought to be 2800 mm. The proposed configuration accomplishes the ISO-7176-5 guidelines of measurements and turning range, where it is involved length and width are 904.34mm and 660.65 separately these measurements with the capacity to chip away at two wheels enable this plan to work in thin territories.



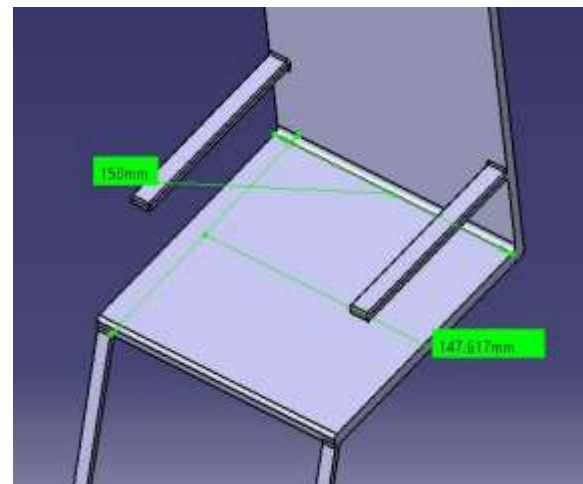
(a)



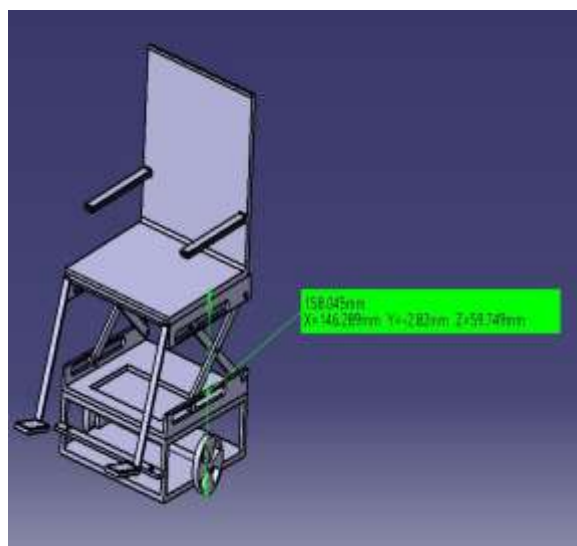
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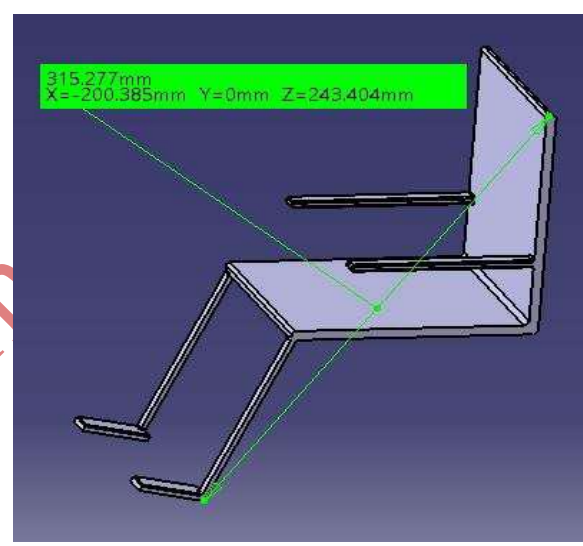
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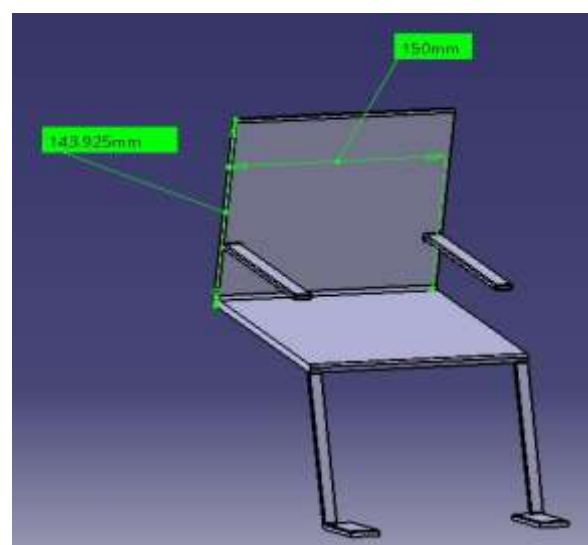
(f)



(d)



(g)



(e)

Figure 2: design of two-wheeled wheelchair

Figure 2 shows the occupied length, occupied width and turning radius of two-wheeled design.

5. Conclusion

In this paper a bottom-up assembly is used to build the 3D model of the two-wheeled wheelchair. Starting from building the parts, then integrate it together in one assembly to reach the full 3D model. SolidWorks simulation has been used to ensure the capability of the frame to Stand under the influence of an external force – human body

weight. Finite element analysis has been done using steel and aluminium to build up the frame, both material success in the test, but aluminium has been selected because of its light mass.

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