Equal Access through Service Learning for Persons with DisabilitiesWorkshop 6

Jelena Micevska, MSc Sofija Sidorenko, PhD Tatjana Kandikjan, PhD

Improvement of the life quality of children with cerebral palsy – design of specialized wheelchair







Introduction

- What is cerebral palsy?
 - Cerebral palsy is a result of brain injury, which produces impairments of the locomotion system, balance and coordination of the body.
- Need of specialized wheelchair.
- Conducted analysis:
 - Analysis of the children's needs,
 - Analysis of the medical, customer and manufacturer requirements,
 - Analysis of the proposed solution.





Characteristics of children with cerebral palsy

Forms: spastic, athetoid, ataxic

80% - speaking problems and impaired visual activity

Cognitive impairment

Often accompanied by epilepsy

Additional disorders





Children's needs

Affordable price

Durable

Various

Additional

elements for

play and fun

wheelchair

Seat with height,

depth

Comfortable

backrest

Place for bags and additional elements

support height, width

side, leg, feet support





Medical requirements

Firm posture of the spine

Therapeutic effect

Body and lower limbs angle 90°

Appropriate dimensions to child's

wheelchair

Head and side support to obtaining proper position

Spine, arms, leg, feet support

Possibility to add medical treatment accessories

Soft seat in order to avoid wounds





Customer requirements

Afford able price

Low weight

Easy to use

Durable

Easy transfer

Upgrad able

wheelchair

Easy to dissemble

Modular

Possibility of use in different spaces

Lovely and smart design

Adjustable

Comfort able

Easy to change positions





Manufacturer Low production requirements price Low market Low market price price Good Standard logistic wheelchair processes system Standard Pricey spare parts parts Modular parts



Ergonomic requirements for the wheelchair

- Possibility to change driving system;
- Possibility of having storage space;
- Good suspension system;
- Adjustable handles for companion's manipulation.

Ergonomic requirements for the seat

- Seat and backrest angle must be 90^o (usual active position);
- Adjustable backrest inclination in order to provide rest position (90⁰-120⁰);
- Possible transformation into standing support;
- Obligatory integrated armrests for placing the arms in rest position;
- Obligatory possession of additional supports for providing vertical position of the spine;
- Obligatory integrated feet supports for stabilization of the body;
- Obligatory integrated legs supports for stabilization of the body in standing position;
- Obligatory integrated headrest for obtaining proper position of the head;
- Obligatory possession of a wedge (between the thighs in order to prevent of spasms);
- Soft seat cushions to prevent wounds occurrence;
- Dimensions of the seat must be appropriate for the child's dimensions.





Design concept

- Design problem
 - Design a wheelchair for a children with cerebral palsy, age 7-14.

- Concept of modular wheelchair
 - Fixed seat
 - Variable driving system









Design concept

- Concept of adjustable seat
 - Principal of modularity and
 - Principal of adjustability,

 Transformation of the wheelchair into a standing device.



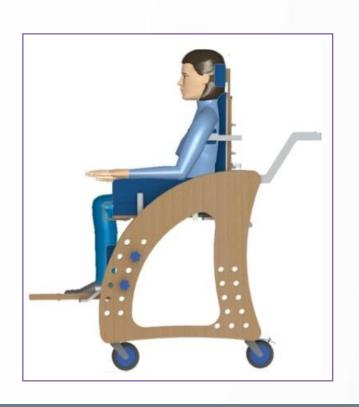




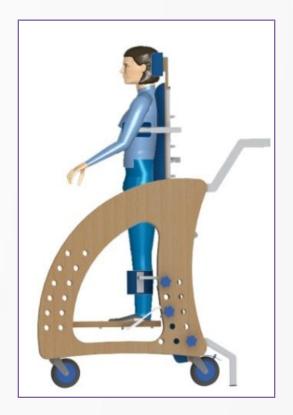


Analysis of the design – first evaluation

Verifying wheelchair comfort for child, age 7.





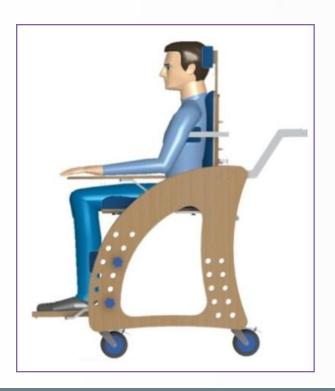




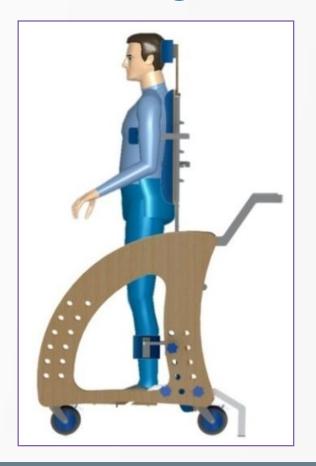


Analysis of the design – second evaluation

Verifying wheelchair comfort for child, age 14.





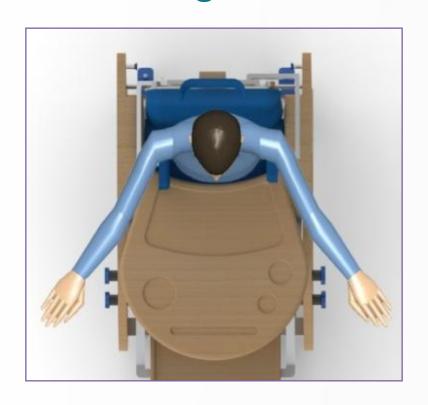


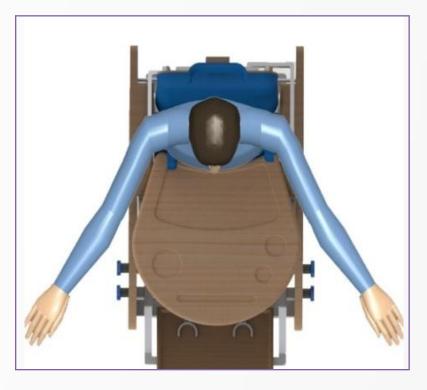




Analysis of the design – third evaluation

 Verifying the zones of convenient reach for the children age 7 and 14 in seating position.









Instead of a conclusion

 If you really want to do something, you'll find a way. If you don't, you'll find an excuse.

- Jim Rohn

