

# Balancing Posture and Pressure in Complex Custom Seating — A Case Study

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# Introduction



- Lady, 40 yrs., 36 Kgs., full-time power wheelchair user
  - Lives independently with assistance from carers and friends
  - Hoisted all the time
  - Communicates with Augmentative communication device for speech
  - Love to go out and about locally, travels aboard
  - Uses public transport.
  - A poet and story writer
- 
- Rear wheel drive power wheelchair
  - ROHO seat cushion and modified moulded backrest
  - Other secondary supports



# Concerns..... Client reported:

- Wants to be out and about
- Participation in day-to-day activities
- Enhanced social life
- Able to stay in the wheelchair for longer duration
- Needs to be well held and hugged





# Summary of findings - General



- Socially:
  - Mostly home bound with limited socialisation
  - Drastically decreased function at home
  - Decreased involvement in the community
  - Poor self-esteem
  
- Skin and pressure injuries:
  - Pressure injury started four years ago at sacral area.
  - Present Pressure injury:
    - Grade 3 at the sacral area
    - Grade 2 over the IT
    - Grade 2 over spinal region
    - grade 1 at left hand side rib cage



# Summary...MAT assessment

- Physically:
  - Posterior pelvic tilt (severe, fixed)
  - Spine: Scoliosis (convex left hand side, moderate & fixed) and kyphosis (severe, fixed).
  - Pain both hips and knees (7 /10)
  - Trunk-to-thigh angle 125 degrees and thigh-to-lower leg 80





# Clinical Objectives.....



- Pressure Care
- Posture
- Stability
- Seating tolerance
- Seating Balance
- Improved active mobility

- Wheelchair outcome measure (WhOM) used to measure the changes or improvements pre and post-intervention

# Posture and Pressure

Material	Foam Tech	Gel Tech	Fluid Tech	Air Tech
<b>Feature</b>				
<b>Postural Support</b>	Good	Reasonable	Poor	Poor
<b>Pressure-relief risk level</b>	Low - Medium	Medium	Medium-High	High
<b>Shear-reduction</b>	Poor	Very Good	Very Good	Excellent
<b>Heat Dissipation</b>	Poor	Reasonable	Reasonable	Good
<b>Weight</b>	Light-Medium	Very heavy	Very heavy	Very Light
<b>Cost</b>	Cheap	Expensive	Very expensive	Expensive

			Properties		Resilience	
Material	Envelopment	Shear	Dynamic	Thermal	Long-Term	Short-Term
Foam	GOOD	HIGH	GOOD (1)	POOR	GOOD	GOOD
Viscoelastic Foam	GOOD	HIGH	MIXED (2)	GOOD	MIXED (3)	MIXED
Solid Gel	POOR (4)	LOW	MIXED (5)	GOOD	-	-
Viscous Fluid	VARIABLE	LOW	POOR (6)	GOOD	POOR	POOR
Air	DEPENDS (7)	DEPENDS (8)	GOOD	DEPENDS (9)	-	-

Stephen Sprigle (1992) *The Match Game*, S.I.: TeamRehab, pp. 20-21.



# What did we do...



## Combined Technology: Foam (Posture) + Air (Pressure)

### Foam

Step 1: One Piece moulded seating system

Step 2: Fitting and modifications to molded seating system for confirmation to body shape

Step 3: Split the seating system into half and add 1" foam – widened seating space to add custom air system

Step 4: placement and channeling of air control valves

### Air

Step 1: Pattern of the contact surface in the existing mold to plan for shape, size, and to obtain quote and for discussion

Step 2: Decide over cell height with respect to seating needs

Step 3: Re-confirm the size with supplier for final manufacturing.

Step 4: Placement of customised air seating insert and maintenance of air for enhanced seating.



# How did we do...

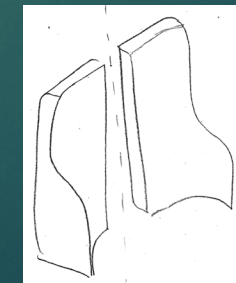
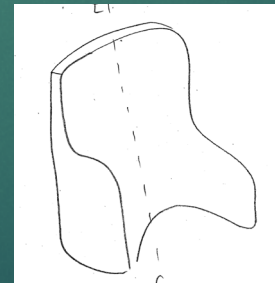
## Foam

Step 1: One Piece moulded seating system

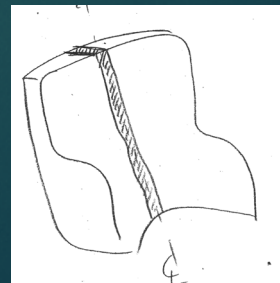
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Stage 3





# How did we do...

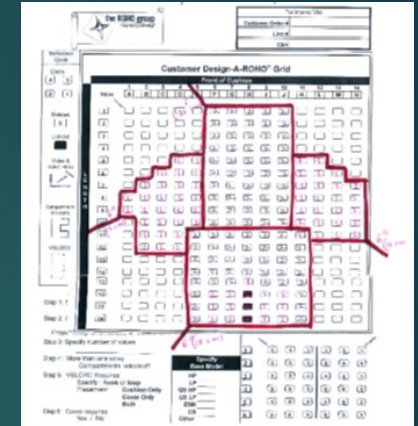
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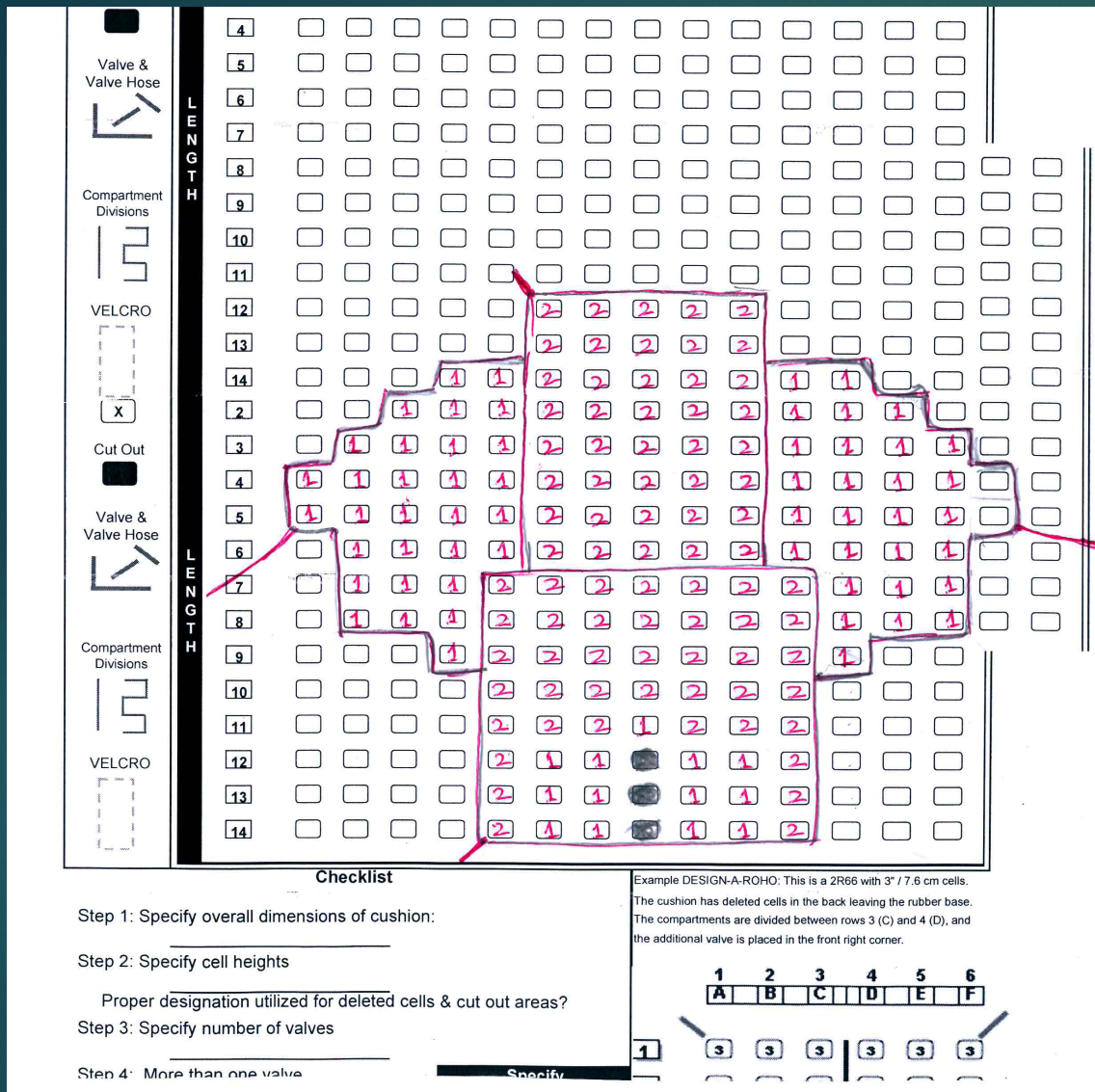
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## ROHO Design

ROHO Inc. was approached through Irish supplier as they were proactive during discussion stage and were supportive through the process.



The form displays a grid of cells, each containing a handwritten number (1 or 2) indicating the number of valves. The grid is divided into sections by vertical lines. The left side of the grid is labeled 'HEIGHT' and the bottom is labeled 'LENGTH'.

**Checklist**

Step 1: Specify overall dimensions of cushion: \_\_\_\_\_

Step 2: Specify cell heights \_\_\_\_\_

Proper designation utilized for deleted cells & cut out areas? \_\_\_\_\_

Step 3: Specify number of valves \_\_\_\_\_

Step 4: More than one valve \_\_\_\_\_

**Example DESIGN-A-ROHO:** This is a 2R66 with 3" / 7.6 cm cells. The cushion has deleted cells in the back leaving the rubber base. The compartments are divided between rows 3 (C) and 4 (D), and the additional valve is placed in the front right corner.

1	2	3	4	5	6
A	B	C	D	E	F



# Outcome...



- Immediate reaction at issue:
  - Seating was very stable and comfortable
  - Improved from 5.5/10 to 9/10
  
- 2 weeks on a follow-up telephone call
  - Able to stay longer in the wheelchair and seating
  - Able to travel up to some distance without getting tired.
  - This helped her achieve some degree of ability to manage her ADL
  - Improved level of socialisation.
  - Seating posture and functional activity had improved to a great extent in wheelchair outcome measure scale.
  - Increase seating tolerance and seating balance



# References



## References

1. Engstrom, B. (2002) *Ergonomic Seating – A True Challenge*. Medico Druck & Logistik GmbH, Germany.
2. Mayall, J.K and Desharnais, G. (1995) *Positioning in a wheelchair – A Guide for Professional Caregivers of the Disabled adult*. Slack Incorporated, USA.
3. Ham, R., Aldersea, P., and Porter, D. (1998) *Wheelchair Users and Postural Seating – A Clinical Approach*. Churchill Livingstone, UK.
4. Stephen Sprigle (1992) *The Match Game*, S.l.: TeamRehab, pp. 20-21.

