Build Instructions: *Astro Pillow*

Adaptive pillow for a quality nights sleep for individuals with Ankylosing Spondylitis or 'tech neck'

Developed by:

Tikkun Olam Makers

TOM: Melbourne

Approximate Cost: $70 *for Blue Foam, $40 for cervicollar, $20 foam and pillow case.*

Time Required: 3 days

General Warnings and Cautions

- Read through entire manual before attempting to build this device.
- Do not attempt a step if you are unsure of what you are doing. Certain steps in this manual require experience with fabrication tools. <<General Warning>>.
    - For assistance or clarification of any step, contact the Protolab staff at Swinburne University or Design Team listed above.

User Assistance

For any questions regarding the assembly, operation or specifications of this device, please contact Design Team:

TOM: Melbourne is available to facilitate any questions about the product.

Icon Glossary

The following icons may be used throughout this manual—each with its own purpose.

- **Caution:** The caution icon is used to signify whenever someone attempting the procedure may injure themselves or damage their equipment.
- **Note:** The note icon is used to signify useful bits of information that complement the instructions.
- **Reminder:** The reminder icon is used to provide information for after the procedure is completed, such as tips for disassembly.
- **Need-Knower Specific:** This part or method of manufacture has been designed specifically for a local Need-Knower.

Need-Knower Background:

Kade is a boardsports-loving father, partner and occupational therapist who deserves a peaceful and comfortable night's sleep to enable active participation in daily life. To do this, he needs an individually designed, ergonomic pillow that extends and retracts his cervical spine to provide relief from pain and stiffness caused by his condition of Ankylosing Spondylitis.

Purpose of Device:

The Astro pillow aims to provide a safe and comfortable sleeping support that can adapt to the users needs of achieving cervical extension and retraction stretch or neutral support. This is achieved through the self inflatable section within the pillow in combination with the unique integration of lumbar support, neck support and head support.

Physical Description:

The Astro pillow is comprised of 5 main sections.

1. *Lumbar support: this 'normal curve' shaped piece provides stability for the pillow but primarily promotes a graded support from mattress to the shoulder /neck piece.*
2. *The shoulder/ neck crescent: This piece connects the lumbar support with the head support. It is graded to support under the shoulders, up into the neck. The base extends under the inflatable disc to connect the head support.*
3. *Inflatable disc: This is a retail device Cervicollar that can be purchased for $37. The cervicollar is curled tightly in a spiral shape and placed on top of the base piece. The cord and hand pump is then fed out to be external to the main shape to allow user to comfortably pump with either left or right hand.*
4. *The Head support: Crescent shaped to connect with the shoulder neck crescent to form full oval. This piece provides additional support for the users head when in the neutral position.*
5. *Overlay of 3cm thick foam is wrapped around the pillow encased in a modified European pillow case. This ensures comfort, appropriate temperature and hygiene of the product. This pillow case may also have handle to enable easy travel.*

History of Development:

This project has been developed as part of the Design Factory Melbourne at Swinburne University (DDD80013 DFM Toolbox: Innovation & Interdisciplinary Collaboration 2). A collaborative unit between Masters of Occupational therapy and Masters of Design Students that has extended from August- November 2022.

Bill of Materials

Part ID	Part Name	Description	Qty	Units	Supplier	Unit Cost	Cost
A	Blue Foam	RTM	120mm x 600mm x 2500mm	0.5	Unique Foams	140	$70
B	Cervical Collar	Inflatable cervical collar	1	1	Aussie Massager Store	37	$37
C	Tribeca Memory foam square	Convoluted foam square to reduce pressure points and increase circulation	1 x 500mm x 500mm x50mm	1	Spotlight	37	$37

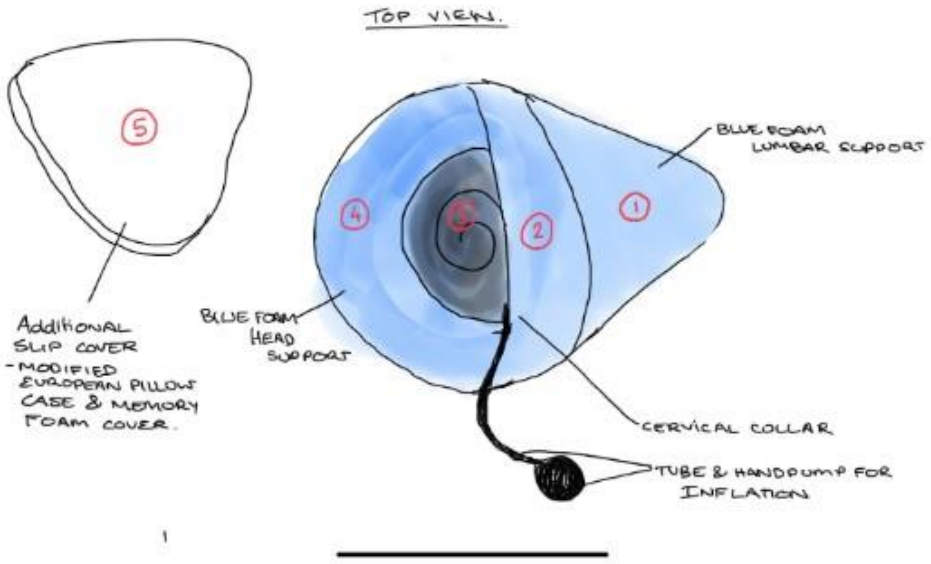
Tools Required:

- *Double sided sticky tape*
- *Hot wire cutter*
- *Sanding paper*
- *Band Saw*
- *Laser Cutting Machine*
- *Plywood 1200 x 700 x 3mm*
- *PVC Glue*
- *Cotton padding*

Parts Inventory (Assembly) :

Part No.	Part Name	Description	Qty	Units
1	Lumbar support	Blue Foam Lumbar Support	1	1
2	Denneroll	Blue Foam Crescent moon shaped "Denneroll" based section connecting the lumbar support to the head rest.	1	1
3	Cervical Collar	Inflatable Cervical collar, curled between the Denneroll and head rest with tube for hand pump threaded through space for easy inflation	1	1
4	Head support	Semi circular blue foam piece connecting to the Denneroll to make full oval shape to support head.	1	1
5	Foam cover/ Pillow case	Tribeca memory foam square cut to shape and placed over the pillow with a modified european pillow case.	1	1

1. Assembly drawing with parts numbers :



Assembly

Step 1 : *Preparing templates*

- Parts and Tools Used In This Step:
    1. Laser Cutting Machine
    2. Plywood 1200 x 700 x 3mm
- Instructions:

Dividing the pillows into four parts. Each part of the pillow had plywood templates.

1. Prepare a laser cutting file setup on Adobe Illustrator for each section of the pillow.
2. Adjust the lines as required.
3. Choose the material and laser setting for Plywood 1200 x 700 x 3mm
4. Prepare the laser cutting machine for printing.
5. When all done press play to start cutting or etching
6. Now Plywood templates of each section of the pillow were created

Step 2 : *Preparing Blue foam pieces*

- Parts and Tools Used In This Step:
    1. Band Saw
    2. Double sided sticky tape
- Instructions:
    1. Divide the Blue foam 120 x 600 x 2500mm into pieces using the BandSaw.
    2. Place the Plywood Templates on the top and base of the blue foam using the double sided sticky tape.

Step 3 : *Hot wire cutter*

- Parts and Tools Used In This Step:
    1. Hot wire cutter
    2. Sanding paper
- Instructions:
    1. Use the Hot Wire Cutter to cut the pieces that make from blue foam and plywood templates.
    2. Some of the pisces need to be cut in the hot wire from the second direction too. Repeat Step 2 if required.
    3. For the curves that couldn't be done with the Hot wire, use sanding paper to soften edges.

Step 4 : *Assembling Blue foam*

- Parts and Tools Used In This Step:
    1. PVC Glue
    2. Double sided sticky tape

- Instructions:
    1. Stick the parts together using PVc Glue or the Double sided sticky tape
    2. Allow some time to dry while gluing the parts together.

Step 5 : *Inflatable Centre and padding*

- Parts and Tools Used In This Step:
    1. Cotton padding
    2. existing inflatable pillow with manual hand pump.
    3. Double sided sticky tape

- Instructions:
    1. Add the inflatable center to the pillow and make sure the pump pipe is not tangled.
    2. After making sure that all the parts are in the right position and order, add a double sided sticky tape to stick the cotton padding on top of the pillow.