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Zero G

Concepts and Prototypes

Revision A





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Concept Description

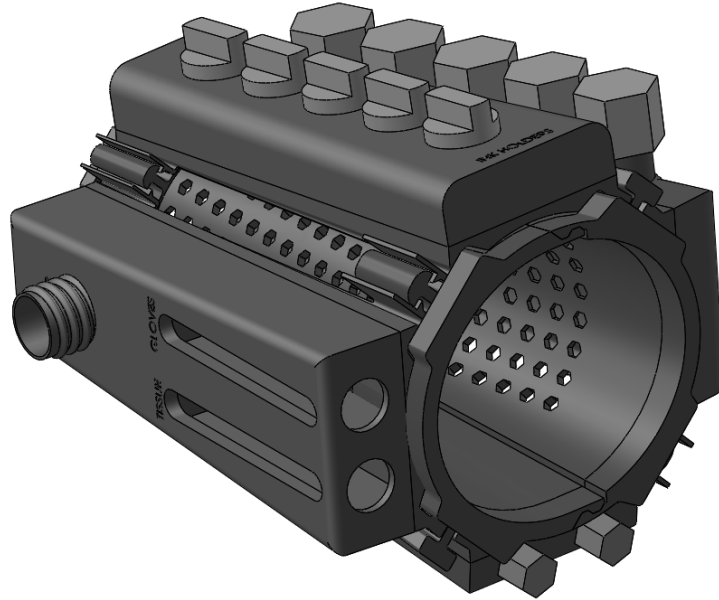


Figure 1 - Full and Finalised Prototype of Contraption

Zero G was conceived with the long-term goal of being able to tattoo in space/zero gravity. This grew into providing a convenient, accessible, and portable tattoo station for artists desiring a quick setup and efficient dispensing method for needles, inks, and hygiene equipment. The compact size and encapsulation of essentials provides a means for artists to travel long distances to meet a client and provide their service while also being able to complete short sessions much quicker and at both the clients house and the artist's own studio.

The lightweight and thin contraption is meant to clip around the entirety of the users forearm as a base with interchangeable additions to the base providing the user with the option of equipment additions that suit them best. These additions also clip onto the base and provide a quick method of installation and removal. The four additions conceived thus far are: ink holder, needle holder, hygiene dispenser (soap, gloves, tissues) and phone/watch holder.

This document is dedicated to displaying the journey from concept to prototype and some of the specifics of each component comprising the assembled contraption.

Concept Drawings

An overall view of the initial concept is shown below, with a flexible sleeve that fits over the arms and multiple attachments, including an ink and needle holder.

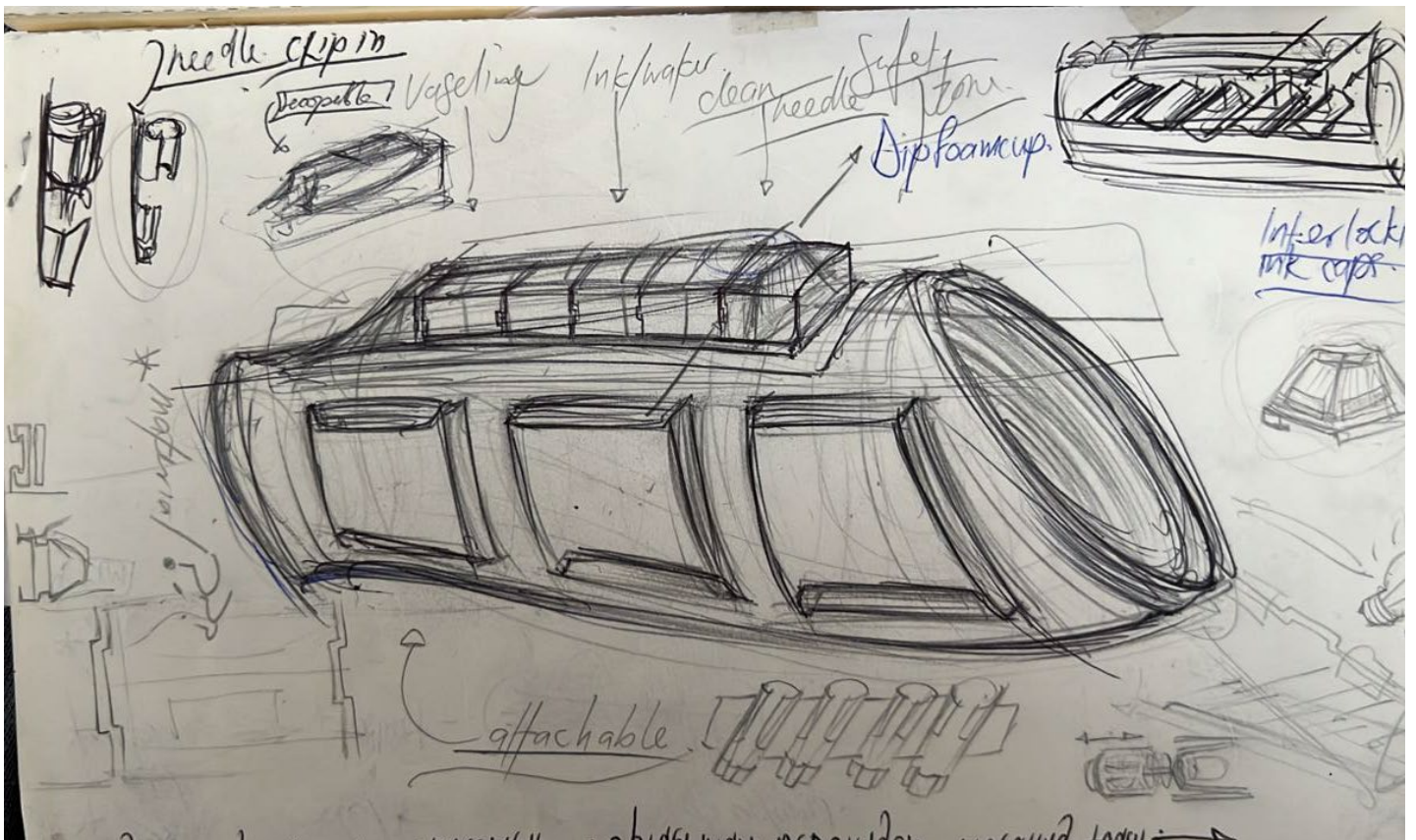


Figure 2 - Initial Overall Concept

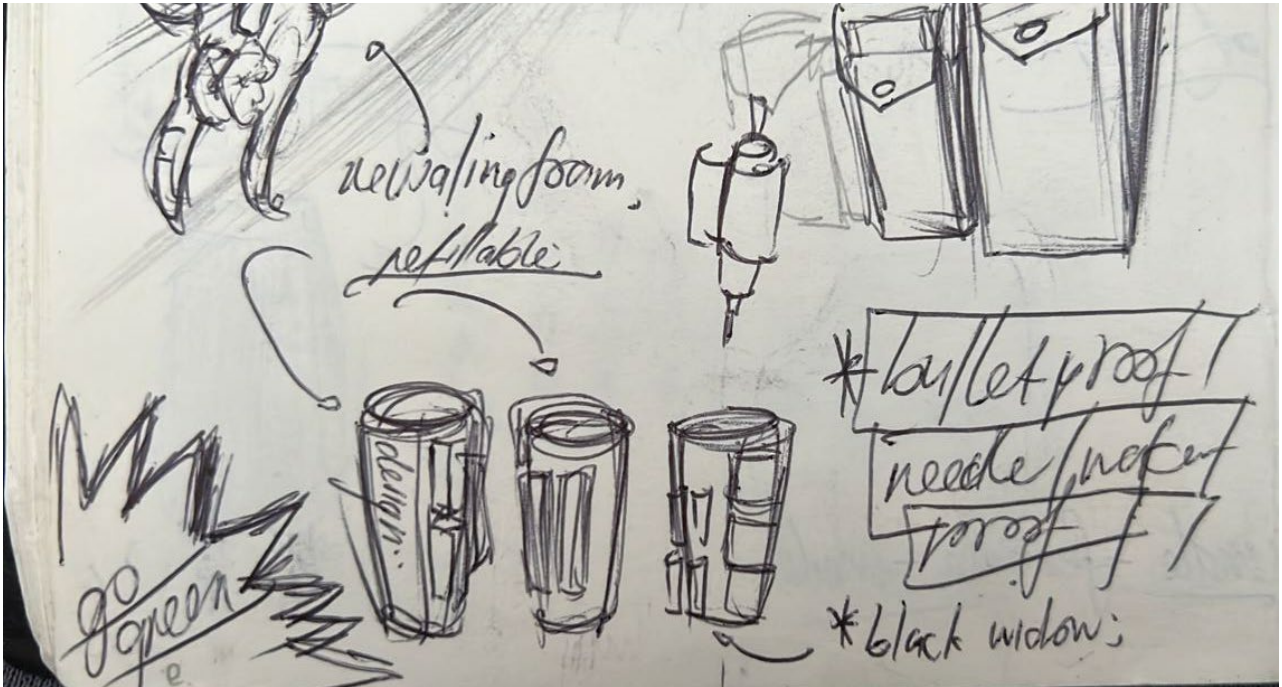


Figure 3 - Needle Changing Concept

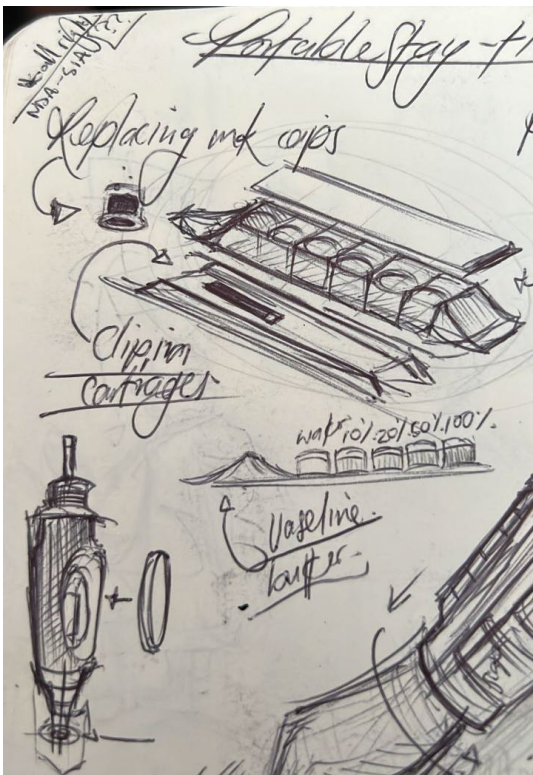


Figure 4 - Ink Changing Concept



Figure 5 - More Details on Ink Changing



Figure 6 - More Details on Sleeve and Holders



Figure 7 - An Overall View of All Concept Designs

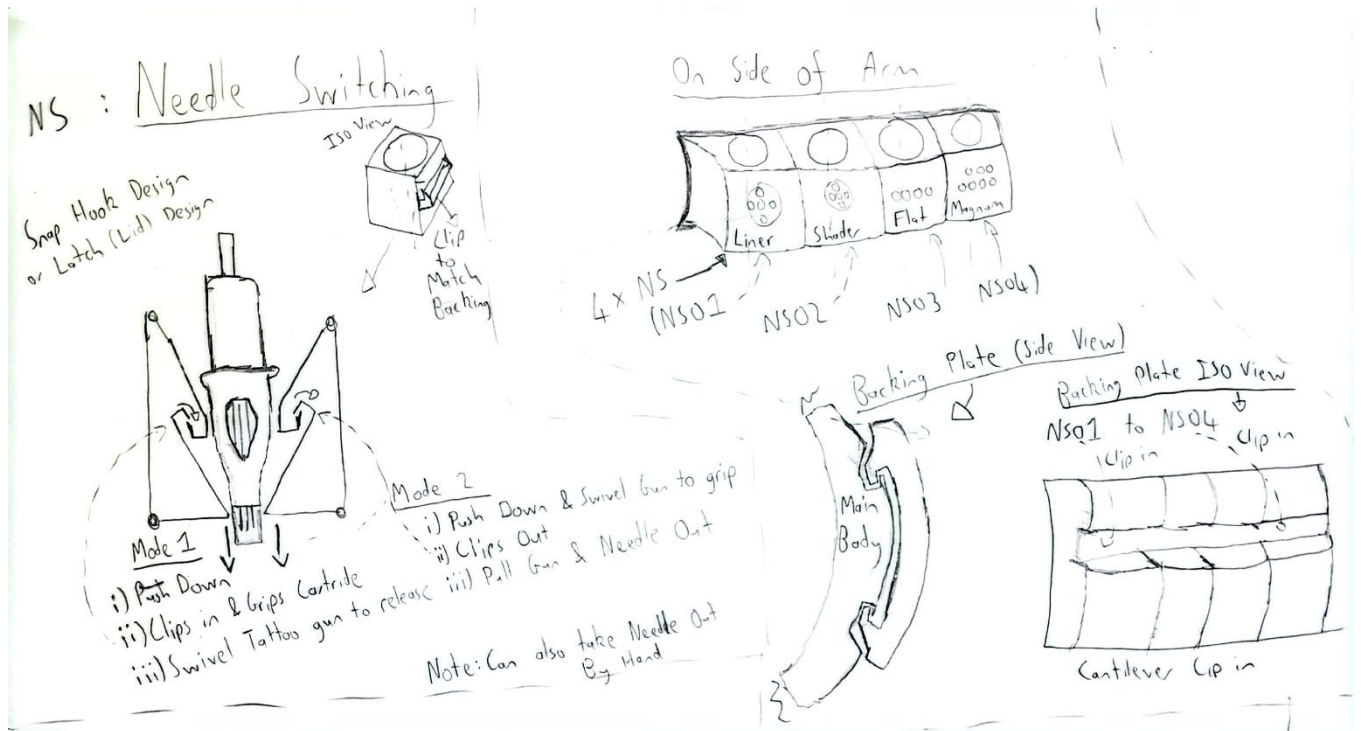


Figure 9 - Initial Ideas on Needle Switching

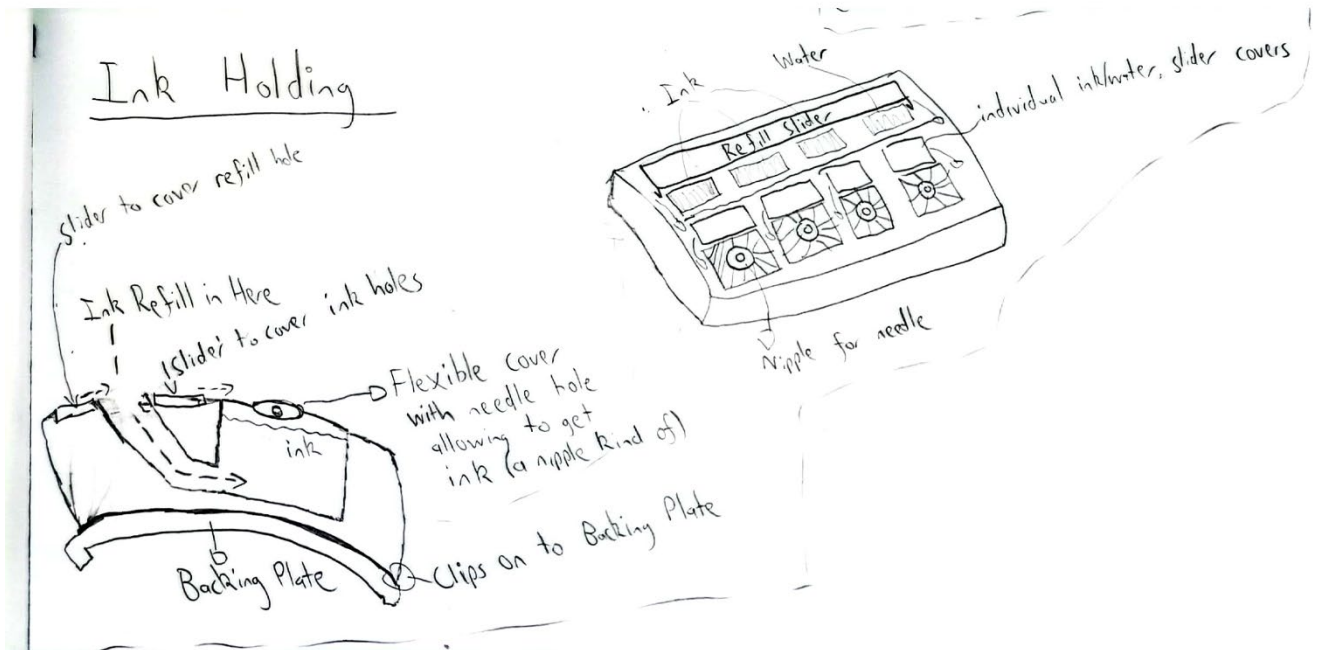


Figure 8 - Initial Ideas on Ink Holding and Switching

Revisions One to Three

Initial designs were concerned with the base which fits over the arm. The first design consisted of a thick base with four cantilever snap fit clips and four guide pegs which would mate with a mirrored opposing base. Plastic snap fit components were chosen for this contraption due to their low cost, ease of prototype (3D Printing), high forces required when switching needles/dispensing hygiene products and for the modularity provided by the design of clippable components.



Figure 10 - Base Revision A

The next revision removed a large amount of thickness (and thus mass) and accounted for annular snapping together of the arm base (annular snap fits were designed at the connection between the mirrored components). The design for clipping in of additions was accounted for as well and additional mass was removed with feature cuts.



Figure 11 - Arm Base Revision 2

The snap fit clip below was designed so that the additional components could easily be removed with fingers.

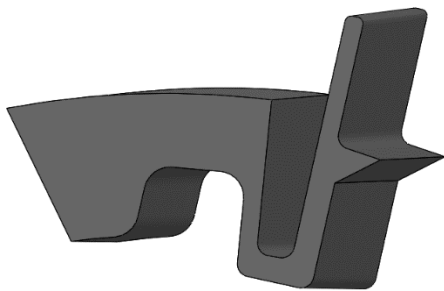


Figure 13 - Snap Fit Clip Removable with Fingers

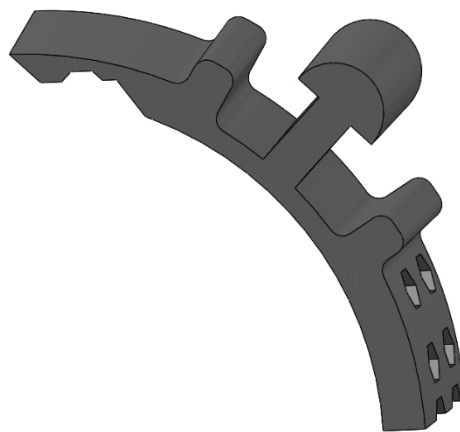


Figure 12 - Base Zoomed In (Where the Clip Attaches to)

In the third design, the annular snap fit (where the bases fit together) was made easier to mate (more angles were added) and the material removal was maximized and neatened. This concept was printed with additions in a small prototype version and the main issue noticed was that the circular inner shape of the arm hole did not conform well to the more lofted ellipse shape of a typical arm. Another issue noticed was the having the clips and clip fittings run over the entirety of the lofted base meant that a large amount of force was required to unclip the additional components. The clips also did not have a horizontal constraint, and this meant they could slide out of place and effectively off of the base. All these concerns were addressed in the final revision.

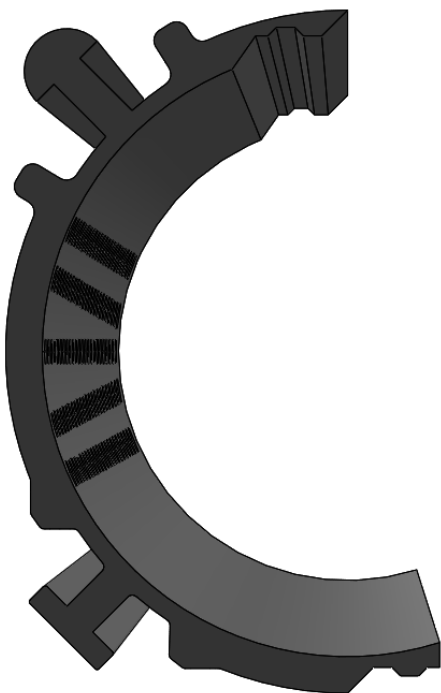


Figure 16 - Front View of Base Revision 3

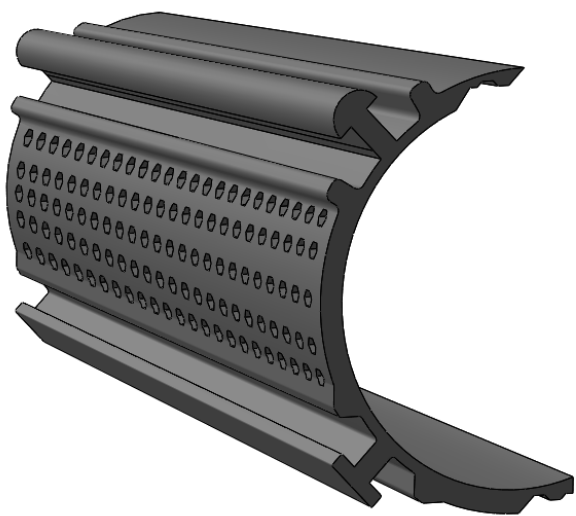


Figure 15 - ISO View of Base Revision 3



Figure 14 - First 3D Printed Prototype

Revision 4

In this revision the cross sectional shape of the base was made elliptical (to conform to the arm better), horizontal constraints were added to the ended of the base to ensure no movement of the additions could occur and the annular clips were neatened even further. The additions (not included in previous designs) were conceived and designed with modularity, ease of prototype and simple use in mind.

Assembly Renders

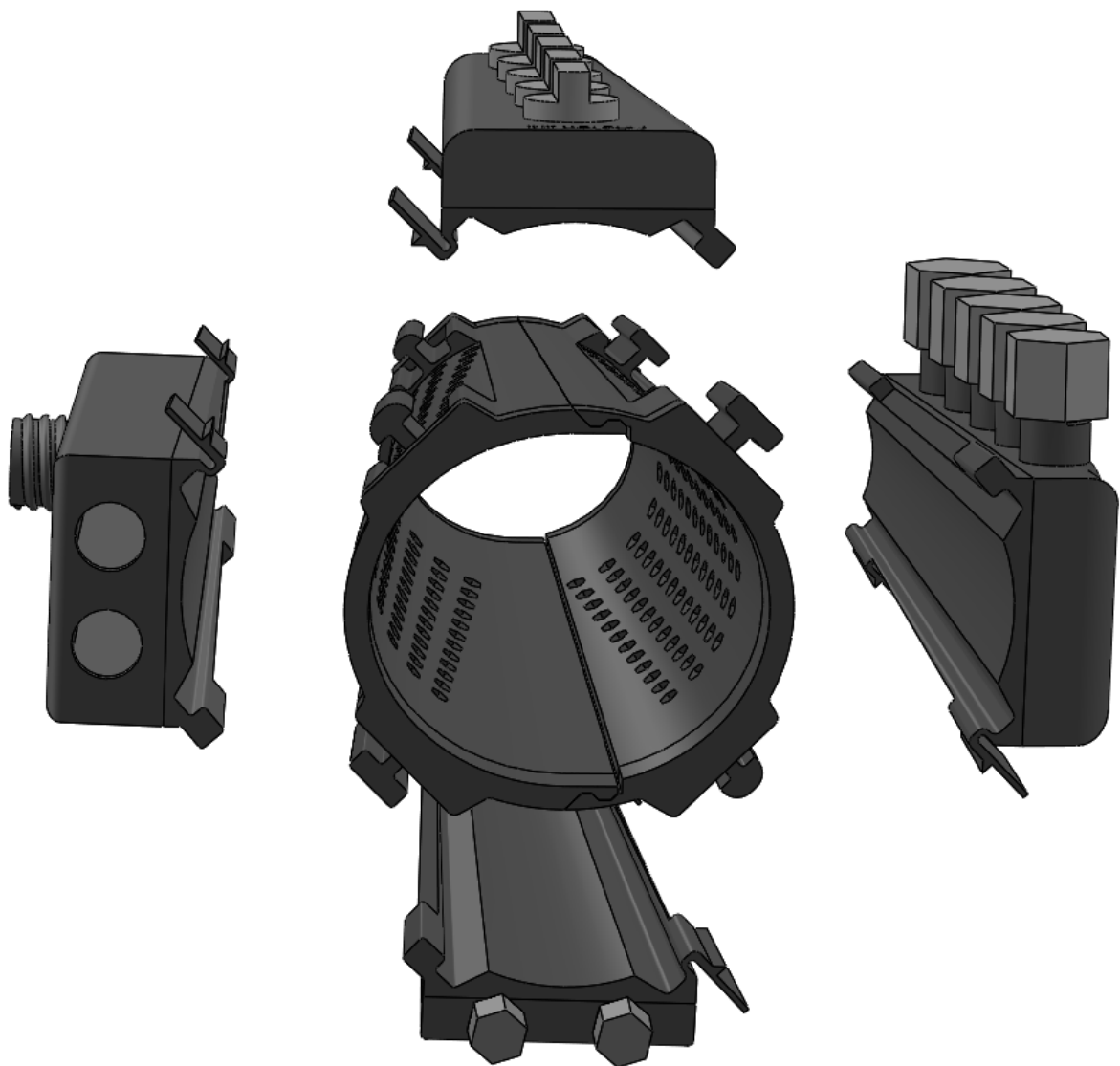


Figure 17 - Assembly with Additions not on Base

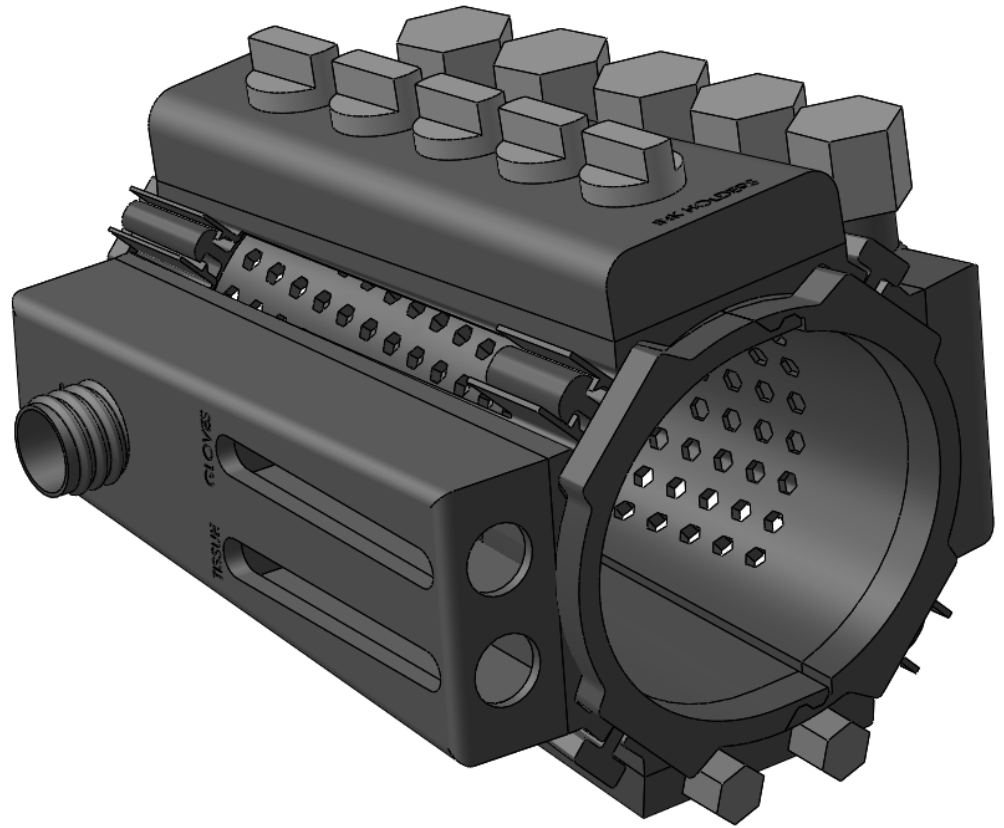


Figure 18 - Fully Assembled Contraption

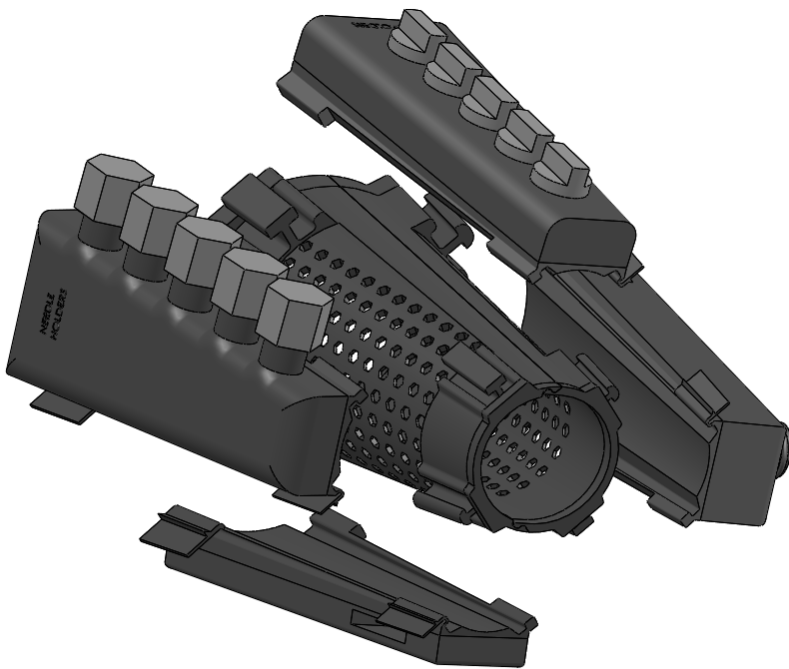


Figure 19 - Secondary Exploded View of Assembly

Component Renders

Base (Top and Bottom)

These two components mate together to form the base

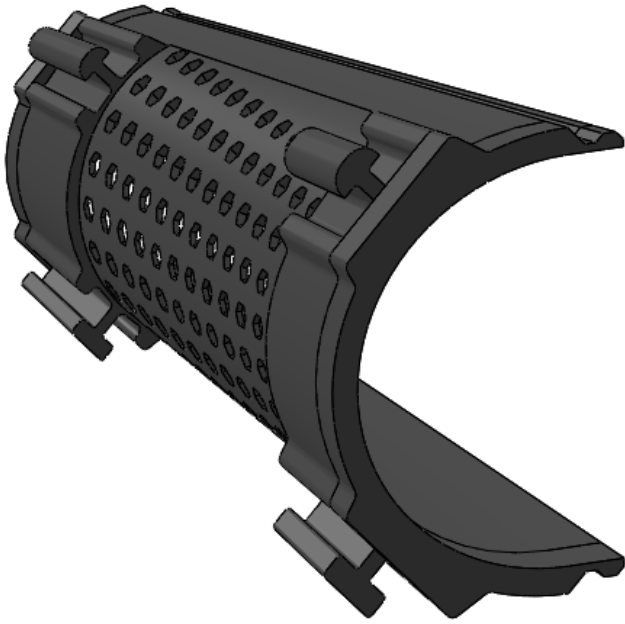


Figure 20 - Arm Base, Bottom

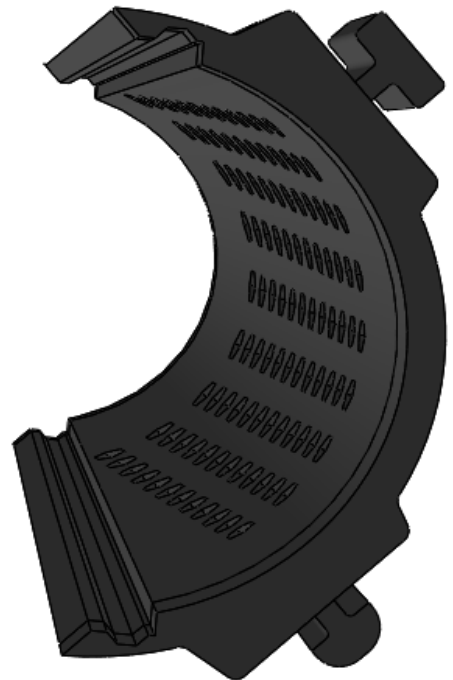


Figure 21 - Arm Base, Top

Ink Holder



Figure 22 - Ink Holder Addition



Figure 23 - Ink Holder Base

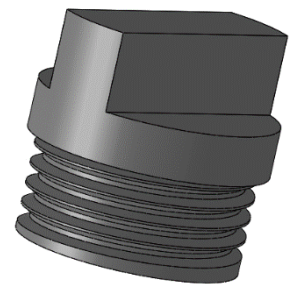


Figure 24 - Ink Holder Custom Screw

Needle Holder

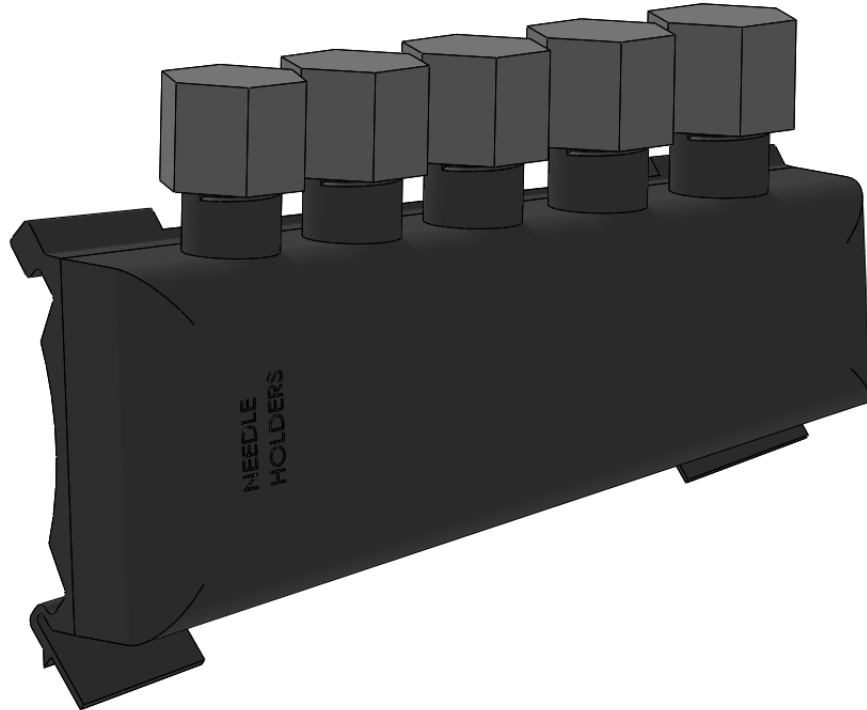


Figure 27 - Needle Holder Addition

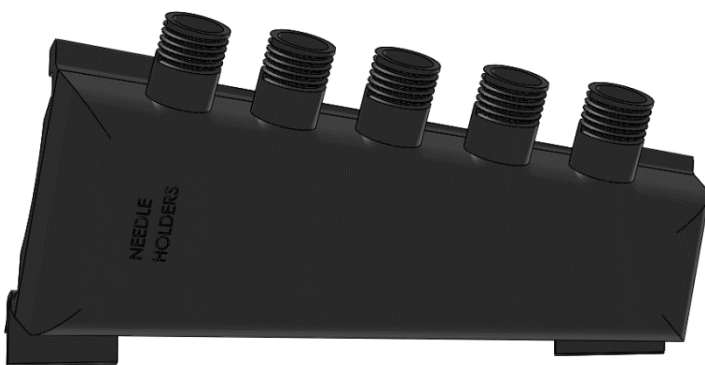


Figure 26 - Needle Holder Base

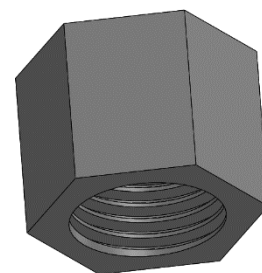


Figure 25 - Custom Screw for Needle Holder

Phone and Watch Holder

Designed to fit an apple watch and a SOYES X11S mini phone.

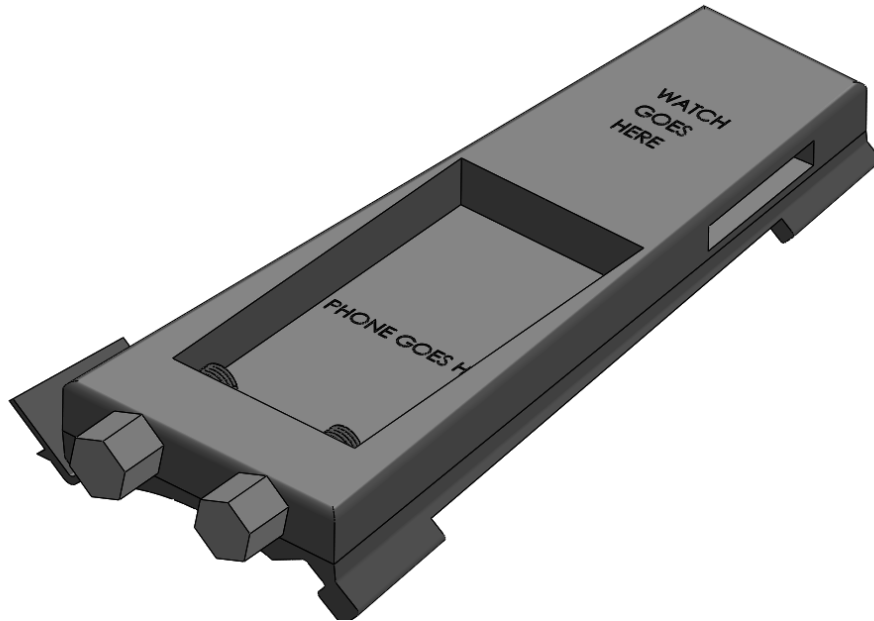


Figure 30 - Phone Holder Addition



Figure 29 - Phone Holder Base

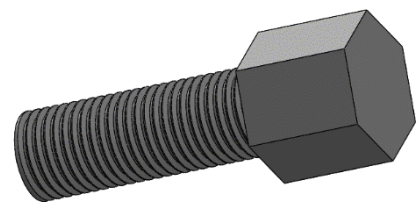


Figure 28 - Phone Holder Custom Screw

Hygiene Dispenser

Designed to dispense gloves, tissues and soap, the screw allows a typical soap dispenser lid to be fastened on to allow foamy soap to be dispensed easily.

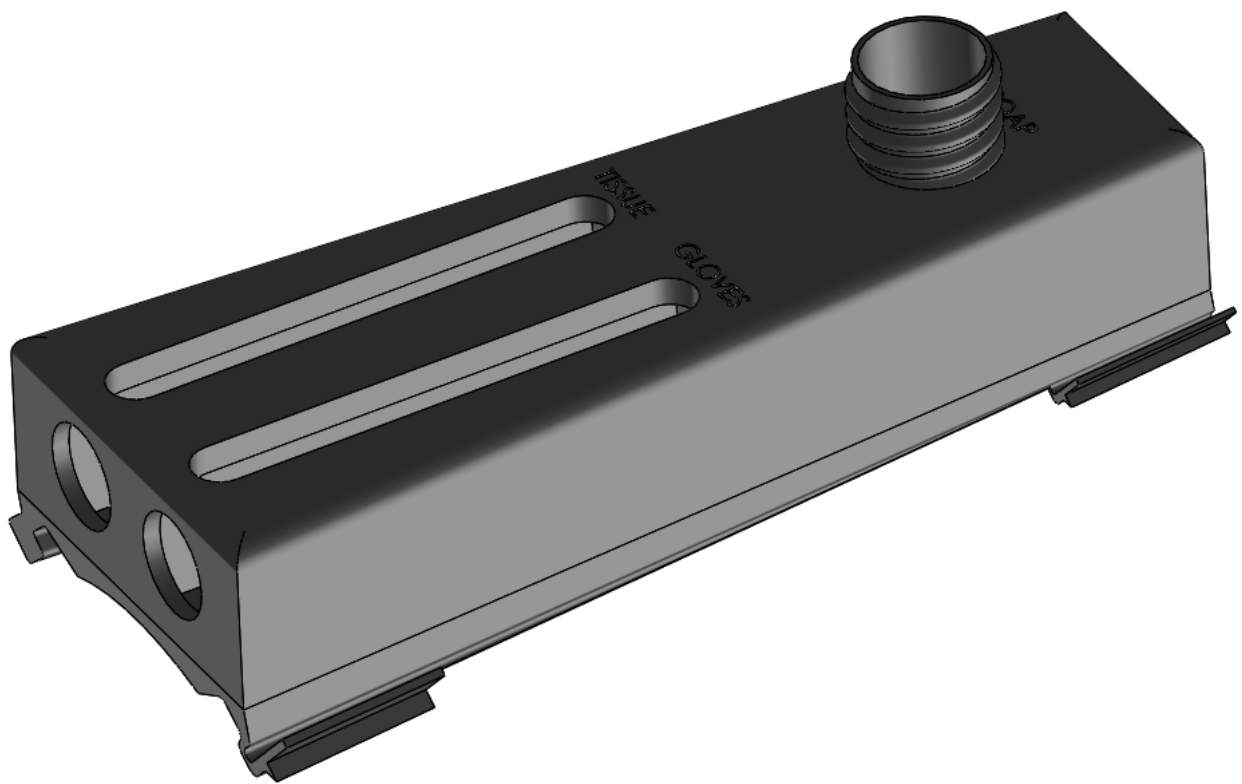
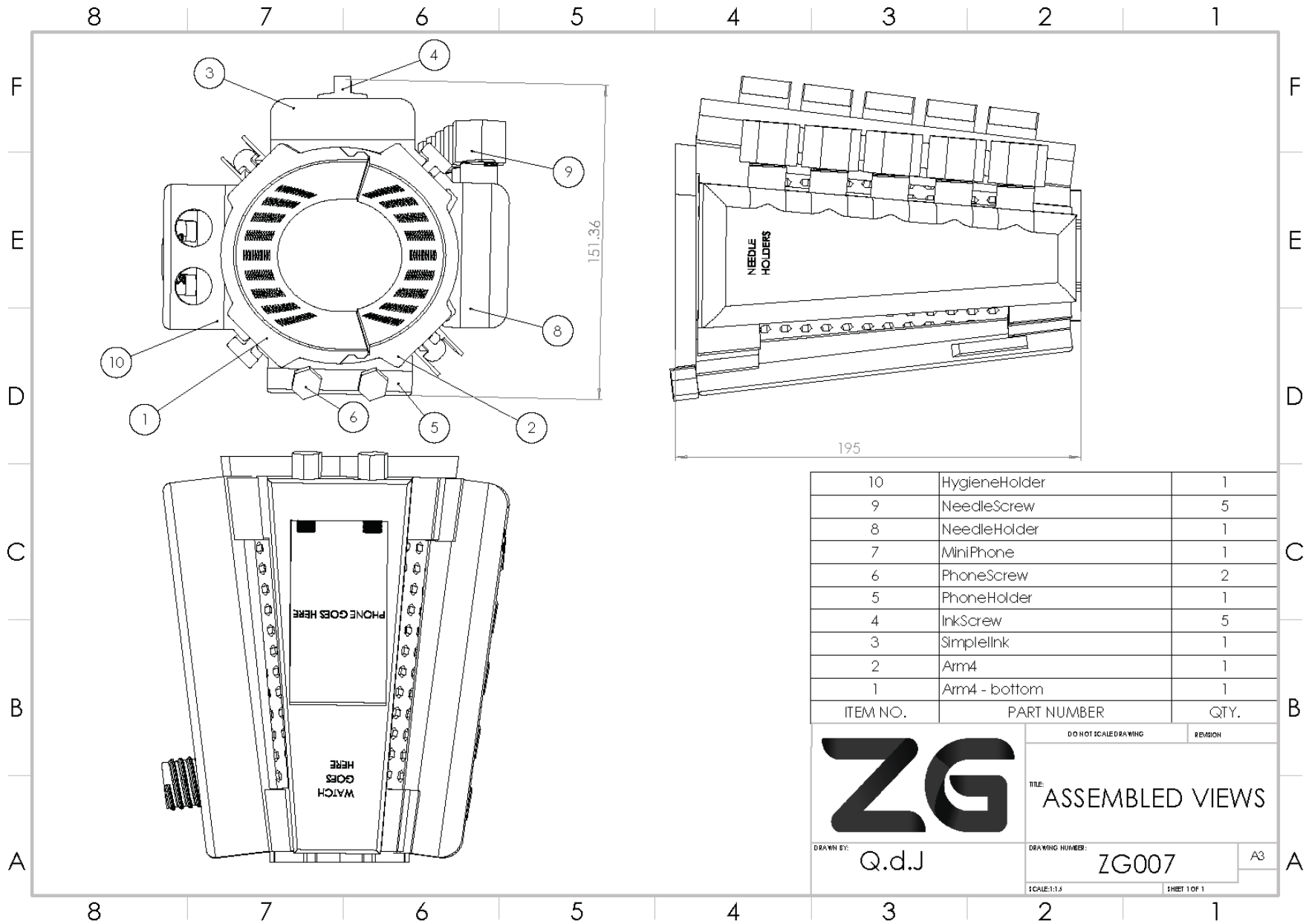


Figure 31 - Hygiene Dispenser Addition

Assembly Drawings



ZG

DO NOT SCALE DRAWING

REVISION

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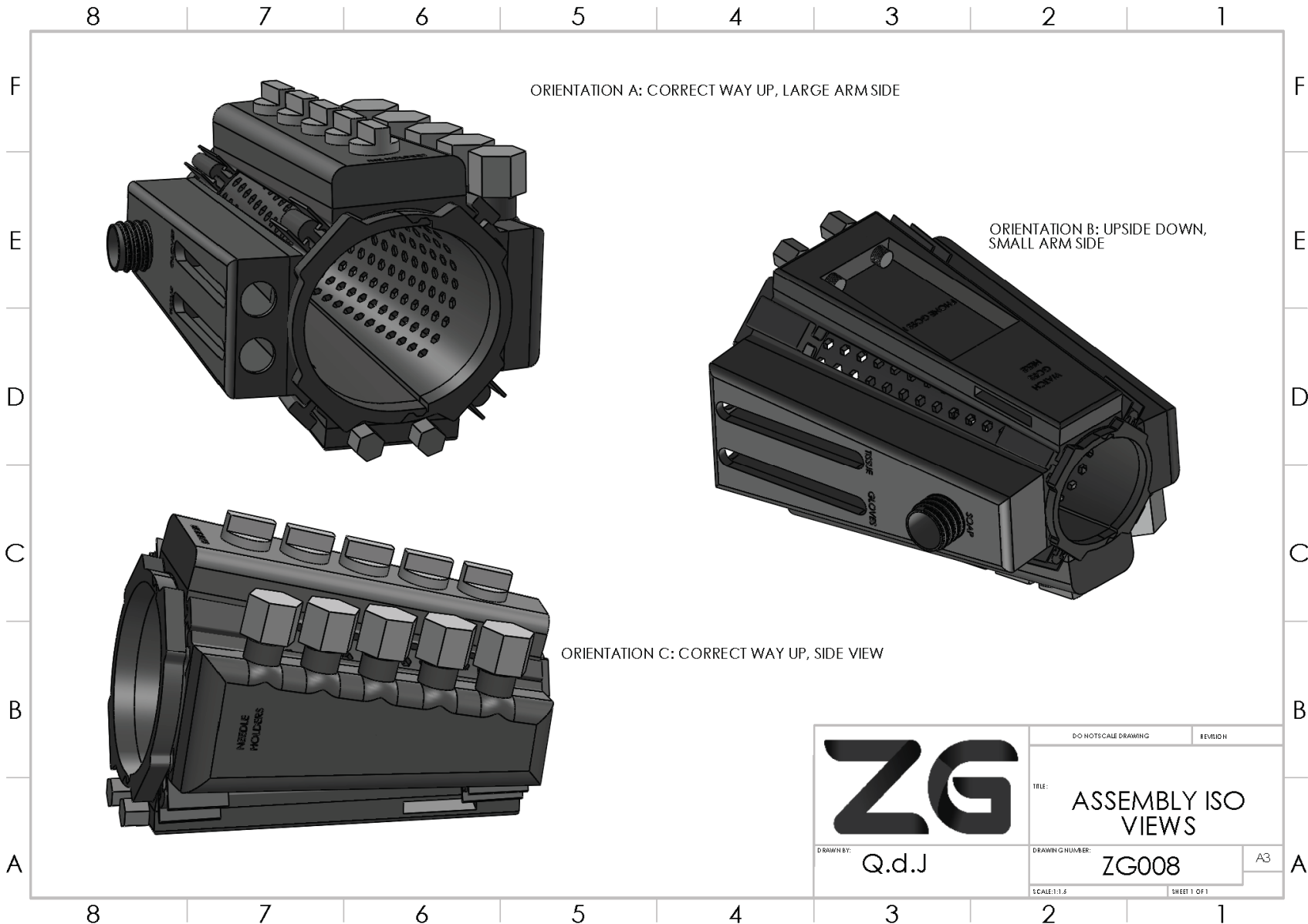
DRAWN BY: Q.d.J

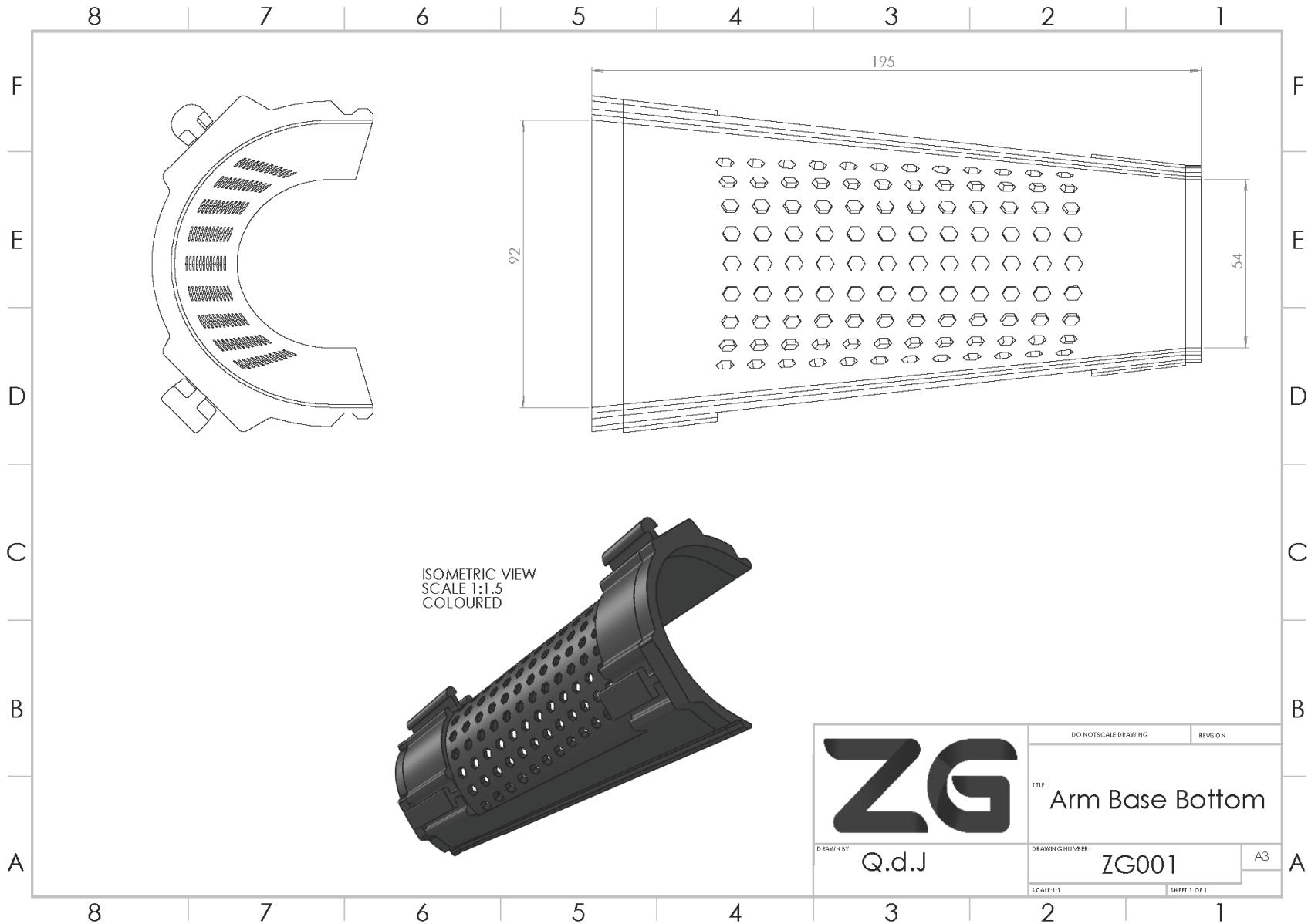
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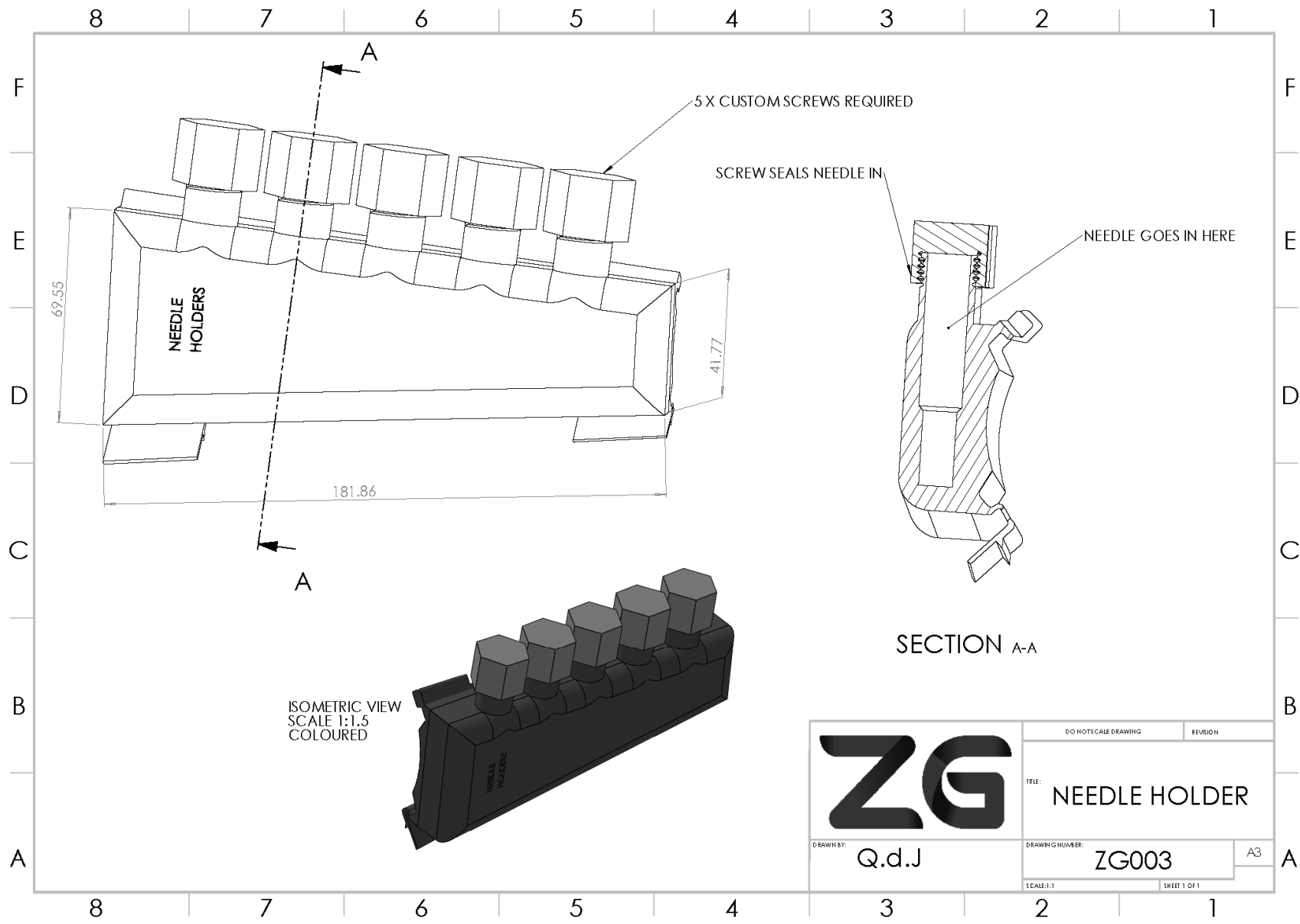
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SHEET 1 OF 1

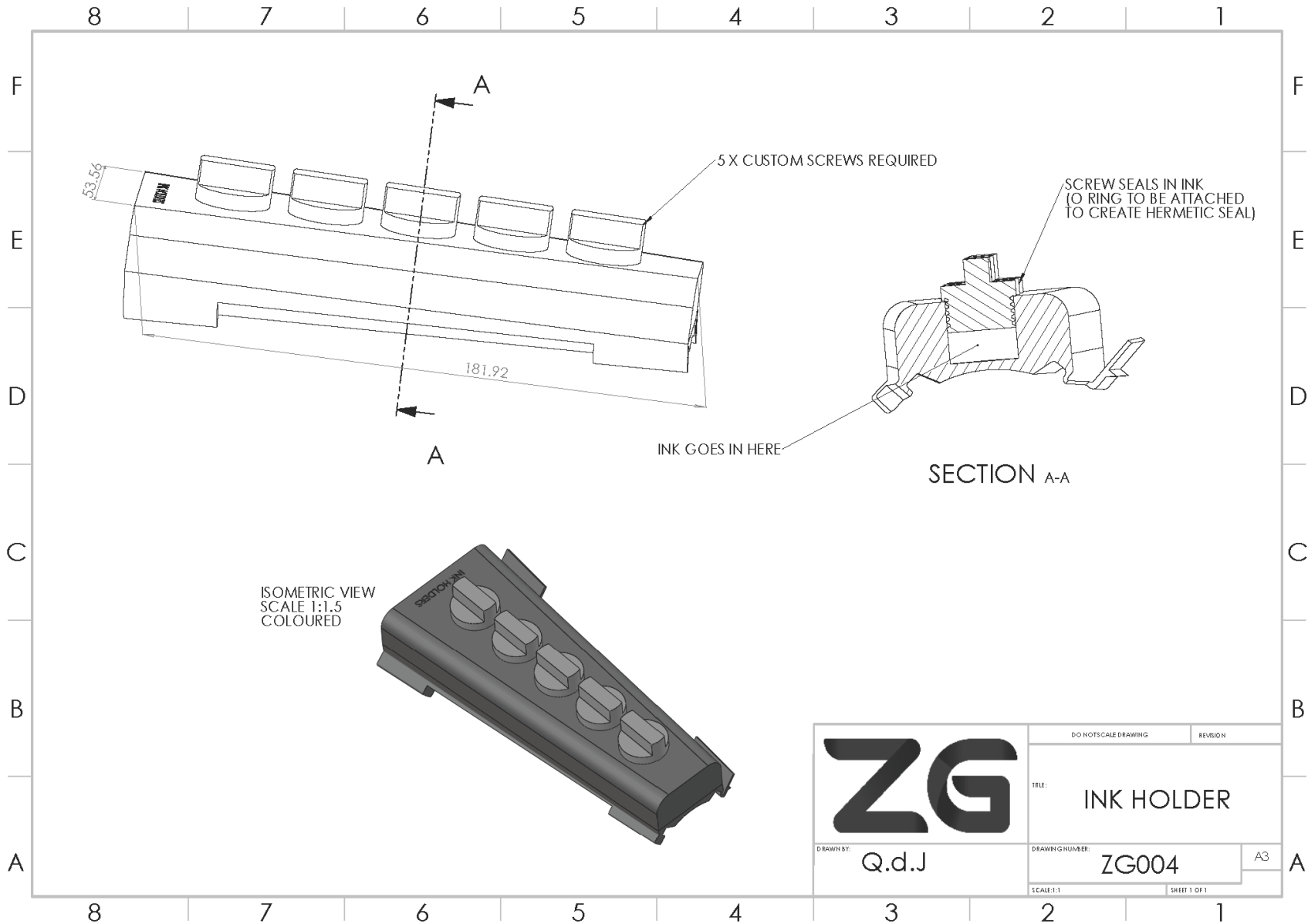
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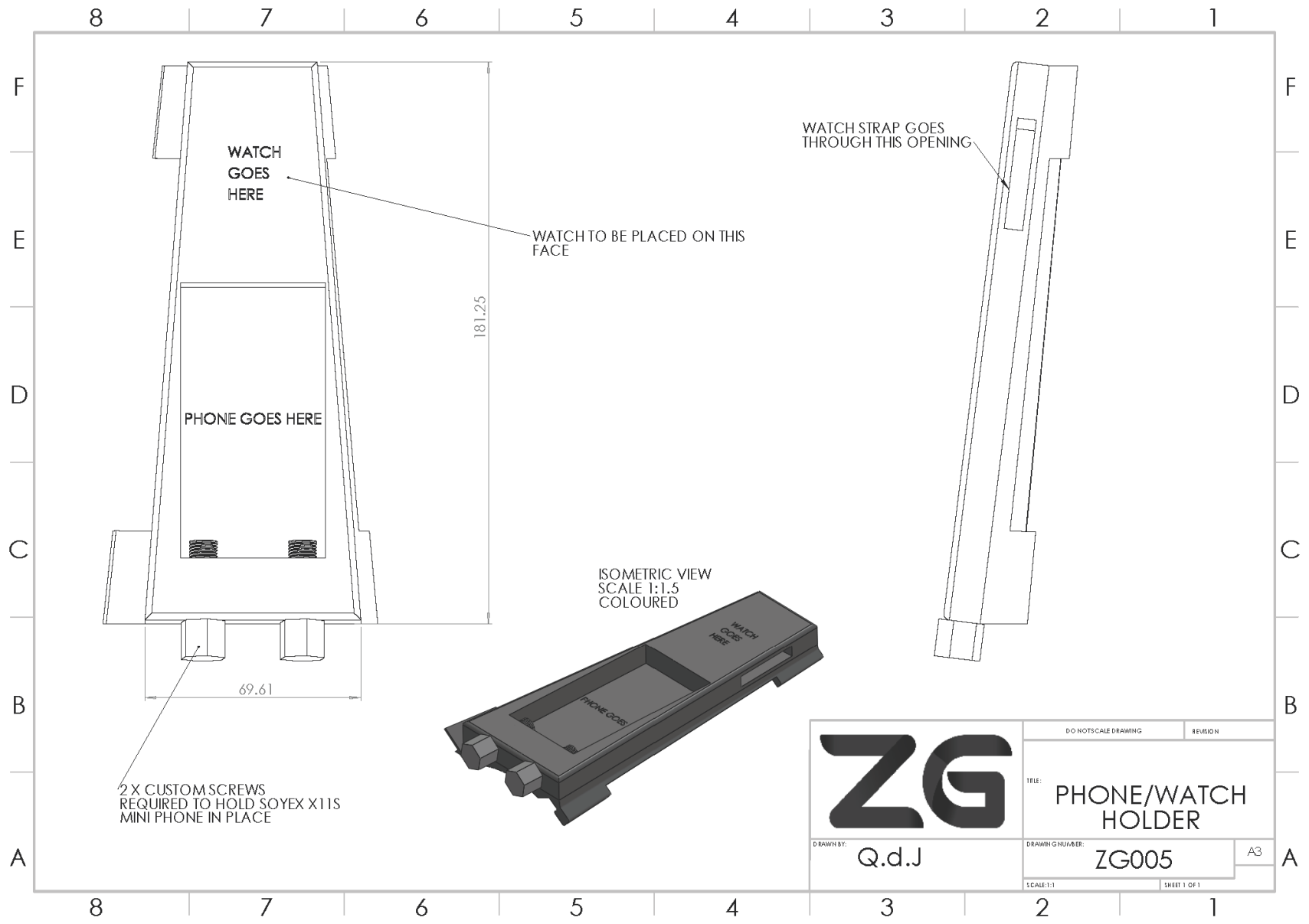


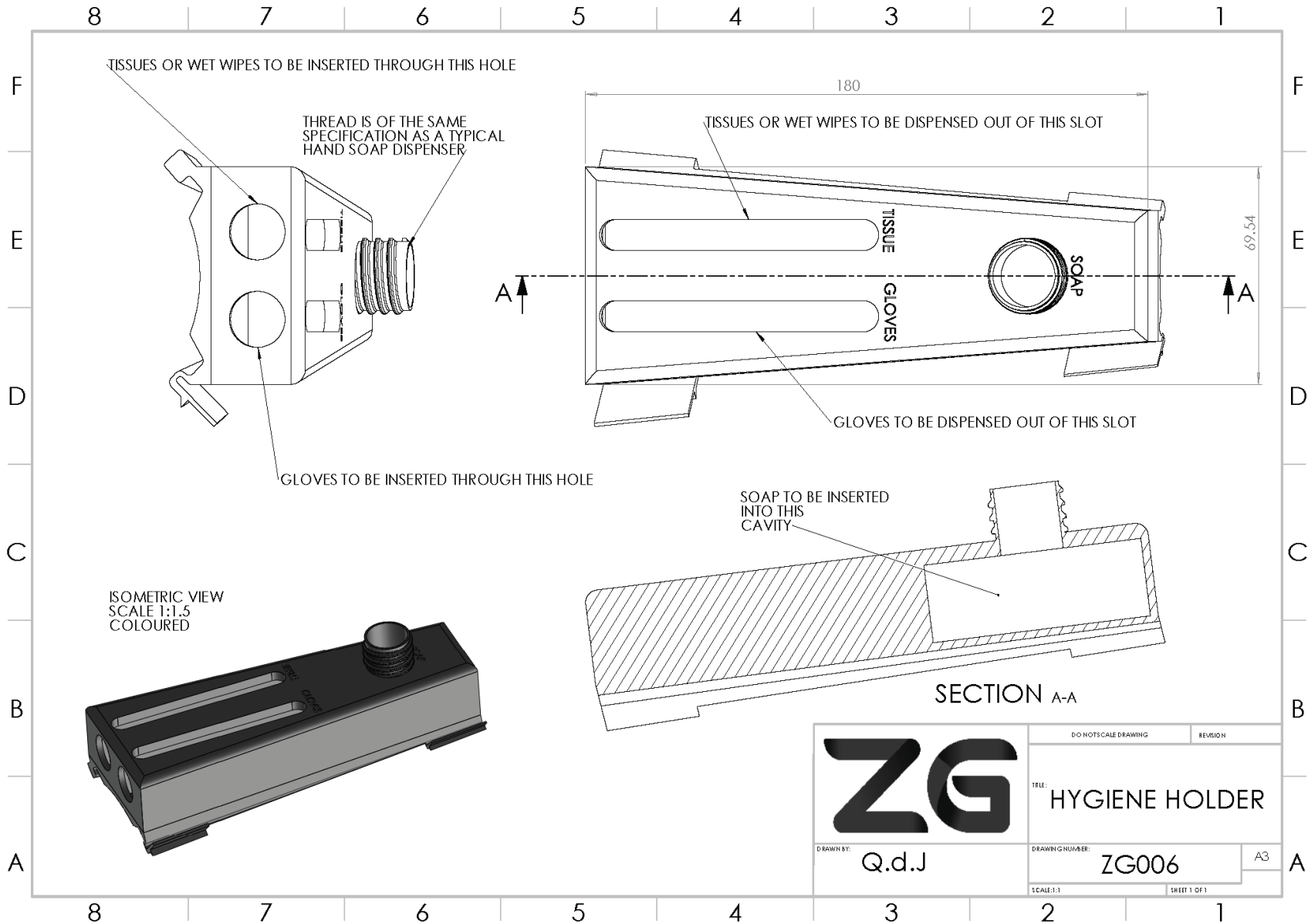




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SCALE: 1:1		SHEET 1 OF 1	







Prototype Prints



Figure 33 - Front View Prototype

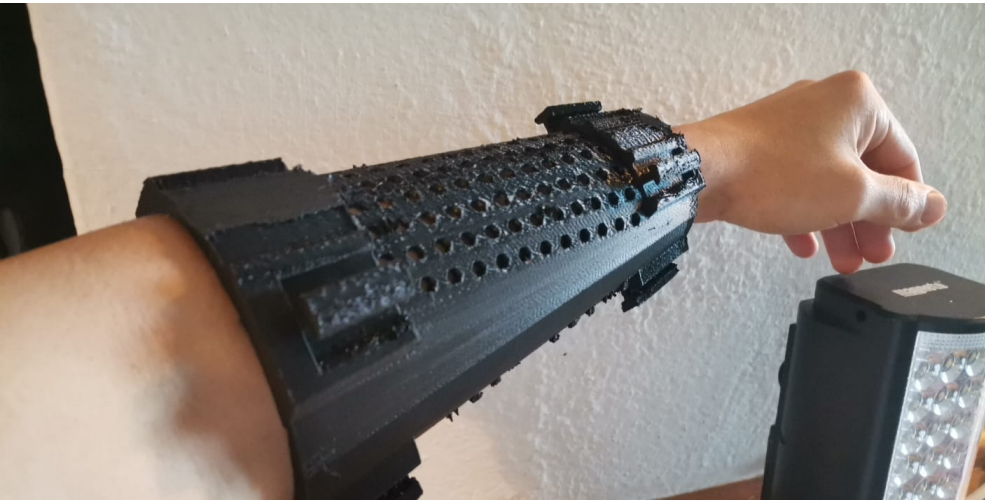


Figure 32 - Back View Prototype