ZARA MASSIMINI
IDN3002 · PERLAFORM



# Perlaform

A BATHING SYSTEM FOR ONE PAIR OF HANDS



# ZARA MASSIMINI

I am an industrial designer and marketer in the penultimate year of my double degree at Monash University. My approach to design has always been driven by my curiosity, love of experimentation and a desire to challenge the way people think about everyday products.

I am particularly interested in creating products that go beyond just functionality. I would like to explore how design can improve everyday experiences, influence behaviour and create meaningful connections between people and the products they use.

Throughout my studies, I have learnt that some of my best ideas come from experimenting, making mistakes and questioning what I thought I knew. Whether it's sketching, working with clay or building full-scale prototypes, I truly enjoy the process of discovering new skills & processes and seeing where they take me.

**Perlaform** is a reflection of my approach. What started as an exploration of the challenges women face postpartum became an opportunity to rethink the traditional baby bath. This project really pushed me to move away from conventional forms, challenge my own assumptions and explore how design can make everyday tasks a bit easier for the people who need it the most.

ACKNOWLEDGEMENTS

I would like to thank the teaching staff of IDN3002, particularly Tahmineh, Lyndon and Ilya, for their feedback, guidance and encouragement throughout the semester. Their critiques constantly pushed me to question my decisions, think differently and take my design further than I originally imagined.

I would also like to thank Heather Wallace, midwife and board member of Alola Australia, for taking the time to share her knowledge and experiences of working with women in Timor-Leste. Her insights were incredibly valuable in shaping the early stages of my research and helping me better understand the challenges women face postpartum.

A special thank you to my cousin for allowing me to photograph her and her child using my final design. Being able to see Perlaform in a real-life setting was a really special part of bringing this project together.

Finally, thank you to Ed and the DFab team, my studio cohort for all the support throughout the semester, and to my family for their constant encouragement, patience and support, especially during the final weeks of bringing this project to life.

# DESIGNING FOR THE FIRST SIX MONTHS

We were challenged to explore humanitarian design by identifying a group of people experiencing challenges in their everyday lives and developing a design that could make a difference for them. My project originally began by looking into the challenges faced by postpartum women in Timor-Leste, particularly their access to maternal healthcare and support. However, through research and feedback my focus shifted towards single mothers in Melbourne and the physical challenges of caring for a newborn whilst recovering from childbirth.

This led me to explore something as simple as bathing a baby. While it might seem like an ordinary everyday task, bathing a newborn involves a lot more than just washing them. Parents need to constantly support their baby, reach for essentials, manage water and maintain supervision, and for women specifically, whilst their  bodies are still recovering. **For single mothers who don't always have another pair of hands to help, something so simple can become physically demanding.**

Perlaform was developed from the idea that a baby bath shouldn't just be designed for the baby, but also for the person bathing them. By exploring ergonomics, functionality and unconventional forms, I wanted to challenge what is currently available and create something that specifically supports single mothers during postpartum recovery.




Photo: Zara Massimini

# Perlaform

A nautilus shell inspired infant bath that holds the baby, keeps the washing essentials within reach, and empties without needing to be lifted and cleaned as thoroughly.

BABY BATH | SINGLE MOTHERS | POSTPARTUM SUPPORT





Photo: Zara Massimini

# BATHING AS THE PRESSURE POINT

Through my research into the challenges women face during postpartum recovery, I became particularly interested in how everyday tasks could be made easier for mothers who are still physically recovering from childbirth. One task that stood out to me was bathing a newborn.

Bathing a baby might seem simple, but there is actually a lot involved. Mothers need to support a slippery baby while washing them, managing water and reaching for essentials, all while keeping a constant eye on their child. For mothers recovering from childbirth, especially single mothers who may not have someone to help, the constant bending, lifting and awkward positions can make this task even more physically demanding.

I began to question why baby baths are primarily designed with less consideration for the person actually bathing the baby. I wanted to explore how the design of the bath itself could better support both the mother and baby, rather than focusing on just one user.

My research also highlighted the importance of safety when bathing newborns. A twelve-year Australian review identified 78 child bathtub drownings, with 43.6% involving children under one year old. All children in the study had been left without adult supervision.[1] This reinforced the importance of creating a product that could provide additional physical support without suggesting that a baby could be left unattended.
Looking at existing baby baths, I noticed that many focus on supporting the baby's position but don't necessarily consider how the mother interacts with the product. This became an opportunity for me to explore how the shape and functionality of a baby bath could reduce unnecessary bending, reaching and lifting, while still creating a comfortable and supportive space for the baby.

I wasn't just interested in designing another baby bath. I wanted to rethink the entire experience of bathing a newborn and explore how one product could better support both the mother and baby during those first few months.

**43.6%**

Of the children identified in the twelve-year Australian bathtub drowning review were under one year old.[1]

**100%**

of those children had been leftwithout adult supervision.[1]

**FINDINGS**

**One of the biggest things I learnt through my research was that making a baby bath more supportive doesn't necessarily mean making it safer, I realised the “safer” the product the easier it is for a parent to justify looking away, even for a moment.**

***The goal is not to make a baby bath that requires less supervision, but one that made it easier for a mother to provide it.***

**This became an important consideration throughout the development of Perlaform, particularly when designing the infant-support insert, the shape of the bath and its integrated features.**

1. Peden, Franklin and Pearn, "Unintentional Fatal Child Drowning in the Bath," Journal of Paediatrics and Child Health 54, no. 2 (2018): 153-59.

2. Peden and Franklin, "Causes of Distraction Leading to Supervision Lapses," Journal of Paediatrics and Child Health 56, no. 3 (2020): 450-56.



Photo: Zara Massimini

# WHAT THE CURRENT MARKET ASSUMES

I explored existing baby baths across retailers to better understand what is already available and how these products support both babies and their mothers. I looked at their functionality, materials, pricing and ease of use, particularly for mothers bathing their babies alone.

From this research, I identified three main areas where existing baby baths could be improved.

## 01: LIMITED ADAPTABILITY

Many baby baths are designed for specific stages of a baby's development, meaning parents often need to buy multiple products as their baby grows. This creates extra costs and takes up more storage space. These products can also, only be used in on area of the house.

## 02: DIFFICULT DRAINAGE

Many baby baths need to be lifted, tipped or moved to empty the water. For mothers recovering from childbirth, lifting a heavy bath full of water can add unnecessary physical strain. For the baths that have plugs, they are small and hard to clean, therefore growing mould easily.

## 03: ACCESSIBILITY OF ESSENTIALS

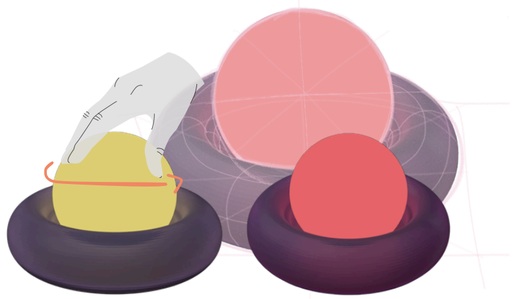
Bathing a newborn involves more than just the bath itself. Parents often need separate products like water scoops, thermometers and washing essentials. Having to reach for these while supporting a baby can make an already challenging task even harder.

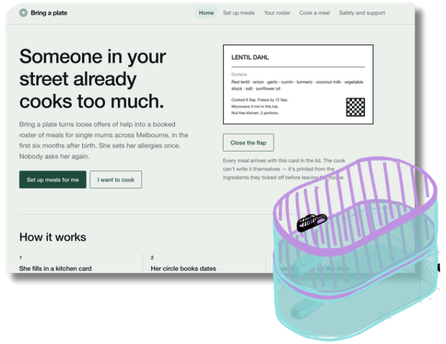


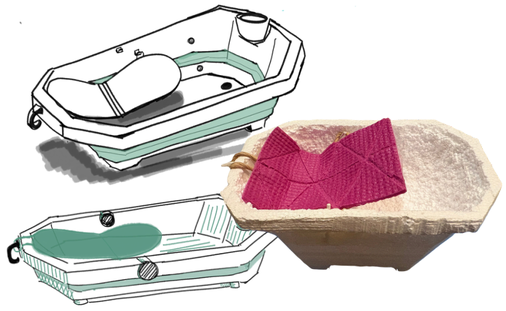
# THREE WAYS TO ADD A SECOND PAIR OF HANDS

I started by exploring different challenges mothers face throughout the postpartum period, rather than focusing on one specific task. From my initial brainstorming, I developed three concepts that looked at different ways design could support mothers in their everyday routines.





## 1 Spin to sleep

An interactive sleep lamp that changes colour when the inner sphere is rotated. The idea was to create a calming and consistent bedtime routine for both mother and baby.

### RESEARCH INSIGHT

*Settling a baby can be difficult, especially when doing it alone. I wanted to explore how the environment itself could help create a calming routine.*

## 2 Bring a Plate

A reusable meal container and sharing system that allows friends, family and neighbours to provide meals to new mothers. The design includes easy one-handed opening and stackable containers to make everyday use more convenient.

### RESEARCH INSIGHT

*Support might be available, but asking for help and organising it can become another task for a mother who is already overwhelmed.*

## 3 Bath Station

An adaptable baby bathing station designed to provide physical support for the baby while keeping washing essentials within easy reach of the mother.

### RESEARCH INSIGHT

*Bathing a newborn often means having only one hand free. I wanted to explore how the bath itself could provide some of the additional support a mother might otherwise need from another person.*

# “A BATH DOES NOT NEED TO LOOK LIKE A BATH”

One of the biggest pieces of feedback I received was that my baby bath still looked like a traditional bathtub. This made me realise I was designing around what a bath was supposed to look like, rather than questioning what it actually needed to do.

I started looking into biomimicry and became particularly interested in the nautilus shell. Rather than copying the appearance of a shell, I wanted to explore how its spiral structure could influence the functionality of my design, I started by sanding down spiral shells (empty and already broken) to see the form inside .

The spiral allowed me to experiment with different depths and positions within one continuous form. It also created opportunities for a natural drainage point and integrated storage, turning areas that might otherwise be wasted space into something functional.

This was an important turning point in my project, as I began to move away from conventional bathtub shapes and let the function and natural form guide my design.

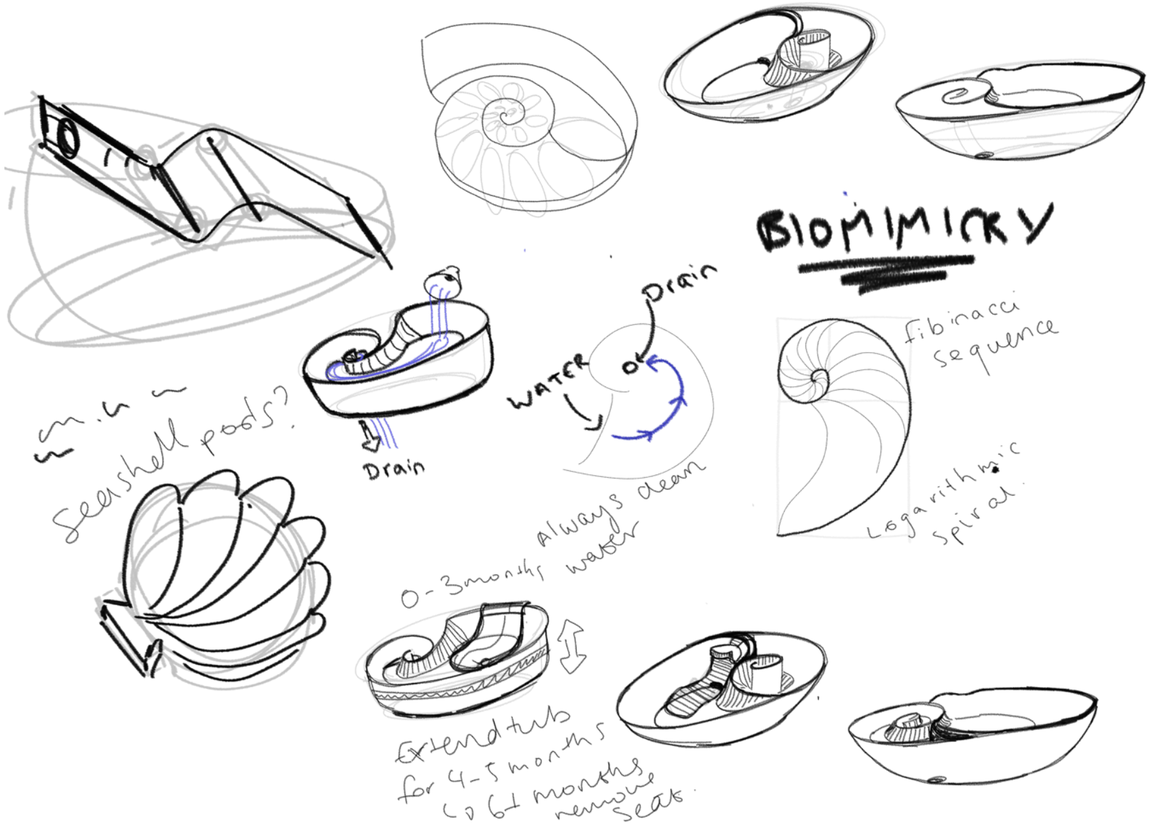




Photo: Zara Massimini

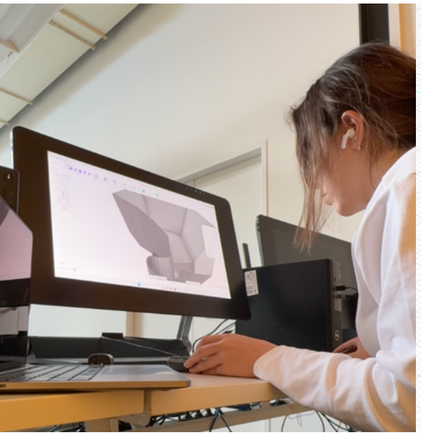


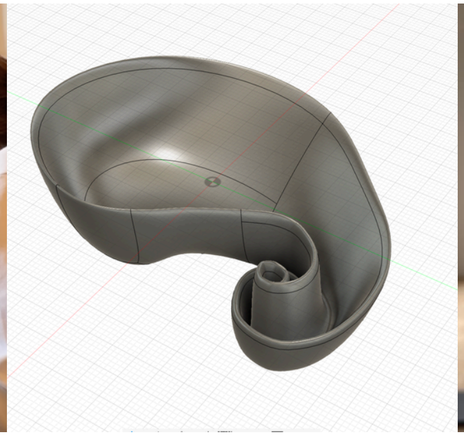
Figure 1: Cross-section of a nautilus shell showing its natural spiral structure. Photograph by guy-ozenne, Getty Images, n.d.



Photo: Zara Massimini

# TWEAKING THE DESIGN







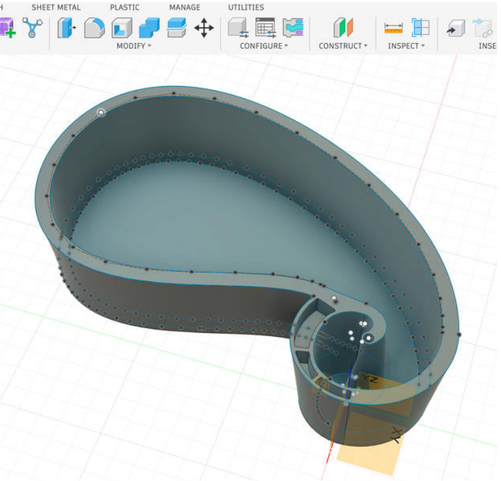


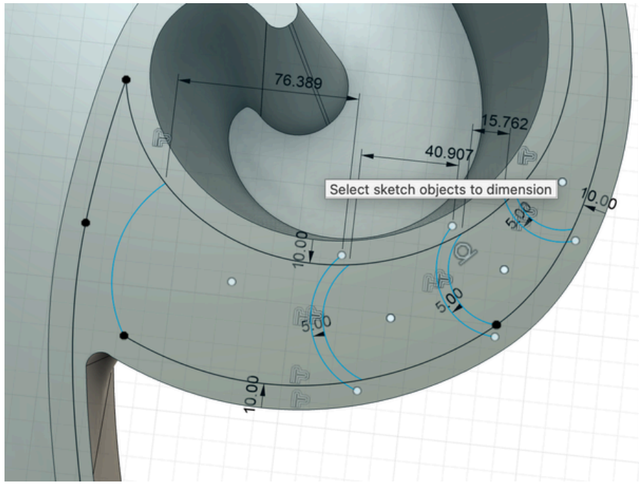
My initial design was intended to sit over a sink, allowing water to continuously flow out. However, after 3D printing and testing the model under running water, I realised the angled base made the bath unstable.

This led me to redesign the base to be flat, allowing the bath to sit securely on different surfaces. I also began developing an integrated drainage system to avoid lifting or tipping the bath, along with storage within the spiral to keep bathing essentials close by.

Throughout this stage, I continued questioning whether each design decision actually improved the experience for the mother and baby, helping me simplify the form and focus on functionality.

*Lofted surfaces in Fusion 360; dimensioned plan of the spiral and insert seating; and the printed study model tested under a running tap. The slanted base was abandoned after testing showed it was unstable.*








# TESTING THE 1:1 SIZE

When I started building my full-scale prototype using chicken wire and paper mâché, I quickly realised that some of the proportions that worked at a smaller scale didn't work as well in real life. The bathing area was longer than it needed to be, and the rim was too low to comfortably rest arms on.

I intentionally kept this prototype rough because I wanted to focus on the overall shape and functionality rather than how it looked. Working at full scale allowed me to better understand how someone would actually interact with the bath, including where they would sit, lean and reach.

Once the model was dry, I tested it against my own body and discovered that the curved shape allowed for different bathing positions, including kneeling, sitting cross-legged or standing at a bench. This helped me make changes to better support the mother's comfort.

## CHANGED BY BUILDING IT AT SIZE

### 01: FLOOR USE
Explored how the bath could accommodate mothers sitting or kneeling on the floor, rather than only being used on a bench.

### 02: APPROACH
Refined the shape so the bath could be comfortably approached from different sides and positions.

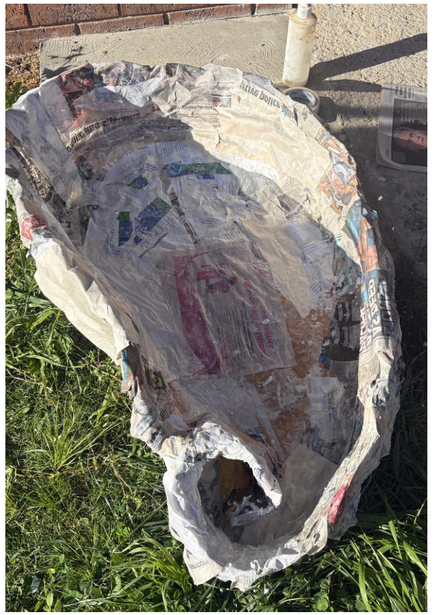
### 03: INNER CURL
Opened up the inner spiral to make it easier to reach into and clean.

### 04: RIM HEIGHT
Raised the rim to provide a more comfortable place for the mother to rest and support her forearm.

### 05: OVERALL LENGTH
Reduced the overall length after realising the original bathing area was larger than a newborn needed.









# WILL SOMEONE KNOW HOW TO USE IT INTUITIVELY?

I wanted to explore how someone would naturally interact with the bath and whether the design could accommodate different bathing positions. Using a weighted soft toy to represent a newborn, we tested the bath on a table, kneeling beside it and sitting on the floor with the bath between her legs.

She found that while using the bath on a table it was more comfortable for her back but sitting on the floor felt the most natural, as she could rest her arms on the rim, keep everything within reach and comfortably position herself around the curved shape.

This testing helped me realise that the bath needed to adapt to the mother's position, rather than forcing her into one particular way of using it. I used these findings to refine the rim height and positioning of the storage area.

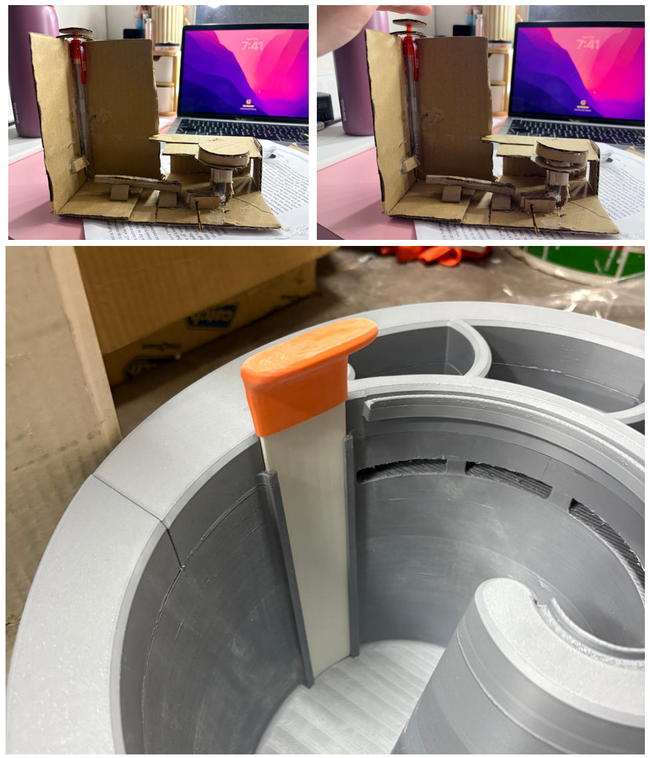
## LIMITATIONS

As the person testing the design has not experienced postpartum recovery, these findings are limited. Using a soft toy also cannot replicate the movement of a real baby. While the testing helped me understand reach, posture and positioning, further testing with mothers would be needed to properly evaluate the design's comfort and usability.



Photos: Zara Massimini

# IT'S ALL IN THE DETAILS







## Drainage

I wanted to create a drainage system that allowed mothers to empty the bath without lifting or tipping it. My initial design used a spring-loaded push mechanism, but I realised it was more complicated than necessary. Using cardboard, string and a pen mechanism, I tested the idea before simplifying it into a lever-operated drain.

## Koi scoop

The spiral shape of the bath reminded me of a koi fish, which inspired the design of the water scoop. I 3D printed and tested the scoop under running water, discovering that the flow was too strong. This led me to explore widening the opening to create a gentler stream of water.

## Support insert

I initially explored a gel-filled beanbag insert but moved away from the idea due to safety concerns. I then experimented with EVA foam, neoprene and 3D spacer mesh. I found that spacer mesh offered the best combination of cushioning, drainage and breathability, making it a more suitable material to explore for supporting the baby during bathing.

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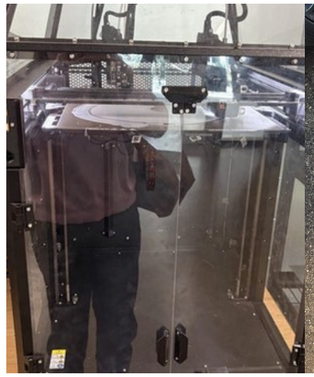
# BUILDING THE REAL THING

The final model was printed in 10 segments by DFab, bonded, connected with pins and epoxy. Cracking appeared along the bonded seams after the first colour coats, most likely from movement between the printed shell and the filler. I stripped the affected areas back, re-filled with a more body filler and rebuilt the primer coats thinner, which still did not hold. I then attempted using a different acrylic plastic primer and had the same issue. So I stripped it again and after sanding down until smooth I decided to skip the primer and paint on the bare surface. This worked better.

**If the product were manufactured rather than fabricated, most of it would be made by injection moulding (possibly parts with rotational moulding) which suits the shape and size of the bath.**

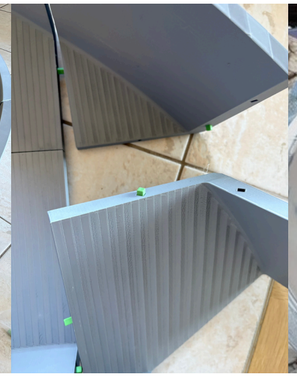


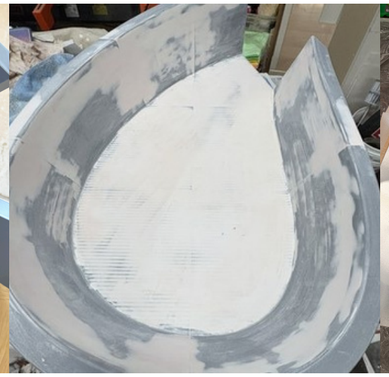
*Large-format printing, segmented to fit the bed.*





*Segments bonded and faired with epoxy and 3D printed pins.*





*Body filler and primer worked over the seams.*







*Primer and paint created an unintentional crackle finish so sanded back down*



*Painting the tub : used 4 shades of red/orange tones with a final coat of orange over the top*







*Used Frog Tape to make a crisp line and painted the bottom blue, once dried I added the accessories and texture details*





*Final gloss coat over the top*

# CLAY TO CAD









Photos: Zara Massimini 

FINAL INTERVENTION

# Perlaform

Spiral bathing to curve around the body and make bathing easier

Spacer-mesh insert that cushions and drains through

Accessory shelving easy to reach and drains back into the bath

Lever drain that empties the bath in place

Colour temperature non-slip patches on the floor

Intuitive Max Water Height

Can be used anywhere: Floor, Bed, Shower, Benchtop, Table, Bathtub



Photo: Zara Massimini

# PERLAFORM FEATURES

Temperature sensitive grips that chnage colour if the water is too hot





Form curves well around the mother's body and CMF blocking so you can see the max water height from any angle



Storage sections that drain back into the bath and rim around the tub for grabbing in any way that is preferred



Max water height hole as a safety measure so the water cannot continue filling up





Neck contouring for newborns and snap up living hinge to allow for easier cleaning for the baby.



Zip up foam cover so it is easy to wash



Visual affordances : colour matching rim for intuitive placement



Easy to pull up drain lever











Photos: Zara Massimini












Photos: Zara Massimini

# WHAT DID I LEARN?

***One of my biggest learning curves was that just because a product has always been designed in a certain way, doesn't mean it needs to necessarily stay that way.***

Throughout this project, I learnt the importance of questioning what I already know and being more open minded to where the design process can take me. Perlaform started as a completely different idea, and through research, experimentation and feedback, it developed into something I hadn't originally imagined. One of my biggest learning curves was that just because a product has always been designed in a certain way, doesn't mean it needs to necessarily stay that way.

Feedback played a huge role in shaping Perlaform. My tutors constantly challenged me to think beyond what a traditional baby baths look like and question why I was making certain design decisions. This really pushed me to explore different avenues, biomimicry being one of them, and eventually the nautilus shell, which became the inspiration behind Perlaform. I learnt that sometimes stepping away from what I am familiar with and what everyone is familiar with, can lead to a greater outcome.

Physical prototyping was probably one of the most valuable parts of this project for me. Moving from sketches and clay models to a full-scale prototype helped me understand proportions, ergonomics and how someone would actually interact with the bath. I also found that some ideas which worked really well in CAD didn't necessarily work when physically tested. This was particularly evident with my original bench top design, which looked functional on screen but made the bath unstable in real life.

Another important learning curve was understanding how design can influence behaviour. I wanted Perlaform to make bathing a newborn easier for mothers recovering from childbirth, but I also needed to consider how making a product more supportive could unintentionally encourage a parent to look away. This made me think more carefully about my responsibility as a designer, especially when designing within the realm of Humanitarian design.

If I were to continue developing Perlaform, I would continue testing the product with postpartum mothers to better understand their comfort, physical limitations and how they would use it in everyday life. I would also like to further develop the drainage mechanism, infant-support insert and explore materials and manufacturing processes to bring the design closer to production.

Overall, this project taught me that some of my best  and most creative ideas come from making mistakes, experimenting and asking myself why. I have become much more comfortable with changing direction through the design process and I think my biggest takeaway is that design isn't always about coming up with something completely new and innovative (even though there is a beauty in that) , but sometimes about questioning something people use every day and if there is a way we can look at it differently.

# LIST OF REFERENCES IN JOURNAL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2. Peden, Amy E., and Richard C. Franklin. 2020. “Causes of Distraction Leading to Supervision Lapses in Cases of Fatal Drowning of Children 0–4 Years in Australia: A 15-Year Review.” Journal of Paediatrics and Child Health 56 (3): 450–56. https://doi.org/10.1111/jpc.14668.

3. Peden, Amy E., Richard C. Franklin, and John H. Pearn. 2018. “Unintentional Fatal Child Drowning in the Bath: A 12-Year Australian Review (2002–2014).” Journal of Paediatrics and Child Health 54 (2): 153–59. https://doi.org/10.1111/jpc.13688.


IMAGE CREDITS

## ATTRIBUTION

All images have been, taken by Zara Massimini, unless otherwise specified.

Figure 1: Nautilus shell cross-section (page 8)
guy-ozenne. n.d. “Shell Cut Half Nautilus.” Photograph. Getty Images. Accessed November 10, 2026. Via Canva.



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