

London South Bank University London

School of Engineering

Research Methods and Design Project

Major Project

Product Design Specification

Carla Sofia Moreno Lima

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BSc (Hons) Product Design

Introduction

ENOVA is a multi product concept involving tangible products as well as digital goods for state-maintained schools in England. Both the ENOVA Dispenser and the Application work as a system in order for the concept to serve its purpose, with the Enova Case being an optional additional product purchasable via the app.

The ENOVA app is designed to be compatible with iOS and Android operating systems, offering users two features – the Discover, which allows users to socialise, discuss, share stories and advice i.e tips, hacks, and receive daily facts around the topic of menstruation with other users registered to the app. It will be available to install on App Store for Apple users and Google Play for Android mobile device users.

Through the app, students will also have the ability to request a variety of period products provided by Phs Group to registered educational institutions in England. Users receive Quick Response Codes for each order and scan on the ENOVA dispenser to obtain the desired period product. The primary purpose of this concept is to help combat period poverty, ensuring that the education of students is not compromised because of their inability to afford period products. The Social application creates a safe community for young inexperienced people where they are able to eliminate the stigma surrounding periods. ENOVA is intended to operate alongside the The Department for Education's (DfE) free period product scheme for schools and colleges in England.

Each school registered with ENOVA has full access to modify features to better suit their school policies.

1. Performance

The multi column ENOVA dispenser will have the ability to store 22 types of period products from 3 different collection methods and 8 products subcategories. This includes:

Pads (Always, Bloomers & Nora, Lil-lets Brands)

Eco Friendly:

- Available in Regular (normal) with wings
- Available in Night (super) with wings

Reusable:

- Available in Mini with wings
- Available in Midi with wings

Teens:

- Available in Day with wings
- Available in Night with wings

Normal:

- Available in Size 1 with wings
- Available in Size 2 with wings

Tampons (Lil-lets & Tampax Brands)

Applicator Cardboard:

- Available in Regular
- Available in Super
- Available In Super Plus

Applicator Plastic:

- Available in Regular
- Available in Super
- Available In Super Plus

Non-Applicator:

- Available in Regular
- Available in Super
- Available In Super Plus

Organic Non-Applicator:

- Available in Regular
- Available in Super
- Available In Super Plus

Menstrual Cups (Mooncup)

- Available in Size A
- Available in Size B

Dispenser and App:

- 1.1. The QR Code reader (Dispenser unit) must be able to automatically scan the QR code in 0.1 seconds. This is the average time that a smartphone camera takes to capture and register a QR code.
- 1.2. The QR Code reader must have a scanning distance of 1.5-2.5 feet (45-75 cm) away.
- 1.3. The QR Code reader must not process a QR code when dispenser is not available (out of stock/not functioning)
- 1.4. The QR Code reader must scan a QR code size of 2.4-6.3 in (6-15.8 cm)
- 1.5. The application must generate all QR codes with quiet zone (The space around the QR Code, separating the QR Code's pixels from the other designs)
- 1.6. The application should generate QR Codes with a minimum size of 2cm x 2cm.
- 1.7. The unit must read and scan a QR Code that has been partially damaged e.g. less than 90%.
- 1.8. The QR Code reader must read codes in black & white
- 1.9. The unit must be anti-vandal, easily cleaned and durable.
- 1.10. The unit must display "Unavailable" if stocks run low. The minimum should be 5 products left in a compartment before displayed.
- 1.11. The QR reader must not accept/process expired or used codes.
- 1.12. The specified unit compartments must open once QR code scanned and accepted.
- 1.13. The unit must open with a single generic lock key.
- 1.13. The wall mounted unit must withstand a load of 10kg.
- 1.13. The unit interior must be sterile to safely store products and prevent bacteria and mould.
- 1.14. The app must allow schools to edit number of products offered to individual users.
- 1.15. The application must store type of product of requested from users.
- 1.16. The unit must be powered using mains. Based on a similar existing product, the power requirement would be 100-240VAC, 50/60Hz, 1.4A.

2. Environment

2.1. The unit dispenser unit will be placed within the schools premises (indoors). The recommended area is the special needs cubicle, in the washroom.

2.2. The unit will be placed in an area ventilated by a sufficient quantity of fresh or purified air. It should not fall below 5-8 litres per second per occupant.

2.3. In order for the unit's QR reader to function effectively, the environment must provide adequate light levels.

2.3. The environment for which the unit will operate in must have a relative indoor humidity level of around 50% and 20°C room temperature to prevent growth of bacteria. The ideal is between 45% and no lower than 30%.

2.4. The unit must not be installed near liquids such as water or where condensation is probable to avoid a short circuit.

2.5. The unit can be powered down on the mains to avoid unnecessary energy consumption.

2.6. The unit can be opened for users to easily clean and disinfect the product.

3. Life in Service

3.1. The purpose of the unit is to dispense a variety period products at the point of need upon request to ensure that users can continue to attend school safely and hygienically. The unit must dispense 22 products from each of the 8 compartments, a total of 140 before "Unavailable" sign in displayed to inform the school welfare office; the team in charge of hygiene products for students, that the ENOVA dispenser requires a refill.

3.2. The scanner is disabled once the unit dispenser becomes unavailable.

3.3. The LCD Module Display should have a lifetime of 50,000 hours – 5 years + of 24x7 usage at full power.

4. Maintenance

4.1. The unit will be designed for easy disassembly to allow the maintenance team (external contractors) to replace any faulty components without damaging the entire product.

4.2. Once a school purchases the ENOVA dispenser, installation will be offered by a team of specialised individuals with aftercare including any required technical maintenance.

4.3. The built-in durability of the dispenser material will reduce the need for long-term maintenance and cleaning costs.

5. Target Product Cost

5.1. Smart menstrual care dispenser machines range from £220 to £750. The average price is at £218 per unit. This is based on market research of similar existing products and the formula of Product Cost = Direct Material Cost + Direct Labor Cost + Manufacturing Overhead Cost. See below.

5.2. The estimated cost of manufacture for the dispenser unit will not exceed . This is based on the formula of Product Cost = Direct Material Cost + Direct Labor Cost + Manufacturing Overhead Cost. Manufacturing overheads include all the indirect costs of production that are necessary to manufacture a finished good or create a service. See below:

| Particulars | Amount |
|--|------------|
| Production Volume (Pieces) | 300 |
| Direct Material Cost (Coloured acrylic ABS;Acrylonitrile butadiene styrene, plastic, plexiglass, acrylic powder,vinyl) | £127.44 |
| Direct Labour Cost (Average Field Service Technician Salary UK) | £28,988 |
| Indirect Material Cost (Lubrication etc) | £8,646.41 |
| Indirect Labour Cost (security guard) | £20,053 |
| Other Overhead Cost (Factory Rent and Utilities) | £7,500 |
| Manufacturing Overhead Cost = Indirect Material Cost + Indirect Labor Cost + Other Overhead Cost | £36,199.41 |
| Product Cost = Direct Material Cost + Direct Labor Cost + Manufacturing Overhead Cost | £65,487 |
| Production Cost per Unit = Product Cost / Production Volume | £218 |

6. Competition

6.1 What existing products are there in the marketplace to compete with this one and What are the strengths and weaknesses?

In recent years, there has been more efforts to tackle the various challenges affecting millions. Gender inequality is a global issue that has been highlighted particularly by the media, which has helped reveal the ongoing issue of period poverty that is stagnating and preventing young girls from receiving equal opportunities worldwide. Designers are adopting technology more than ever to develop products able to effectively bring solutions to those that use them.

Competitor research analysis shows that there is a surge of companies worldwide redesigning traditional washroom hygiene products, including menstrual care vending machines, and integrating advanced technologies such as IoT.

6.2. **Huge Inc - (Hooha)**

HDQ Location: 45 Main St, 3rd Floor, 11202

Brooklyn, New York, United States

Tel: +17186254843

Website: <https://www.hugeinc.com>

Strengths:

The Hooha dispenser has an advantage as it is lighter in weight and smaller in dimensions than competitors but can has a capacity of up to 60 tampons at a time, 3x more than the industry average. The simple design and text element makes it relatively easy to use despite using smart technology which is a good selling point as it means that users that do not possess a smart phone or those with low proficiency of modern technology will not be excluded. (Text the number on the machine to dispense)

Weaknesses:

The machine is solely powered using a mains power adaptor which requires a socket outlet nearby. This could pose an issue especially because of the intended location for use ; public w/c, it could risk the health and safety of its users if liquids were to get on the electrical outlets and create a short circuit.

Another notable weakness is that the easily accessible products also makes the an easy target for ill intentioned actions. The lack of monitoring user limits means that people can excessively request the free tampons and illegally resell.

Additional information:

N/A

6.3. **Strapt Inc - Strapt**

HDQ Location: Greater Atlanta Area, East Coast, Southern US, United States

Tel:+1 470-869-0170

Website: <https://www.straptvending.com>

Strengths:

Strapt has partnered with Lola to launch a smart dispenser branded Strapt that can hold 4x the capacity of traditional dispensers. The purchase of a dispenser enables free installation, maintenance, and restock, which is a unique selling point for the product. The product is adapted to the current virus pandemic considering user safety with its contactless operations.

6.4. PHS Group -

HDQ Location: Block B, Western Industrial Estate, Caerphilly,

United Kingdom, CF83 1XH

Tel: 029 2080 9098

Website : https://www.phs.co.uk/?utm_source=google&utm_medium=PPC&utm_Campaign=BrandBroad-PHS&utm_term=phs&gclid=Cj0KCQjwyZmEBhCpARIsALlzmLpGkoc6lGGfIEA795rRJK5Ro8WgDF2ZFhFSGwKK2-wlRIKKrlq8X8aAnkjEALw_wcB

Product : UltraVend

Strengths:

The Ultra Vend machine is self-contained—Battery operated, does not require mains wiring. This feature makes it an ideal product to be installed in places with a high likelihood of vandalism such as educational institutions, transport, and other public spaces, since users will not be given the opportunity to tamper.

Weaknesses:

This product requires cash input in order to dispense products. The vending machine does not feature any stock status displayer, meaning that when the dispenser has run low on products and does not carry out the request users will have to assume this and then select for the return of cash.

Additional information:

N/A

Product : Multi Column Vend

Strengths:

The Multicolumn Vending machine is a fully serviced unit that is stocked by phs. This is particularly appealing to schools and businesses as they will not need to employ workers and will be able to cut costs on the products maintenance.

The vending machine also has a modern and smooth design, with the ability to house a variety of consumables - unisex essentials, women's essentials and male essentials to suit the environment of the individual.

Weaknesses:

N/A

Additional information:

N/A

6.6. **ChuanyiTech - Ebayar**

HDQ Location: Guanghzou, China

Tel: 08602039148113

Website: N/A

Strengths:

This machine features a body Infrared (IR) sensor that activates the products automative voice playback when the presence of human is detected. This is an advantage as it encourages connection between machine and user, removing the solely functional purpose of providing users with products. It allows interactivity makes the product more welcoming to users.

Weaknesses:

The added advanced technology within the product means that the price per unit will be higher, this may be a put off for buyers especially for application in public schools where the number of students will be higher and require a high quantity of dispenser to accommodate. It may be too costly for schools.

Additional information:

Ebayar machine has a digital screen to instruct users and advertise the product.

6.7. HappyNari - HNSE 300

HDQ Location: Plot No. 28, E-51, Flatted Building, MIDC, Satpur,
Nashik – 422 007 (M.S.)

Tel: +91-253-2350899

Website: <https://www.happynaricare.com/index.php>

Strengths:

The HNSE 300 is a smart sanitary napkin vending machine that users can operate with a card provided to each school girl. Only users that have obtained a card are able to use the dispenser, which will help control the number of people requesting products.

Although the product consumes less than 5 watts, it can also be purchased to be battery operated as a power backup.

Weaknesses:

The dispenser only works with a card, meaning that if the user does not possess one at the time of need they will not be able to request any sanitary napkins.

Additional information:

Smart Card can be topped up with money.

6.8. HLL Lifecare Limited - Vendigo

HDQ Location: Mahilamandiram Road, Poojappura Thiruvananthapuram - 695 012
Kerala, India

Tel: +91-471 2354949

Fax : +91-471 2354949

Website: <http://www.lifecarehll.com/product/view/reference/202cb962ac59075b964b07152d234b70hYGF>

Strengths:

The Vendigo sanitary napkin vending machine is programmable and has easy data retrieval electronically through USB port, eliminating manual errors in data (sales, cash collected etc) collection. The machine also has an LCD display to inform users when products are unavailable.

Weaknesses:

N/A

6.9. Initial - Period Poverty Vending, FreeVend, Dual Vend, Multi Vend

HDQ Location: CAMBERLEY, United Kingdom

Tel: 0808 256 3859

Website: <https://www.initial.co.uk>

Product: Period Poverty Vending

Strengths:

This particular product was designed to combat period poverty and encourage users to make use of products. Its slim and compact design makes it more practical for schools as it will be possible to install within toilet cubicles. This vending machine is coin free and very simple to use, not featuring any buttons or electrical components.

Weaknesses:

The small size means that the product will not be able to store a large stock, with its maximum capacity being 8 packs of Kotex or 11 packs of Tampax. This would not be an ideal choice for schools as it would mean that it would require frequent restocking.

Additional information:

The dispensable free sanitary products are stored in boxes.

Product: FreeVend

Strengths:

The FreeVend machine can hold a larger capacity than the Period Poverty Vending, offering two different products in boxes free of charge. Users can see the products stored within the machine and will know if the vending machine has run out of products.

Weaknesses:

N/A

Additional information:

N/A

Product: Multi Vend

Strengths:

The product is available in ABS and a can come in a variety of colours. It has high security casings with alarms available for installation. Accepts a wide range of coins.

Weaknesses:

N/A

Additional information:

N/A

6.10. Sanmak

HDQ Location: 332G+CJ Chinniyampalayam,
Coimbatore, Tamil Nadu, India

Tel: +91 6379 909 200

Website: <https://www.sanmak.in>

Strengths:

The machine has daily activity report available by SD card or by print out. This is beneficial as businesses can monitor user preference and daily demands. Automatic battery backup function can also be included, which is an advantage if power mains fail. Buyers have a choice to make the product more eco friendly and cut energy costs by making the machine operate on solar power.

Weaknesses:

N/A

Additional information:

N/A

6.11. Stree Sanman

HDQ Location: 332G+CJ Chinniyampalayam,
Coimbatore, Tamil Nadu, India

Tel: +91 6379 909 200

Website: <https://www.streesanman.com>

Strengths:

The Stree Sanman vending machine has a uv disinfectant light to keep products clean and safe for use. It can either be purchased as push button, coin or QR Code operated.

Weaknesses:

N/A

Additional information:

Storage capacity of 30, 50 or 99 products.

| Brand | Dimension (H) | Dimension (W) | Dimension (D) | Weight | Capacity | Commodity Type | Compartment Quantity | Installation Type | Type | Materials | Cost Per Unit | Operation | Comment |
|----------------------------------|---------------|---------------|---------------|------------------|--|--|----------------------|-------------------|-----------------|---|---|-----------------------------------|--|
| Heatha | 22" (558.8mm) | 10" (254mm) | 4" (101.6mm) | 13 lbs (5.997kg) | 50 | Tampon Tubes | 1 | Wall Mounted | Digital (Smart) | Plastic and Metal 7 | N/A Bc | Main Power Adapter | Fix standard vending tampon sizes |
| UltraVend (gels) | 70cm (700mm) | 35cm (350mm) | 15cm (150mm) | 17 kg | N/A | Reg Tampons & Winged Ultra Pads | 2 (Dual Columns) | Wall Mounted | Non Digital | Metals - Powder-Coated Steel (White or Silver Finish) | N/A | Battery Operated | Push Buttons & High Security Lock |
| Multi Column Vend (gels) | 800mm | 200mm | 230mm | 30kg | 140 units | Female: EdgeGuard, Tampoon and Menstrual Super Tampoon, Ultra Winged Pad, Sanitary Napkins, Pads, Tights | 4 Columns | Wall Mounted | Digital (Smart) | Metal - Powder-Coated Steel (White or Silver Finish) | USD\$50.00 - USD\$1,000.00 (USD\$2.45 - USD\$15.57) | Battery Operated | Push Buttons & High Security Lock |
| | | | | | | Female: EdgeGuard, Tampoon and Menstrual Super Tampoon, Ultra Winged Pad, Sanitary Napkins, Pads, Tights | | | | | | | |
| Happy Next - MDEC 300 | 850mm | 500mm | 250mm | 27kg | 270 Units | Sanitary Napkin Mask | N/A | Wall Mounted | Digital (Smart) | 1.2mm Thick anti-corrosion powder coated steel | N/A | Power Adapter with Battery Backup | Card Reader sensor & GSM Card Connectivity |
| VendEdge | 610 mm | 600mm | 150mm | 14kg | 78 Units packed in a pack of 78 | Sanitary Napkin | 2 | Wall Mounted | Digital (Smart) | 1.2mm Thick anti-corrosion powder coated steel | £ 22.740 (£223.22) | Main Power Adapter | Coin Operated, LCD display, Push Buttons, Paper Money, Coin Operated |
| Initial - Period Poverty Vending | 220mm | 140mm | 50mm | 7kg | 8 packs of Kotex or 11 packs of Tampax | Tampax & Pads | 1 | Wall Mounted | Non Digital | Steel Metal | N/A | NOT REQUIRED | Push Buttons |
| Initial - FreeWorld | 190mm | 200mm | 100mm | 5.9kg | 21 Kotex Maxi and 28 Tampax SuperCompact | Tampax & Pads | 2 | Wall Mounted | Non Digital | Steel Metal | N/A | NOT REQUIRED | Push Buttons |
| Initial - Quick Vend | 170mm | 200mm | 100mm | 5.9kg | 21 Kotex Maxi and 28 Tampax SuperCompact | Tampax & Pads | 2 | Wall Mounted | Non Digital | Steel Metal | N/A | NOT REQUIRED | Push Buttons |
| Initial - Multi Vend | 1000mm | 300mm | 230mm | N/A | N/A | Organic tissues and tampons + | N/A | Wall Mounted | Digital | ABS Plastic | N/A | Main Power Adapter | Coin Operated, High security casings + alarms available, wide variety of product configurations |
| Sanemak (Automatic) | 600mm | 1700mm | 140mm | 27kg | 100 | Napkins | 2 | Wall Mounted | Digital (Smart) | Metal | N/A | Main Power Adapter | LCD display, Battery Backup, machine can store transaction history in SD Card, vend napkins based on ID cards (optional) |
| Sanemak (Manual) | 580mm | 530mm | 140mm | 18kg | 100 | Napkins | 2 | Wall Mounted | Non Digital | Metal | N/A | NOT REQUIRED | |

7. Shipping

7.1.The product will be shipped directly by the producer/service provider.

7.2.This unit will only be made available to schools in the England via a website, where purchases can be made and will not be to be sold in stores to other businesses.

7.3. A single product will be shipped in individual insulated cardboard boxes, however if schools purchase a batch, they are to be placed in master carton.

7.4. The product not will deteriorate over a period of time if exposed to severe environmental conditions thus will not require any special storage, however as electrical components are included, it is advisable to store in an environment with low humidity levels to prevent the formation of liquids and rust.

7.5. The items will be stored in a freight facility, and processed and shipped on pallets with slip-sheets in transportation, upon request .

7.6. The unit will not disassemble for transportation.

7.7. The cardboard packaging is rectangle to facilitate stacking on pallets and load onto truck. This helps to reduce the carbon footprint of shipping.

8. Packing

8.1. The packaging will consist of expanded polystyrene (EPS) foam in the interior, separating the product from the exterior packaging. These will be contained in a corrugated cardboard box for easy stack.

8.2. The product must be packaged in a well-designed packaging which is easily recoverable or reused, minimises environmental impacts and saves costs.

8.3. The packaging should provide protection against microbiological contamination.

8.4. The packaging will offer sufficient protection to prevent damage to the unit during transportation, such as vibration and compression.

8.5.Excessive packaging will not be exercised.

9.Quantity

9.1. According to research on annual quantity manufacturable, the sanitary napkins segment of the feminine hygiene products market, washroom and pupil quantity in educational institutions, the product should be batch produced with an average of 39 units being readily available per school. There are more companies developing modern sanitary product machines to help eliminate the charge of washroom products and bills created to encourage businesses to offer free period products. This market is large and expected to increase as people become more involved with strive for equality.

| Secondary/ 6th Form State + Academy School UK | | | | | | | | | | |
|---|---------------------|-----------|--------------------|------------------|-------------------------------|---------------------------|-------------------------|-----------------------------------|--|----------------|
| School | Type | Age Range | Number of Students | Maximum Capacity | Eligible Free School Mealters | Number of Female Students | Number of Male Students | Legal Number of fixtures Required | Quantity of DORHER.VITA Dispensers Required Per 20 Females | Schools Median |
| Windmore School + 6th Form | Community | 11-19 | 1,638 (2021) | 1,431 | 15.30% | 803 | 835 | 82 | 40 | 39 |
| Highlands School | Community | 11-19 | 1,531 | 1,589 | 10% | 781 | 750 | 77 | 39 | |
| Broomfield School | Foundation | 11-16 | 732 | 1,000 | 19.80% | 337 | 395 | 17 | 37 | |
| St Anne's Catholic High School For Girls | Voluntary Aided | 11-18 | 1,034 | 1,089 | 12.40% | 0 | 1,034 | 52 | 52 | |
| St Thomas More Catholic School | Academy Converter | 11-18 | 1230 | 1260 | 17.70% | 587 | 677 | 62 | 28 | |
| Woodford County High School | Community | 11-18 | 1154 | 1,215 | 5.50% | 1,154 | 0 | 58 | 58 | |
| Bescon High | Community | 11-16 | 493 | 900 | 42.80% | 173 | 325 | 25 | 9 | |
| Meridian High School | Academy Sponsor Led | 11-18 | 614 | 980 | 47.20% | 295 | 319 | 31 | 15 | |
| King Henry School | Academy Sponsor Led | 11-19 | 1,627 | 2,050 | 24.10% | 781 | 846 | 81 | 39 | |
| Bentley Wood High School | Academy Converter | 11-18 | 1,236 | 1,304 | 14.80% | 1,236 | 0 | 62 | 62 | |
| The Camden School For Girls | Academy Aided | 11-18 | 1,043 | 1,000 | 20.80% | 0 | 1,043 | 52 | 52 | |
| Dame Alice Owen's School | Academy Converter | 11-18 | 1,440 | 1,416 | 3.60% | 749 | 691 | 72 | 37 | |
| Forlanshere School | Foundation | 11-18 | 1,783 | 1,655 | 6.90% | 892 | 892 | 45 | 89 | |
| West London Free School | Free School | 11-18 | 871 | 860 | 18.80% | 436 | 436 | 44 | 22 | |
| Grey Court School | Academy Converter | 11-18 | 1,415 | 1,398 | 8.20% | 608 | 807 | 71 | 30 | |
| The Henrietta School Barnet School | Academy Converter | 11-18 | 792 | 779 | 1.90% | 792 | 0 | 40 | 40 | |
| Holland Park School | Academy Converter | 11-18 | 1,389 | 1,430 | 17.70% | 708 | 681 | 69 | 35 | |
| Lady Margaret School | Academy Converter | 11-18 | 739 | 538 | 9.60% | 739 | 0 | 37 | 37 | |
| Newstead Wood School | Academy Converter | 11-18 | 1,100 | 955 | 4.10% | 1,100 | 0 | 55 | 55 | |
| Sacred Heart High School | Academy Converter | 11-19 | 1,093 | 793 | 9.20% | 1,093 | 0 | 55 | 55 | |
| The Tiffin Girls' School | Academy Converter | 11-18 | 1,190 | 1,001 | 2.20% | 1,190 | 0 | 60 | 60 | |
| Twyford Church of England High School | Academy Converter | 11-18 | 1,499 | 1,372 | 6.90% | 794 | 705 | 75 | 40 | |
| Wallington High School for Girls | Academy Converter | 11-18 | 1,497 | 1,460 | 4.90% | 1,497 | 0 | 75 | 75 | |
| Woolwich Polytechnic School | Free School | 11-16 | 232 | 1,200 | 15.10% | 232 | 0 | 12 | 12 | |
| Wembley High Technology College | Academy Converter | 11-19 | 1,399 | 1,330 | 11.60% | 672 | 727 | 70 | 34 | |

9. Manufacturing Facility

9.1. what are the proposed manufacturing options, and where might these take place?

9.1.1. The manufacturing process for the unit will take place in a single hired factory to batch produce the units.

9.1.2. The factory must be producing goods or products that are very similar to the unit, in order to better understand the target market.

9.2. Are there any components that will be bought in from other manufacturers?

9.2.1. Electrical components used in the unit, will be purchased from external manufacturers.

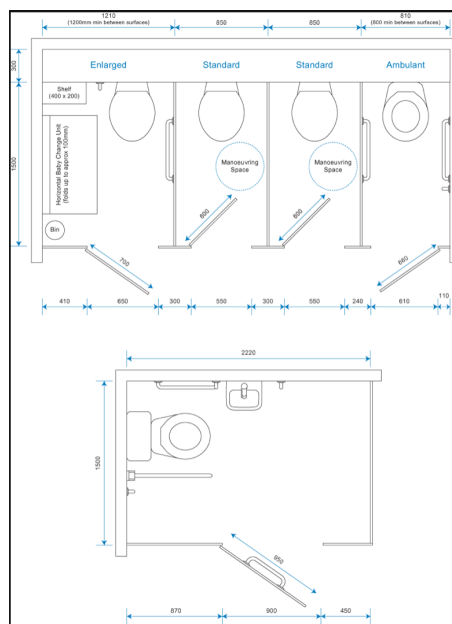
10. Size

10.1 What are the factors that dictate size requirements and how will these be defined?

10.1.1. The actual size of the dispenser is 410mm x 485mm x 285mm (W x H x D), however, it must be able to store the 22 products that come in different sizes and electrical components. kept as small as possible to fit in with the environment in which it is to be used.

10.2. What is the required product size?

10.2.1 To ensure that the dispenser can fit the recommended environment for use; Enlarged, Standard, Wheelchair Accessible Toilets and Ambulant washroom cubicles, the overall size of the unit must not exceed: 800mm x 2100mm x 250mm (W x H x D).



11. Weight

11.1. What are the factors that dictate weight requirements and how will these be defined?

11.1.1. The unit will be installed behind the rear panel of a cubicle usually made from either laminated Melamine Faced Chipboard (MFC), High Pressure Laminate (HPL) or Solid Grade Laminate (SGL) and mounted onto the wall.

11.1.2. The weight limit of drywall depends on the size of the panel and the distribution of weight, hardware and technique. With the correct selection, drywall can hold up 45kg. Plasterboard wall may hold up to 40kg.

11.2. What is the required product weight?

11.2.1 Based on the weight of similar existing products when empty, the unit must not exceed a total weight of 18kg.

12. Aesthetics, Appearance, and Finish

12.1. What is the intended aesthetic and design language of the product?

12.1.1. To show that the ENOVA Dispenser and the ENOVA App are under the same brand, the dispenser will follow the same shape as the ENOVA App buttons; displaying three round edges and a single 90 degree edge, however this will be in 3D.

12.1.2. The dispenser exterior will display laminated stickers for brand and product instructions.

12.1.4. The design must be modern, sleek and ergonomic to make the product more appealing to its intended users and provide accessibility.

Are there any customer expectations or preconceptions regarding aesthetics?

12.2.1. The dispenser will be designed with a range of unisex pastel colours that represent neutrality and are able to emit a sense of tranquility. Darker as well as softer pastel colours were chosen as it ensures that different users such as girls, non binary, and trans boys, are included and are able to make a connection with the product. Pastels have become especially popular amongst young people and commonly used in feminine products- with softer colours.

13. Materials

13.1. What are the range of materials that might work for this application?

13.1.1. Materials selected for the dispenser must abide to regulations in place and product standards to guarantee safety and legal product distribution. For example, plastics must undergo testing and conform to certain flammability ratings in order to acquire an approval.

13.1.2. The unit will be primarily made from 1.2mm powder coated 304 antibacterial stainless steel external, to reduce opportunity for vandalism. This material is ideal for high traffic areas and unsupervised school spaces such as student washrooms. Powder coating, improved product durability and finish, and reduces environmental impact in comparison to other alternatives e.g. paint.

13.1.3. The powder coating will be thermoplastic for additional durability and eliminates chemical bonding to make the coating reversible and reusable.

14. Product Life Span

14.1. What is the shelf life of the product?

14.1.1. As for the units' electrical components, it is estimated that Liquid Crystal Displays (LCDs) can remain functional for 40,000 to 60,000 hours because of the energy-efficient backlighting - LEDs.

14.1.2. With the additional coating of powder to provide a protective barrier that helps prevent corrosion, reduces the need for maintenance as it is more chip proof and the robust external material should withstand acts of vandalism.

14.1.3. Properly cared for and cleaned stainless steels result in a low maintenance cost. When not exposed to saline or chloride environments, this material grade lifespan is estimated to be around 20 years, with some extending to centuries.

14.2. What happens at end-of-life / disposal?

14.2.1. Stainless steel is one of the most sustainable and valuable commodities in the metal market. The appliance's powder coated material can be removed chemically and physically, and recycled in an electric arc steelmaking.

14.2.2. The simple assembly of the dispenser means that it can be easily taken apart and turned to scrap metal. Chromium, nickel and molybdenum are highly valuable elements that can be recovered from materials and recycled.

15. Standards and Specifications

15.1 Are there any national or international standards to which the product must conform?

15.1.1. The dispenser must conform to relevant BSI and international standards: International Standards (Northern America: UL and FCC. For Europe it is TUV and CE) - ISO 9001:2015

16. Ergonomics

16.1. What are the customer requirements in terms of ergonomics? What user / operator features are desirable and/or essential?

16.1.1 The dispenser unit should be designed with ergonomics. The Case slot should be positioned correctly in terms of height so that the intended user may insert the ENOVA Case with ease.

16.1.2. The product will be designed, to require as little space possible whilst maintaining its functionality and to be easily installed in any standard washroom cubicle.

16.1.3. The dispenser will not require any physical input from the end user.

16.1.4. The location of the components such as the scanner, must be placed at the appropriate distance from each other for the users to navigate with ease.

16.1.5. All essential components for user input must be visible and easily recognisable.

16.1.6. The power adapter on the unit, and other cables placed on the rear of the unit, to prevent students from handling.

17.Customer and user

17.1. Who will buy this product and why? List all potential classes of customers.

17.1.1. The product stands out from similar existing products in the market as it combines various elements from social media; which is popular amongst adolescents, and smart tangible products. The dispenser will attract users that experience period poverty as well as those that are more affluent.

17.1.2. Potential expansion could see this multi product or the physical unit being used not just in educational spaces, but also in businesses, transport, retail and leisure spaces.

17.1.3. Ideal companies that could potentially adopt the product into their lines of similar product would be Phs Group and Initial, as they currently provides schools with various services and products. An international company could be Happy Nari.

17.2. Is there a new segment of the market that you can tap into?

17.2.1. By 2027, the feminine hygiene products market is estimated to reach 31.51 Billion USD. The Dispenser could tap into the market of smart feminine care or feminine hygiene as it is experiencing a high demand, due to development of innovations. This segment is projected to see significant growth- at a CAGR of 6.5% from 2020-2026.

18.Quality and Reliability

18.1. What level of reliability can you expect for this product?

Reliability Standard:

18.1.1. The reliability of the product will have high standard as to ensure that it can carry out its purpose, making period products easily accessible to students in an effort to tackle period poverty.

18.1.2. The unit must be designed and maintained to conform to the ISO 9001 standard.

Quality Standard:

18.1.3. The product will undergo various standard tests to guarantee quality, and ensure that the device will perform its required function when subjected to expected conditions.

18.2. Are there any legal requirements for reliability? How will you regulate or check quality on bought-in components?

18.2.1. Reliability of bought-in components will be verifying that companies meet reliability goals numerically rather than qualitatively to make sure that the electronics are being managed and are able to provide reliability specifications.

19.Shelf life (storage)

19.1. For how long is the product expected to be stored before use?

19.1.1. The product does not have any issues regarding its shelf life. Acceptable storage procedures must be carried out to minimise the chance of the packaging and the product getting damaged.

20.Processes of manufacture

20.1. Does the manufacture require new production processes to be developed?

20.1.1. The stainless steel material will be sourced from external manufacturers. The manufacturing process will include melting the raw materials, casting, forming, heat treatment, descaling, cutting, finish and powder.

20.1.2. Each unit must pass a quality control before being stored for dispatched.

21. Time scale

21.1. What is the timescale of the project? List key milestones: design freeze, pre-production prototype, implementation of manufacturing process, sales agreements, investment phases.

21.1.1. This project was launched in September 2020 and is aimed to be completed by June 2021. Research, ideation, initial prototyping, testing, manufacturing and final prototyping are processes to take place during the 9 months.

Timescale:

- 22 September 2020 - Project Launch
- 22 September – 22 October 2020 - Research
- 17 November 2020 – February 2021 - Ideation
- 5 March 2021 – Design Freeze
- February 2021- Initial Prototyping
- April 2021 - Testing
- 28 May - Final Prototyping
- June 2021 - Graduation

22. Testing

22.1. What will be the testing requirements and procedure?

22.1.2. The product must be able to receive a Design Qualification (DQ) to show that it works as intended in all respects.

22.1.3. The electronic dispenser must be CE certified.

23. Safety – including standards

23.1. What are the potential sources of product liability legislation?

23.1.1. Product liability legislations for England and Wales include:

Product Liability Statute e.g.

- Part 1 of the Consumer Protection Act 1987 (CPA) – EU Directive 85/374/EEC on liability for defective products (Product Liability Directive).
- Consumer Rights Act 2015 (Consumer Rights Act)

Consumer Protection Statute e.g.

If the dispensers are not of satisfactory quality or fit for purpose when purchased, customers may be entitled to:

- Within 30 days of delivery; full refund
- Within six months of delivery: repair or replacement, or full refund
- Over six months from delivery to six years: repair or replacement within a reasonable time.

Liabile parties

23.2. Are there any potential operator / user hazards?

23.2.1. Potential hazards to the user include liquids coming into contact with the dispensers' electronic components which may cause the product to break down, but very minimal harm to users.

23.2.2. When restocking, the dispenser must be deprived of its power source as to prevent parts parts from moving unexpectedly.

23.2.3. Refer back to heading (15) for additional units safety specification.

23.2.4. The case slot on the dispenser must not allow users to place their hands in the machine to prevent fingers from getting caught in moving parts.

23.3. Are there any manufacturing and assembly hazards?

23.3.1. There should not be any manufacturing hazards of the electrical components because external manufacturer must follow the required safety standards and provide reliability specifications to ensure that products are safe for utilisation and assembly.

23.4. What is the potential for misuse and/or abuse?

23.4.1. The dispensers must be installed away from flammable substances and objects such as radiators as to not melt the components and external shell causing a short life span.

23.4.2. users must not attempt to pry open the machine with sharp or conductive objects as to not cause injury.

24.Company Constraints

What are the limitations of the company as it is at the moment? How can these be overcome?

24.1.1. Limitations would include introducing a new company that needs to expand in size and imprint its brand in the market. This may be difficult with other bigger established companies currently operating and offering its products and services to the same target users. To overcome this, it may need to partner with other more well known companies, manufacture the dispensers but allow the products to be sold by those companies in partnership.

25. Market Constraints

25.1. Who is buying this type of product?

25.1.1. Smart period product dispensers are not common products in state funded educational institutions in England.

25.1.2. Currently these smart dispensers are being not a popular choice for bigger businesses or washrooms in public spaces because the larger the company, the more the number of required dispensers would increase. By opting for non smart, lower cost dispensers, companies are able to purchase a more.

25.1.3. The

26. Political and social implications

26.1. Are there any forecast political or social implications of this product?

26.1.1. The positive social implication is that the product may help close the gap between female and male student school attendance as well as students from lower income household and students from wealthier backgrounds opportunity.

26.1.2. No political implications can be drawn from the introduction of the product at this point.

27. Legal

27.1. What are the legal issues around a product of this nature?

27.1.1. Improper use of electrical products by consumers can raise serious legal implications, especially if user health is compromised.

28. Installation

28.1. Is a professional required for installation?

28.1.1. As stated previously, the unit will not be designed to disassemble for transportation, but will be designed to be easily taken by professionals apart in the case that it requires replacement pieces and repair.

28.1.2. Educational institutions will not be expected to carry out the product installation, however a manual will be provided with each dispenser. Rather, a professional employee will be dispatched to perform this process to ensure that it is properly fitted.

28.1.3. Once the product has been installed, the only task for the user is to register and sync the dispenser to the school administrator ENOVA app account in order to obtain control and receive dispenser stats. The user will also need to stock the dispenser with the products provided by Phs Group.

29. Documentation

29.1. What documentation must be supplied with the product?

30.1.1. Alongside the dispenser, a complete set of product manuals, both for the user and for service engineers will be provided.

29.1.2. The user's guide will provide instructions for the user operating the unit. It must contain details of how to register and sync the dispenser, and safely utilise, dispose and clean the product.

29.1.3. The service manual will provide instructions for the engineer. It must contain details of how to install and start up the scanner (power) and how to repair the dispenser.

29.1.3. A product note will also be included to inform the user how the product will be recycled, after its shelf life.

30.Disposal and End-of-Life scenarios

30.1. Does the product constitute an environmental hazard when disposed of? Can parts of it be effectively recycled?

30.1.1. The user recycle the dispenser or return it to the company to ensure that the product will be disposed properly and taken to a furnace.