

ACPA7006

Management of New Product Development

Assignment B - Product Design Brief

Product Design Brief for:

Virus Detection Breathalyser Device

Issue Number: **V002**

Date of Documentation: **30/09/22**

Company

Breathtronic is a Carmarthen-based SME which specialises in the manufacture of electronic breathalyser systems.

Product

The product is a new breathalyser device which has the functionality of detecting other organic materials which includes virus infections.

Background

The new product was identified through a knowledge transfer partnership with a local university, where the proposed product went through successful laboratory trials and the necessary patent applications, which have been registered.

Target Market

Breathtronic has identified through market intelligence that the primary markets the company will target is the public health sector (NHS) and the private travel sector (cruises).

Goal

To become a leading supplier in virus detection breathalyser products in the UK.

Budget

An initial investment of £1 million will be provided by the company's stakeholders with a match funding of £1 million from Breathtronic to manage the design, testing and production of the new product (total £2 million).

Table of Amendments

Original Issue Number	New Issue Number	Date of Amendment	Section	Owner	Details of Amendment	Team Affected
V001	V002	30/09/22	Packaging	Bob Jenkins	The packaging should consider a sustainable material which can be recycled through standard council recycling policies	Finance Design Warehouse

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Document Purpose

The product design brief is a new product development control document. Where the purpose of the document is to act as a central source for all company personnel involved in the development of the new virus detection breathalyser device. This document gives an overview and evaluation of the considerations needed to be made in developing the product and informs various managers within the company where their input or insight will be required or just appreciated.

Product Synopsis

The product is a handheld breathalyser device which can detect other organic materials like viruses such as: Coronavirus (NHS, 2022a), Flu (NHS, 2022c), Norovirus (NHS, 2022d), Yellow fever (NHS, 2022e), Zika virus (NHS, 2022f) and Ebola (NHS, 2022b). An indicative image of the product application is shown in **Figure 1**.



Figure 1: Example of a breathalyser device interacting with a user

The product architecture is illustrated in **Figure 2**.

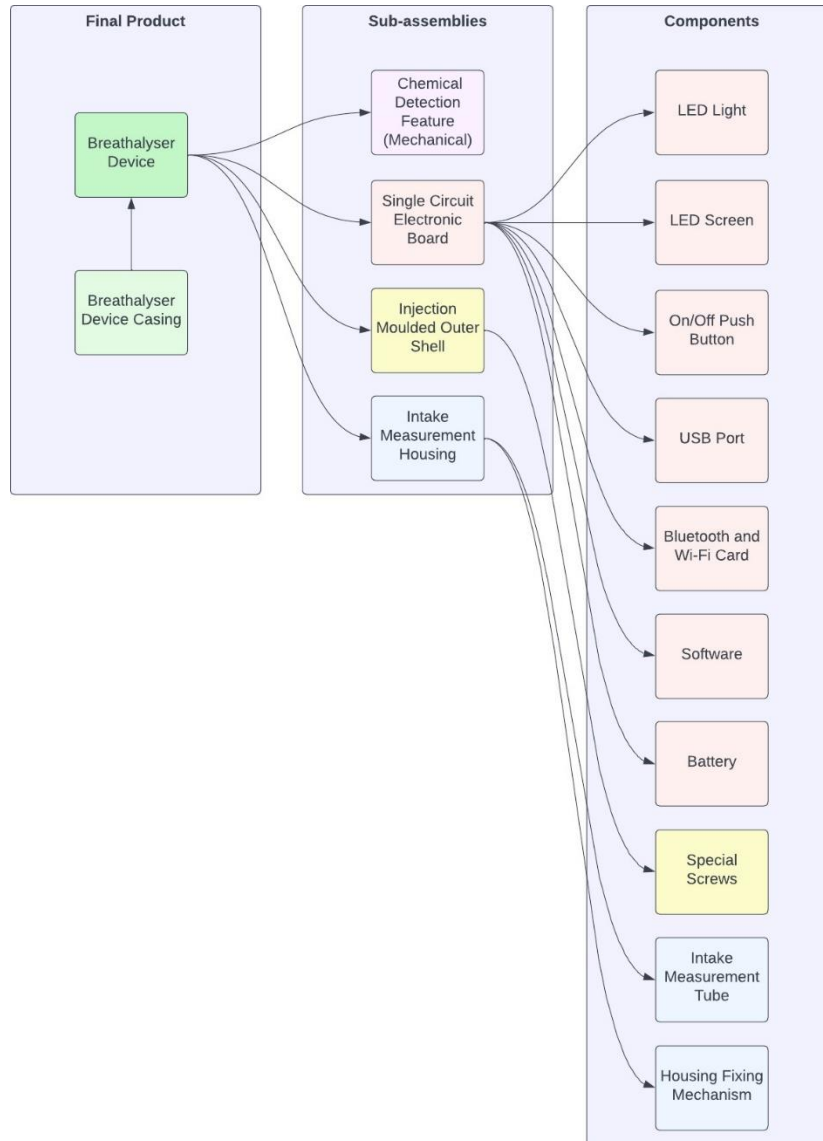


Figure 2: Breathtronic New Virus Detection Device Architecture

The product features are as follows:

- Interactive LED to display user settings and results.
- Bluetooth and Wi-Fi connectivity for connection to phone for historic records.
- LED light to assist with user measurement.
- On/Off button for device power.
- Removeable intake measurement tube.

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- USB port for charging.

The new product will be aimed at the public and private sector where the NHS (public health) and cruise line (private) organisations will be targeted.

The potential for the product to undergo new product development (NPD) is large as it provides an opportunity for the company to introduce new technologies (i.e. AI) and techniques (in machining) which could not be possible with the current breathalyser device. If the development of this new product is successful, there is potential to tap into a global \$8.6 trillion travel and tourism market (World Travel & Tourism Council, 2022) and £192 billion market for the UK public health sector (TheKingsFund, 2022). Finally, successful NPD will allow the company to release the produce with fewer prototypes and into the market at a faster pace to beat Breathtronic competitors.

Aesthetics

- 1.1 The product colour should be in a matte format to give a clean, slick look and needs to be reproduced in a variety of colours i.e red, blue green (based on market research) to give customer flexibility in choosing the product. The colour should not be too bright as it could potentially conflict the bright LED screen. An indication of what could be expected is inspired by the Apple iPhone, shown in **Figure 3**.



Figure 3: Example of matte products

- 1.2 The product should not include any patterns to avoid the potential of the product price point being higher than competitors.
- 1.3 The product should not contain any sharp edges in shape since it is a user handled product. This consideration will need to factor in higher manufacturing costs due to the complexity of producing rounded/curved edges.

- 1.4 As a desirable, the product needs to feel smooth in a human's hand, which creates the perception that the product feels nice to use.
- 1.5 The suppliers for product paint and finish should be identified during design phase.

Branding

- 1.1 The branding is to be embedded onto the product (through paint) to provide customer's a constant reminder of where the product comes from. Consideration needs to be given it is feasible to integrate the branding onto the injection moulded part.
- 1.2 The branding should be shown on both sides of the breathalyser device and positioned above the LED screen as it will align with the user's eyes when reading the measurement.
- 1.3 Breathtronic's slogan does not need to be shown on the product to ensure the product aesthetics is clean and slick.

Company Constraints

- 1.1 The manufacturing facility is 30,000sqft. The facility layout may need to be reshuffled to occupy a new manufacturing assembly line for new products as well as existing products.

- 1.2 The current testing facility is small. Expansion may be needed to test parts which are sourced from third party suppliers but also to check for fraudulent parts from unauthorised suppliers.
- 1.3 Breathtronic does not have digital capabilities in-house. To handle future product developments, the company needs to recruit employees with AI, cloud and IoT skills. It is suggested to advertise jobs early through websites such as Indeed (Indeed.com, 2022), Reed (Reed.co.uk, 2022) or the company's LinkedIn page (Breathtronic, 2022).

Competition

- 1.1 The likely competition Breathtronic will face is AlcoDigital (AlcoDigital Ltd, 2022a) and InspectIR (Inspect-IR, 2022b). AlcoDigital offers a range of brands from portable drug testing (Drugstop) to a range of personal digital alcohol breathalysers with prices varying from £39.95 to £315 (AlcoDigital Ltd, 2022b). An example of their flagship product is shown in **Figure 4**.

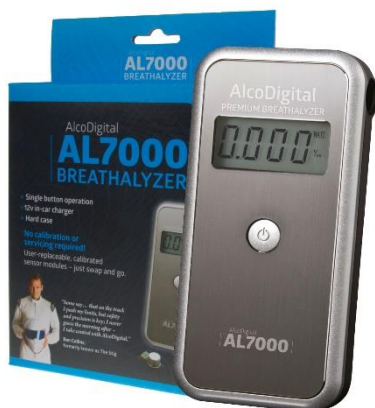


Figure 4: AlcoDigital AL7000

- 1.2 InspectIR is a research and development device company that produces portable Covid-19 testing through a chemical box product called PNY-1000 (Inspect-IR, 2022a). This product allows users to conduct Covid-19 tests through a breathalyser device which is officially approved by the FDA (FDA, 2022). The caveat to their product is that the portable breathalyser device is a size of a suitcase (Mole, 2022), shown in **Figure 5**.



Figure 5: InspectIR Covid-19 Breathalyser Device

- 1.3 IP team should search for existing competitor patents ensure the new product does not interfere with their patents.
- 1.4 It is suggested for the company to keep track of competitors activities to ensure the new product will be first to market. If competitors are likely to release a similar product, the timeline for product release should be reconsidered.
- 1.5 Reviews of the competitor products may be considered to avoid Breathtronic's new device to avoid the same pitfalls.

Costs

- 1.1 The target cost of the product needs to consider raw materials, labour and profit margins of the retailer to ensure Breathtronic makes a profit. The target cost needs to consider the rise of inflation including any changes on import and export tariffs.
- 1.2 The target cost needs to factor in the expectation of the market users, which could be found through focus groups or health and/or tourism trade shows.
- 1.3 The target cost cannot be influenced by the competitor's product as Breathtronic's product is unique in terms of functionality and size. It may be expected for the product to have a higher price point than competitors.
- 1.4 With the £2million initial investment, the investment should be split to cover areas from new product development to initial market entry. An indicative percentage breakdown of the costs is shown in **Table 1**. It is subjected to change from the outcome of the product design specification.
- 1.5 The significant cost in design & development is to ensure the product is correct for purpose and to minimise any possibilities of product failure.

New Product Development Area	Percentage Breakdown of Total Investment %
Design and Development	20
Prototyping and testing	10
Capital (tools, facilities and machinery)	5
Manufacturing	20

Distribution (warehousing, freight, taxes)	20
IP protection	5
Advertisements	5
Market Intelligence	15

Table 1: Percentage Breakdown of £2 million investment in the new product

Circular Economy

- 1.1 At the product end-of-life (degradation from electronics), the product should be shipped back to the facility to refurbish the single electronic board and then delivered back to the customer.
- 1.2 An eco-friendly return bag should be included which users can place the product.
- 1.3 The manufacturing facility has the right equipment to refurbish the electronic boards. It may be a possibly to use old, scrapped electronic components to help replace the degraded electronics in the user's device.
- 1.4 The power to the new breathalyser device should be battery-less and charged via usb cable. The product could integrate a solar material to help recharge the device.
- 1.5 The packaging of the new product should be eco-friendly such that users can throw the packaging into existing recycling polices.

- 1.6 The device should be modular in design, allowing the users to reinsert tubes (To exhale) for hygiene purposes and the manufacturing team to refurbish the single board electronics without damage.

Documentation

- 1.1 A user instruction manual should be created for the product. The manual should be in a digitised format, where a link or QR code can be found on the casing of the product.
- 1.2 Any CAD files or software development (coding) files should be version controlled to make it easier for the company to collaboratively work on future developments of the product.
- 1.3 Testing procedures will need to be in a form of an online documentation to satisfy any external quality audits and should be managed by the internal quality manager.
- 1.4 IP documentation should be paper-based and kept in a secure location.
- 1.5 The manufacturing procedure should be documented to enable knowledge transfer in case of instances where employees leave the organisation.
- 1.6 Any documentation regarding the new product should be shared internally and not kept within a department to promote continuous improvement and generation of innovative ideas.

Environment

- 1.1 Since the product will be launched for the NHS and private travel sector (i.e. cruises), the product needs to be able to withstand conditions in both environments.
- 1.2 The product should be able to operate in a temperature window between 15-30°C, this covers room temperature in hospitals and cruise temperatures upon traveling or on shore.
- 1.3 It is not expected that the product will be used in high altitudes, thus the product should be able to operate for altitudes lower than 500 meters above sea level. The highest peak in the UK is over 1300m above sea level (Countiesman, 2020).
- 1.4 The product should be able to operate in high humidity situations, if extreme weathers occur in the UK but also in countries that are naturally high in humidity.
- 1.5 The product needs to operate when it is experienced under shock (i.e. if a user drops the device – this will be the case for hospitals as it is a high stress environment).
- 1.6 Hospitals will have bacteria which can easily contaminate the device. A casing is required to protect the device from bacteria.
- 1.7 The electronics embedded within the device should be able to operate for noisy environments like busy hospitals and should be protected from insects for users looking to use the product outside of the UK during cruises. Incorporation of a filter may be needed in the device tube housing to prevent insects from entering the device.
- 1.8 The product will need to be subjected to condition testing before mass production.

- 1.9 The embedding of electronics into the device should be carried out in a clean room to prevent any unwanted particles from contaminating the device.
- 1.10 The product may require soldering; thus the electronic boards should be able to withstand solder temperatures if aspects of the board needs to be resoldered.
- 1.11 The product may be subjected to worker's hand during manufacturing; thus consideration is needed to ensure fingerprints are not left on the product before it reaches a user i.e. use gloves.
- 1.12 The product needs to be packaged properly to withstand conditions in the storage facility and transport vehicles when the product is in transit (shock, temperature).
- 1.13 Environment conditions of retailers or wholesalers need to be factored in to ensure the product does not fail during display.

Ergonomics

- 1.1 The product will be assembled and packaged on a typical desk height level and since tooling will be provided to handle the product, the product may need mechanisms by design to allow the manufacturers to disassemble the product with the tooling.
- 1.2 In terms of the end-user, the product will typically be used in two ways; at the user's mouth to take measurements and in the user's hand (either hand) to read results from the LED screen.
- 1.3 The LED screen should be positioned 90 degrees from the device tube, on the largest known width of the product.

- 1.4 The LED screen should be sufficiently large enough for an adult finger (any finger) to interact with. Inspiration can be taken from smart watches (Apple, 2022).
- 1.5 The product will incorporate an LED light to indicate when the measurement is ready and complete. The LED should appear at the user's direct eyesight when taking the measurement (above the device's intake tube).
- 1.6 The product's on/off button should easily be locatable at the top of the device and pressable by a finger.
- 1.7 The design may need to factor in finger grooves in the device for a user's hand to comfortable hold the device.

Installation

- 1.1 During design, the product must contain slots for the on/off button and a usb port.
- 1.2 The product should have a mechanism to remove and replace the device intake tube.
- 1.3 The device software should be installed before it reaches the customer, with over-the-air updates for security and potential new features provided through a wireless network connection.

Intellectual Property

- 1.1 Considerations as to who owns the product IP is needed. Universities policies is required to be checked to see if they own the IP or whether Breathtronic has the right to own it.
- 1.2 Other patents around the chemical detection of viruses should be researched and considered to ensure the new product does not interfere with other patents.
- 1.3 The virus detection product needs to be patented. This will require a patent expert to work alongside the company IP staff to ensure the wording it correct and sufficient. Additional fees are required for this approach.
- 1.4 Breathtronic will need to dedicate time after the product is released into the market to identify potential IP infringers, this could be done through bi-weekly research.
- 1.5 Design rights should be pursued to protect the product aesthetics as well as the packaging.
- 1.6 Breathtronic will need to consider non-disclosure-agreements (NDAs) with third party connections i.e. the sourcing of injection moulded parts, research and development institutes and universities to ensure the confidentiality of the product.
- 1.7 Breathtronic will need to search for copyrights in software for handheld devices to ensure the design of the software is not similar to other organisations.
- 1.8 The company will need to ensure that registered trademarks are in place for the company's logo and product name. This approach will prevent 'knock-off' versions of the new product from being created overseas.

- 1.9 The ownership of the device, once purchased, should belong to the retailer or organisation that purchases the product from Breathtronic.

Legal

- 1.1 Breathtronic must take into account directive 85/374/EEC (European Union, 1985) - liability for defective products. The design and manufacturing team will need to identify defects and find suitable preventative measures to ensure customers do not receive defected devices.
- 1.2 The company must satisfy the general product safety regulations 2005 (Office for Product Safety and Standards, 2022) which ensures that the product entering the market is considered a safe product.
- 1.3 The new product should not be licensed in any capacity as it potentially exposes the product to market competitors.
- 1.4 In any legality troubles, Breathtronic should have a chosen law firm contact to prevent any time wasted in searching for a law firm to represent the company.

Life in Service

- 1.1 The product service life should be assessed against AlcoDigital (the competitor) products. The product should be able to operate 24/7 providing the device has a minimum of 5% charge – typical of mobile phones and smart watches.

- 1.2 The product life expectancy should be assessed against quality (identifying when the product falls under quality after x number of measurements – where x is the quantity to find).
- 1.3 The product life should be assessed in terms of safety (finding out when the product overheats after a certain period) and installation (where wear and tear is a factor for the intake tube insertion after x amount of uses).
- 1.4 It is expected that the electronic components which measures the user's breath will degrade. The life expectancy of this component should be assessed based on the specification of the supplied electronic board.

Materials

- 1.1 The product outer shell will consist of plastic injection moulded parts. The same for the on/off button. The supplier of injection moulded parts should be certified with ISO 13485 (ISO, 2022) to ensure the product is up medical standards. The injection moulded part should be manufactured under BS EN ISO 20430 (BSI, 2020) to ensure repeatable parts are supplied.
- 1.2 The PCB is to be made from a solid substrate material. From research, aluminium or alumina (Al₂O₃) ceramic may be ideal (Essentra Components, 2020). The supplied PCB must be of IPC-2221 standard to ensure the boards are safe, reliable and capable of electronic components being reattached in case of damage (IPC-2221 Task Group, 2003).
- 1.3 The product casing should be produced with an aluminium alloy to keep the product safe from debris and shock. The manufacture of aluminium alloy must comply with

ASTM B221-20 (ASTM International, 2020) and ASTM B209 (ASTM International, 2021).

- 1.4 The product LED screen should be of a typical transparent plastic.
- 1.5 The product packaging is to be sourced from recycled plastic. The obtained plastic must be sourced from suppliers which must comply with BS EN 15270:2008 (ISO, 2008) to ensure the plastic is genuine.
- 1.6 The intake tube material should be recyclable and not hazardous for a human to use.

Manufacturing Facilities

- 1.1 The current manufacturing facility will be used to produce the new product, however, requires the layout to change to ensure efficient flow of products occur for both current and the new product. Discreate event simulation study (University of Pennsylvania, 2022) may aid the layout of the facility.
- 1.2 New electronic benches are required to alter or refurbish the electronic components received from the third-party supplier if necessary.
- 1.3 The manufacturing set-up need to consist of; assembly for the injection moulded part, the integration of the electronic board and battery, the assembly and integration of the chemical detection sensors/parts, a dedicated space for testing, a dedicated space for software installation, packaging and palletizing.
- 1.4 The company techniques are limited to installation. Thus, additional machinery is required to make the chemical detection parts.

- 1.5 The company should create own tooling to open the injection moulded device outer shell which has a special steel screw type fixing.

Market Constraints

- 1.1 The NHS sector is financially constrained as it is dictated by the government. The company may need to think about selling to the private health sector.
- 1.2 There could be a constraint in the behaviour of managers in certain NHS hospitals in the UK, they may prioritise other things over the product. This information can be sought from additional market intelligence.
- 1.3 If the product was to be sold overseas to travel cruise lines, an understanding of the tariffs and documentation to ship and sell the products needs to be understood.

Maintenance and Repair

- 1.1 The end-user can only repair the intake tube and LED screen. The internal components should not be opened and can only be repaired by Breathtronic.
- 1.2 The product should be able to last for 3 years without interruption and wouldn't require maintenance as the product should be tested in terms of measurement accuracy to outlast the product lifecycle.
- 1.3 The software will receive over-the-air updates for security as long as the device is connected to a network (Wi-Fi).

- 1.4 The design of the device's outer shell should be modular, such that any damage can be replaced if the customer chooses to order another from Breathtronic's website.
- 1.5 If the software does not work or the readings become problematic, the product software should be reset and should be carried out by the user. Customers should have the ability to email the support team for help.
- 1.6 The product will come with spare intake tubes in case a user damages the part.

Packaging

- 1.1 The packaging should contain; the device, spare intake tubes, device case and a return shipment bag.
- 1.2 The spare intake tubes should be sealed to prevent any contamination when users need to switch the tube.
- 1.3 Since the device has sensitive parts to measure the user's breath, the product packaging should be stored and transported in a larger box with material to dampen the movement of the device i.e. bubble wrap or foam.
- 1.4 The packaging needs to have a label to identify the batch number and a QR code to enable users to read instruction manuals online.
- 1.5 The boxes used to ship the products should have a label 'handle with care' and 'sensitive products inside' so the transporters do not mishandle the product.

Performance

- 1.1 The device should be able to classify up to 5 different viruses, any additional viruses could be offered as an add-on package to generate more profit.
- 1.2 The device should provide the result after a reading of under 10 seconds, which is determined by ImpactIR and AlcoDigital (competitors) products. The reading can be within a +7 second tolerance.
- 1.3 The classification of virus for a measurement should have a confidence level greater or equal to 80%
- 1.4 The chemical detection parts should be able to identify the virus under a single exhale from a user which must reach a pressure of 1.4 psi +- 0.5 psi.
- 1.5 The device measurement should be activated upon user's input to the LED screen. The LED light status are flashing red (device is ready), solid red (user is blowing into the device) and solid green (measurement is complete).
- 1.6 The LED screen should be smooth if the user is transiting through settings with a finger. The movement of the screen should be triggered by 0.5cm movement of a finger (for left, right, up and down actions).

Political, Social and Cultural

- 1.1 The travel and tourism sector are affected by seasonality i.e. it is unlikely people will travel in winter on cruises and by pandemics i.e. Covid-19 created a detrimental impact to the cruise industry (Walker, 2022). Additional market understanding is required to see which organisations in the travel industry are unaffected by pandemics.
- 1.2 The product can be used by users from any ethical background; thus it is required that the online instruction manual comes with various languages.
- 1.3 The product (device) itself should not contain any slogans or wording, to minimise any chances of creating social upset.
- 1.4 The wording of the product description on the packaging needs to factor in the sector the product is being shipped to. The NHS will care about the breath of viruses the product can detect, whilst the travel sector will want to see information that the device is easy to use.
- 1.5 The company should have an understanding of cultural differences for all staff working on the product, including overseas.

Processes

- 1.1 The PCB wiring specification needs to be designed for instances where the product needs repair or refurbishing.
- 1.2 Specifications for the chemical detection parts should be obtained from the university to allow Breathtronic to manufacture the parts for the device.
- 1.3 The process to install the software should be defined to allow the Breathtronic's software team to repeat any software installations for any defected products.
- 1.4 The entire assembly process of the device should be defined and follow a similar method to the manufacture of the prototype.

Prototyping

- 1.1 Two prototype of the device should be made, one for condition testing and another for market acceptance tests.
- 1.2 3D printed prototypes of the product should be made before the detail design stage to get an appreciation of the size, useability and overall look of the device.
- 1.3 A mock-up of the product's user inference should be drawn to understand what the user will see through the LED screen.

Product Life Span

- 1.1 Breathtronic should look to produce the new product over the next 10 years, providing the demand across the target market is steady.

Quality

- 1.1 The product must be able to clearly classify the virus a user has on the LED screen.
- 1.2 Visual and manual checks should be carried out after the product is produced to ensure the product does not have any damage and does not have any rough areas whilst holding the product.
- 1.3 Inspection is required for the injection moulded parts and electrical components before assembly to ensure the parts have no damage and should be checked for tolerances.
- 1.4 The device needs to be checked for its charging capability and should be operational under charge. The housing for the USB port should be of correct size.

Reliability

- 1.1 The product parts need to be cross referenced to the suppliers to ensure the parts are certified and tested for reliability.
- 1.2 Since the product is Wi-Fi and Bluetooth compatible, the results should be backed up to a user's phone or online account in case the reading on the LED screen becomes unreliable.
- 1.3 The product must be able to provide readings of at least 3 years. This can be determined by appropriate testing procedures to stress the product to estimate when the product is likely to fail.

Safety

- 1.1 The product should incorporate an electronic feature to prevent the circuit from explosion or harming the user if the circuitry is exposed to a current higher than its specification.
- 1.2 The battery should be clear of nearby static materials.
- 1.3 The housing for the tube needs to have a safety mechanism to effectively 'lock' the tube in place to prevent the user from inhaling the tube.

Sales

- 1.1 The product will initially be sold in the UK for the public health sector and for UK travel cruise organisations.
- 1.2 The product will be shipped overseas only to travel cruise organisations that demand this sort of product, initially targeting Europe and then worldwide.
- 1.3 A break-even analysis should be considered following the final product cost and determined profit margin.

Size

- 1.1 The device should be at a size where a user can hold the product in a single hand (either hand). A typical example is shown in **Figure 6**.
- 1.2 The device should be designed **around** 161 x 78 mm in length and width respectively. This will allow any human to hold the device with ease.
- 1.3 The size of the casing should be approximately 10% larger than the device size itself. This is to allow any 'soft' materials to engulf the device and ensure that the user can pick the device out of the casing.
- 1.4 The size of the packaging (to box the casing) should be 20% larger than the casing to allow for any spare parts to fit with the packaging and future accessories if needed.
- 1.5 The device itself should have space to allow electricians to remove the electronic board and battery with ease for repair or refurbishment.

- 1.6 The size of the intake tube for indication purposes should not be larger than 3x a diameter of a normal drink's straw.



Figure 6: Example of handheld breathalyser device fitting in a human hand

Shelf life and Storage

- 1.1 The product should be stored in a cool environment and not under direct sunlight.
- 1.2 The product should not be stored near areas which is exposed to water or any sort of liquids, which could potentially hamper the functionality of the product.
- 1.3 The PCB can have a reduced solderability over time if exposed to air. Thus, it is recommended to design the product such that installed electronics is vacuum sealed.

- 1.4 Circuit board assemblies typically have a shelf life of about 5 years as long there is no proof of corrosion, which needs to be factored in during the design stages (Rayming PCB & Assembly, 2022).

Shipping

- 1.1 The product in boxes needs to be palletised and wrapped for transport.
- 1.2 The product should be transported in a box freight goods truck. Identification of the services which offer trucks for transport is needed to be determined.
- 1.3 The use of ferries may be required for product shipment overseas. If this is the case, the costs and permits are required to be sorted by the time the product begins production.

Standards and Specification

- 1.1 The product design should follow BS8888 drawing standards (Iain Macleod Associates, 2022) to ensure any specifications created are consistent with the wider engineering industry.
- 1.2 The product should achieve an IP68 rating meaning so that the product will be deemed fit to withstand dust, dirt and water.
- 1.3 The product should be CE marked which will enable the product to be utilised in Europe.

- 1.4 The product should factor in EN15964 as a guide to write procedures for testing of breath test devices (European Standard, 2011).
- 1.5 The special screw fixing with requires special tooling (like the Apple iPhone) will need to conform to an ISO standard.

Testing

- 1.1 For quality testing, the product needs to undergo a factory test for the product features before shipment.
- 1.2 During mass production, one product should be taken off the manufacturing line every hour to be tested for functionality under dust/water and shock exposure.
- 1.3 A test specification outlining how the product should be tested must be crafted during the design phase.
- 1.4 The product chemical detection parts should be tested upon assembly in a lab to ensure the right virus is classified. This must be carried out in a controlled environment.

Time Scale

- 1.1 The time scale for this project will be 2 years in total, however the stages at which the product is developed is broken down and shown in **Table 2**.
- 1.2 Additional resource may be required due to other project commitments the company is undergoing.

- 1.3 The project will consist of a few milestones outlined in **Table 3**, which can be seen as decision points as to whether the product development should continue or not.
- 1.4 Most of the time is dedicated to the design phase to minimise chances of creating defective products, misinterpreting the market needs, and any overcomplications in manufacturing.

Activity	Time Allocated
1. Product Design Specification (continuous process)	1 months
2. Concept Design	1 month
3. Detailed Design (including software)	8 months
4. Prototyping	2 months
5. Manufacturing Setup	6 months
Marketing – starting at same time as manufacturing setup	6 months
6. Production	Start at Q3 2024

Table 2: Time allocation for each product development activity (guideline only)

Milestone	Target Date
Completion of draft PDS	December 2022
Concept design via 3D CAD and list of considerations for manufacturing and testing	January 2023

Engineering Drawings, testing specification, draft of user manual	August 2023
Finished prototype	September 2023
Identification and installation on machinery.	April 2023
Production line setup	September 2024

Table 3: Milestones to be completed and reviewed for a go/no-go decision on the product development

Weight

- 1.1 The weight of the product should be between 0.2-0.5 kg, based on competitor products and research into the weights of handheld devices like phones.
- 1.2 The weight of the product should be light enough such that it does not require any tooling or mechanisms to handle or carry the product.
- 1.3 The product weight, including the casing, should be light enough that a user should not feel any fatigue in their hand/arm during 1 hour of use.

References

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