

Purebreathe Urban Velo

A respiratory protection device designed for the urban Chinese commuter

In collaboration with Lifelab Innovations Ltd and designer Daniel Worboys

Urban Velo is a respiratory protection device which was developed in collaboration with Lifelab Innovations. It combats industry approved respiratory masks that provide inadequate anthropometric sizing, resulting in reduced air pollution protection for Chinese users. The design incorporates user perceptions to reduce social stigma and improve social acceptance amongst the specific target market.

The results of this collaboration were used to develop an innovative filtering technology to provide a moisture controlled low resistance filter, with high efficiency particulate protection within a fashion orientated form. The design presents an effective and non-intrusive form of air protection within specific environmental conditions.

Urban Velo is one of two final year major projects exploring potential innovative personal air filtering products for the Chinese market. Final year Industrial Design student Daniel Worboys worked closely with the development team at Lifelab to find a solution in this area.

Building on earlier short-term projects with Life-lab, a University spin-out company led by Professor Alison McConnell, the collaboration moved up a gear setting up briefs for four separate final year student projects. The projects focused on concept development of health and fitness products for global markets based on innovative ideas and strong scientific evidence.

Brief

Building on the expertise established with the LifeLab product development, the potential of

developing a personal air filtering product for the Chinese market allowed for a new direction that had not yet been explored.

Respiratory Protective Devices (RPDs) are becoming more widely used as a form of personal protection against air pollution. Yet currently the majority of urban dwellers subjected to excessive levels of harmful pollutants choose not to wear an RPD. A result of poor design and negative connotations has decreased the potential appeal of using an RPD.

Recent findings have concluded that current regulatory approved RPDs do not provide acceptable levels of protection for the Chinese user. Key facial anthropometric differences recorded by comparison of US and Chinese counterparts indicates current anthropometric data used to derive the RPD panel sizes does not reflect the diverse range of people within China. There was therefore a need to research, design and develop a better solution to current RPDs, specifically aimed at this geographic market tailored in particular towards key facial dimensions.

Approach

The project began with a strong technical study into appropriate filtration materials and systems with an emphasis on user performance thresholds and requirements as well as environmental conditions. Prior to design development, in-depth research was conducted to understand fully all areas associated within the specific product area.

The project developed using various design tools including initial brainstorming, concept sketching and evaluation, with interim reviews between Lifelab Innovations and Worboys at all key stages within the design's progression. The concepts were evaluated against all performance criteria set within the most current Product Design Specification.

Testing of various filtration prototypes and materials required additional learning of testing



equipment and procedures for Worboys, resulting in several industrial collaborations including Dr Blue Ramsey at Runnymede VCT and Dr Alan Reynolds at the ECT Centre. Particulate testing included sample preparation and usage of a Scanning Electron Microscope (SEM). Collaborators and client analyzed all testing methods and results to select the most appropriate material.

Extensive development into the design for manufacture of the filter system allowed Lifelab Innovations and Worboys to develop a system and overcome design issues which would have arisen at the manufacturing stage. Computer Aided Design (CAD) and Finite Element Analysis (FEA) were heavily used in the latter part of the process, from which data the final prototype was formed.

Result

Extensive biometric and human factors research was conducted to evaluate typical user performance parameters and requirements. The final design includes a conforming face piece designed to decrease pressure loss across the filtration system whilst providing high protection efficiency, tackling additional human factors and usability challenges within the product's form. The deliverable prototype is a part function/visual model entirely representative of the fashion orientated direction.

The project was presented at the 2009 Made in Brunel exhibition and the team are now exploring commercialisation options.

