The Compact Canine Oxygen Mask

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INTRODUCTION

For many years, masks have been a common way for people to receive care, either for oxygen or for medicine. However, many of the masks used today are made for humans. This leaves only a small minority of products designed for our animal companions. Of these designs, all the products have one major problem: they require the user to use both hands to hold the mask up to the patient, which while acceptable in a standard domestic setting is can waste valuable time and occupy personnel when in an emergency setting.

There is an estimated 77 million domesticated dogs living with their owners in the united states. These canine companions are just at risk for many of the dangers we face, which is shown by how local professionals have stated to have 2 to 12 dog-related incidents per year. However, due to the hands-on nature of the oxygen masks, the fire department we researched stated that they stopped carrying oxygen masks for canines.

There are also approximately 70 million dogs in the US live without a home, of which an estimated 3.3 million dogs enter Animal Rescue Shelters. This industry, which is growing at an estimated annual rate of 6.7%, can only do so much for our canine companions. There are also a multitude of non-profit organizations such as HSUS (Human Society of the United States) and WAP (World Animal Protection) organization who would also benefit from our design.

Key objectives implicit to our design project are:

- To provide the patient and responder with an easy-to-handle and safe method of reliable respiratory medication.
- To maintain the ability for responders to complete various other actions while the patient is treated.
- To enable low-costs using sustainable local and national manufacturing and distribution.

CUSTOMER STATEMENT

ANLR ASSOCIATES hopes to set the standard for animal emergency care equipment. Our mission is to make the job as easy as possible while also reducing the impact that animal loss has on the community.

FUNCTIONAL SPECIFICATIONS

FS-01 - CCOM must be tightly secured to the patient.
FS-02 - CCOM must be durable.
FS-03 - CCOM must administer O2 and transport CO2 properly.
FS-04 - CCOM must be lightweight.
FS-05 - CCOM must be easily storable.
FS-06 - CCOM must be able to support hands-free operation.
FS-07 - CCOM must be compatible with oxygen generating equipment.
FS-08 - CCOM must be adjustable for different sized canines.
FS-09 - CCOM must be capable of lasting at least a year

FINAL PRODUCT

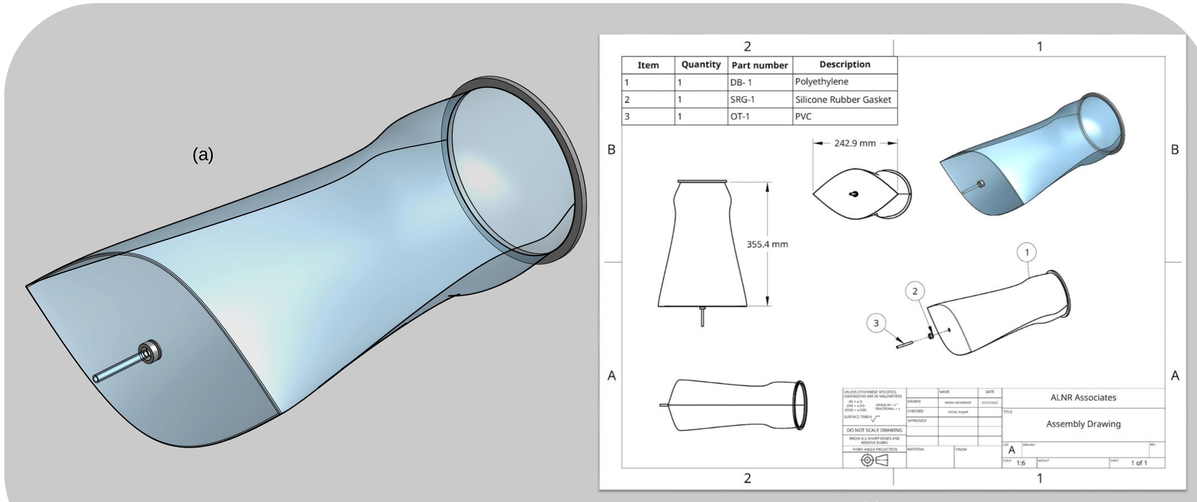

Figure 1: Rendered image of (a) sectioned view of the device and (b) exploded view of device.

TRACEABILITY MATRIX

FUNCTIONAL SPEC.	DESIGN CRITERIA	TEST ID	ACCEPTANCE CRITERIA
FS-01, FS-06	CCOM will secure to the patient through the drawstring mechanism.	T-01	CCOM must withstand 500g of pulling force while attached to the patient.
FS-02, FS-09	CCOM will endure a series of heat, cold, wet, flame, cleaning and abrasion/film puncture tests.	T-02	CCOM must not lose significant percent of mass or stability.
FS-03, FS-07	CCOM will transport oxygen underwater to test for air leaks.	T-03	CCOM must not produce any streams of air bubbles.
FS-01, FS-02, FS-03, FS-04, FS-05, FS-06, FS-07, FS-08, FS-09	CCOM will be validated through customer surveys	V-01	The ECOM must be effective at transporting oxygen and carbon dioxide throughout the device without failure.

Table 1: Traceability matrix allows us to determine the proper testing needed to ensure that the customer requirements are satisfied…….

TESTING RESULTS

WI 2.1 - Bubble Leak Testing

The DB-01 will be sealed at the top to prevent air from leaving the device, CCOM will be inflated with an air pump while it is submerged underwater. The package is then observed.

Sample	Presence of air bubbles (Y/N)	Constant Stream of air Bubbles (Y/N)	Location of the source of the air bubbles	Absence of the Constant Stream of air Bubbles (Pass)	Presence of the Constant Stream of air Bubbles (Fail)
1	Y	N	Clipped opening	X	
2	Y	N	Bubbles on drawstring bag surface	X	
3	Y	Y	Side of the drawstring bag		X
4	Y	N	Bubbles on drawstring bag surface	X	

Table 2: Results.

PERSONNEL AND REPORTING

Expense	Hours Utilized	Cost	Total Cost
Senior Project Manager (Dr. Laura Gaviria)	5	200/hr	$1000
Senior Project Manager (Dr, Don Petersen)	6	200/hr	$1200
Engineer - Maria Arismendi	173	100/hr	$17,3000
Engineer - Faisal Najjar	189	100/hr	$18,900
Engineer - Aaron Lherrison	95	100/hr	$9,500

Figure 2: Calculated Personnel time and Reporting Costs over the Design Process

MANUFACTURING COSTS

Total Prototype Cost: $163.95

CLAIMS

- HANDS-FREE OPERATION
- LIGHT WEIGHT
- DURABLE DESIGN
- BIOCOMPATIBLE
- LOWCOST

CONCLUSIONS

- Three out of the four CCOM (1, 2, and 4) passed the Bubble Leak Test.
- Failure of CCOM (3) could have been the result of the glue unsuccessfully holding the drawstring bag together.
- Additional testing data is required.

TEAM MEMBERS & MENTORS

- Faisal Najjar
- Maria Arismendi
- Aaron Lherrison
- Gaybria Rhoads
- Chief Jones

ACKNOWLEDGEMENTS

We would like thank Chief Jones.
We would like to thank the Department of Biomedical Engineering as well as our Senior Design professor Dr. Laura Gaviria, Dr. Don Petersen, and the T.A. Gennifer Chiou.

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