

## Protective Masks: A Semiotic Discourse in Times of Pandemic

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### Abstract

Face masks have been an essential part of Personal Protective Equipment (PPE). Protective masks are pieces of kit or equipment worn on the head and face to afford protection to the wearer. They are usually worn for providing a supply of air or filtering the outside air (respirators and dust masks). In the past two years while coping with the pandemic, one of the most significant changes that have been part of our wardrobes is a face mask. The Covid-19 pandemic disrupted our normal to give rise to a post-pandemic new normal where the focus has shifted to multi-functional clothing that provides a multidimensional experience to the wearer. Safety, functionality, comfort and aesthetics are at the core of this fashion. However, what continues through the pandemic as well is the ability to communicate visually. Thus, making fashion as a major contributor towards the perception and interpretation of identities. With this as the base, the authors studied the semiotic discourse in perceiving a community's identity in the times of pandemic with respect to performance clothing. The authors conducted an in-depth qualitative analysis of workers using a questionnaire based on a Likert scale and open-ended questions from process industries and Original Equipment Manufacturers (n=50) of Northern and Western India to explore creating mask designs to communicate their work identities. The face masks were designed, which not only help protect against covid-19 and the work hazards but also projected the area and potential hazards of the job profile for better compliance in the workers.

**Keywords:** Functional, Face masks, Fashion semiotics, Identity, Performance clothing, Pandemic.

### Introduction

The pandemic changed what we referred as “a normal attire”. In the past two years, while coping with the pandemic, one of the most significant changes that have been part of our wardrobes is a face mask [1]. The majority of us did not envision ourselves wearing, or being asked to wear, face masks on a daily basis. From being part of medical protective wear to being part of a common man's necessity, the masks have gone through multiple notable changes to evolve into their current form. People around the world are wearing masks for one of its core functions - protection from disease. One has known about the vital role of face masks in maintaining public health. However, today, the masks have become essential. The masks limit the spread of germs. Coughing or sneezing, and

even talking may release tiny droplets from one person into the air that can infect someone. Wearing a face mask can reduce the number of germs that are released by the wearer. This can protect a healthy person from getting infected by someone who is sick. Face masks also cover the nose and mouth, protecting them from splashes or sprays of body fluids. As a consequence of the global pandemic, the strong demand for face protection has accelerated the development efforts for the same, resulting in dozens of new masks in the global market.

### Protective Face masks

A face mask is a tool that is commonly utilized for the prevention of the spread of diseases. They are called by various names such as dental masks, isolation masks, layer masks, medical masks, procedure masks or surgical

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masks. A mask that covers the mouth and nose, which can be secured by ties /bands at the back of the head or ear loops are called face mask. Nowadays, face masks come in many different colors, sizes and shapes and are manufactured by various brands.

Face masks have been an essential part of Personal Protective Equipment (PPE) [2]. PPE refers to protective clothing, helmets, gloves, face shields, goggles, respirators or other equipment designed to protect the wearer from injury or the spread of infection or illness. Protective masks are pieces of kit or equipment worn on the head and face to provide protection to the wearer. They are usually worn for:

1. Protection against dust/pollution/chemicals or for the supply of air (respirators and dust masks).
2. Protecting the face against flying objects or dangerous environments, while allowing vision.
3. Protection during warfare.  
Protection against inclement weather.

### **Evolution of Face Masks**

For over around thousands of years, face masks have been in existence. Early masks, that were most likely made of natural materials and cloth, possibly decomposed at a far quicker rate as compared to the other relics of the past, such as weapons, pottery, utensils and so on. It is difficult to determine the exact period during which the masks made their first appearance. However, the earliest recorded face mask-like objects were found in the southwestern Asian society that date back to as early as the 6th century BC [3]. The archaeological evidence suggests that during Roman Empire, masks were used sometimes in the gladiatorial tournaments for multifunctional use of protection as well as to intimidate the competitor. According to the record of 'The Travels of Marco Polo', the 13th-century travelogue of the famous Italian traveller Marco Polo (1254 - 1324) who travelled in China in Yuan Dynasty (1279 - 1368), servants of the emperor who used to serve meals needed

to wear silk scarves to cover their noses and mouths. These scarves, woven in silk and gold threads, are believed to be the earliest items in China that are similar to the face masks today. It was believed that these silk scarves would prevent the servant's breath from changing the smell and taste of the food [4].

The Black Death was a bubonic plague pandemic that occurred in Afro-Eurasia in the 14th century. It is recorded as the fatal pandemic in the human history. The spread of the Black Death to Europe greatly promoted the emergence of functional face mask-like objects. The physicians who tended to the bubonic plague victims in the 17th century wore special protective wear. This protective wear consisted of covering themselves head to toe along with a long bird-like beak mask [5]. The misconception about the spread and nature of the disease led to a beak-like plague mask. During outbreaks of the bubonic plague, a pandemic that recurred in Europe for centuries, towns gripped by the disease hired plague doctors who practised what passed for medicine on rich and poor residents alike. The beak was designed with only one hole on each side of the nostrils. The beak would be filled with herbs so as to breathe the impressions of the herbs enclosed. The material used to create these masks was leather and glass eyepieces. In some regions, due to poor economic conditions, people used waxed cloth masks. The compound placed in the beak of doctor's mask was Theriac, which comprised more than 55 herbs and components like myrrh, cinnamon, viper flesh powder, and honey. Theriac was put in the masks as it was believed to purify the air that the doctors would breathe in and in turn protect them from the plague. It is believed by De Lorme that the beak shape of the mask provided the air sufficient time to be suffused by the protective herbs before it was inhaled by the doctors [6].

The present-day surgical masks came into existence around the time when germs and pathogens reshaped the medical understanding of diseases. Robert Koch in the 1880s discovered the bacteria responsible for tuberculosis and

cholera. It was in 1897 that the first study by Jan Mikulicz Radecki was published that supported the use of mask while performing surgery. Another recorded plague - the Pneumonic Plague/ Manchurian Plague, occurred mainly in Manchuria between 1910-and 1911. It is reported to have killed 60,000 people and led to the wearing of the first personal protective equipment (PPE) [7]. During the pandemic, Wu Lien-teh promoted the use of cloth plague masks for the healthcare workers and patients as well as to the population at large as per the feasibility. It is believed to be the first attempt at containing an epidemic through such a measure. This event has said to influence the setting up of personal protective equipment as a means to stop the

spread of disease. The origin of the modern hazmat suit also credits its origin to this event. The influenza pandemic of 1918 and 1919 was the deadliest flu outbreak in history, killing up to 50 million people worldwide. It was the first recorded pandemic in the United States region, killing around 675,000 people [8]. The local governments to curb the spread rolled out initiatives like closing the schools/public places, no spitting ordinances were enforced, encouraging use of handkerchiefs or tissue papers as well as mandatory to wear masks in public. From 6<sup>th</sup> Century BC to present day, this evolution of mask is presented as a timeline in Figure. 1.

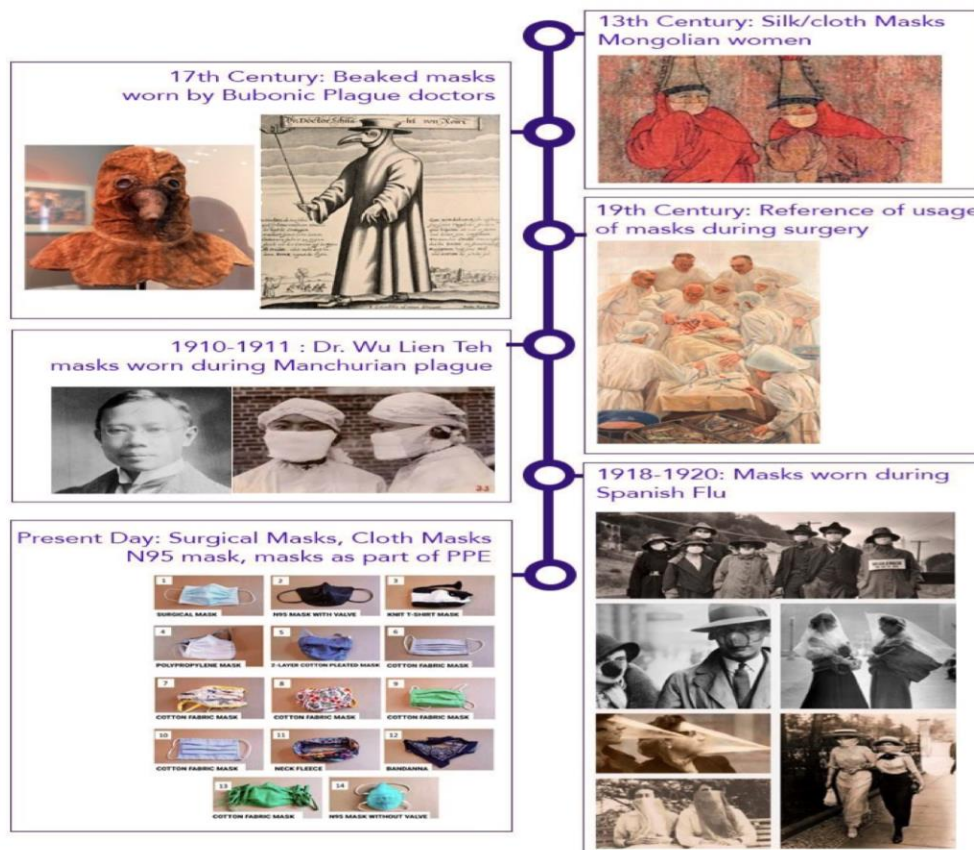


Figure 1. Timeline of Evolution of Masks

### Fashion Identity and Semiotics in Times of Face Masks

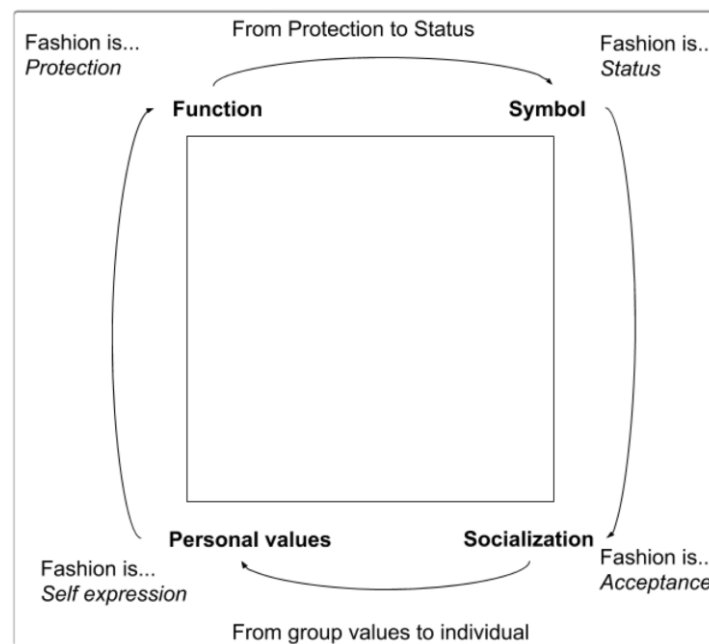
“Fashion provides one of the most ready means through which individuals can make expressive visual statements about their

identities.” - Bennett, A. (2005) culture and everyday life.

Semiotics of fashion is the study of fashion and how humans signify specific social and cultural positions through dress. Fashion is a language of signs that non verbally converse

meanings about individuals and groups. Three main parts of the semiotics of fashion: the sign, what it refers to and the people who use it. The conveyance of messages takes place through the development and use of signs. The form, existence and interpretation that it takes depend on the society and culture within which they operate [9]. Like when one sees a person wearing a camouflage print uniform, a direct relation with armed forces is made. Similarly, seeing a person dressed in a white apron and carrying a stethoscope is a uniform universally accepted for

doctors. These visual appearances based on uniforms create a sense of fashion semiotics and help build a community. It creates a notion of belongingness created by individuals and groups to integrate cultural norms and values that are acceptable into their everyday lives in meaningful ways. Figure 2. depicts a fashion semiotics square that expresses the framework of semiotics in fashion. Fashion has the function, symbolic meaning, acceptance of social status and yet represents personal values.



**Figure. 2.** Fashion Semiotics Square

### **Fashion and Notion for Community Building**

Global Community means people of varied origins from national and international regions who together form a community within and outside of a designated physical space while catering to diverse norms and values, which communicate their perspectives and visions about their beliefs and world. It is a notion of belongingness created by individuals and groups to integrate cultural norms and values that are acceptable into their everyday lives in meaningful ways. Implementation of the goal of building global communities within an identified context-corporate organization, educational

institution, as well as corporate and community services, for example-encourages a favorable partnership in which social responsibility and accountability for actions are situated within the framework of the broader participating community that engages in that intercultural communications event in any way whatsoever. It is believed that building global communities is an attainable and honorable goal, one that requires deep respect, love and compassion for humanity, commitment to social responsibility and upholding of social justice and the belief that together it can overcome adversity. Even individuals have different roles or have been assigned different tasks, but they all have social responsibility roles. Their social responsibility

roles create an imperative for them to make a concerted effort to contribute to global community building [10].

Uniforms, as the word suggests, are clothes that unify and are constructed to the same repetitive format. Most people have experience of school uniforms, others of specific working clothes such as surgeons who wear special gowns when in the operating theatre, nurses who attend to them or guards' uniforms on public transport and in museums and art galleries. What one wears influences how fellow human beings see each other. People talk of 'dressing for the occasion and work clothes often differ from those that one wears for relaxation (sometimes called 'home clothes') or other non-work occasions. Work wear is a visible part of the

corporate image. Work uniforms that are presentable and appropriate are an essential factor with regard to occupational safety and comfort at work. There are different kinds of uniforms throughout the world that give people a distinctive ordered identity [11]. Uniforms are generally functional but can also be aesthetically comfortable. These uniforms generate an idea as the wearers participate in specific activities, which help develop a sense of belonging, in turn generating an identity that is beyond the person. This belongingness can take over other pieces of a person's identity and create a larger brand image, hence creating a community of workers. The authors further studied the impact of a pandemic on this notion and the use of protective masks as an extension of this identity.



**Figure 3.** Workwear at OEMs as a Notion of Community Building

### Objective of the Study

1. To identify the Process Industries & OEMs in Northern and Western regions of India and understand their acceptance, behaviour and reaction to protective masks.
2. To explore the impact of the pandemic on the protective wear segment and communication in times of pandemic at workplace.
3. To conduct a survey for need assessment of design intervention at the process industries & OEMs with respect to the new added piece of clothing - a protective mask.
4. To signify that the designed and proposed masks will identify the job profile and work hazards of the wearer, thus promoting personal safety practices at workplaces.

### Research and Design Methodology

Process Industries & OEMs (Original Equipment Manufacturers) were identified through snowball sampling, personal contacts and internet, firstly to understand the acceptance, behavior and reaction to protective masks during the pandemic as an addition to their uniform and its scope of identity generation. Referring and reviewing collected secondary data.

Sample Selection: In order to gain an insight into the organization and functioning of the process industries and OEMs, people from different groups involved with protective clothing were selected by Purposive Sampling techniques. The total sample size comprised of 5 industries from Northern and Western India. A

sample size of 50 respondents was interviewed based on a convenient sampling method.

### Tools and Techniques of data collection

Interview Schedule was designed for workers and through the observation method it was noted about the needs, problems and impact of protective masks in building a notion of community as well as communication. Likert scale and open-ended questionnaire were used to gather information with respect to study the impact of the pandemic on the protective wear segment and communication & identity in times of pandemic at workplace. The following research questions were addressed in this study and evaluated using a 5 –point Likert scale:

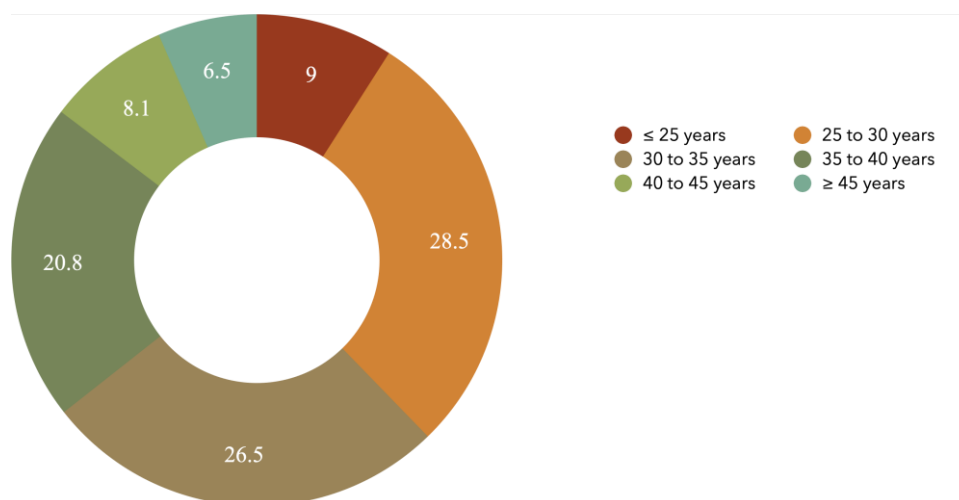
1. Acceptance of Protective masks at workplace.
2. Impact of protective masks on job satisfaction and communication.
3. Aesthetic appeal of Protective masks.
4. Functionality of Protective masks and ease of working.
5. Comfort and Protective masks.
6. Their perception of Protective masks.
7. Motivation, acceptability and compliance of Protective masks.

The questionnaire is based on a Likert scale and a few were open-ended questions. Likert scale questionnaire requires each respondent to rate the statement on a 5-point. Such as scale 1 = strongly disagree, scale 2 = disagree, scale 3 = neutral, scale 4 = agree, and scale 5 = strongly

agree. The questionnaire developed was attempting to measure the demographics, acceptance of protective masks, Protective masks influences on performance, masks as a Uniform, Organizational identification, other job-related data, and job satisfaction as well as several uniform features (such as style, appropriateness, functionality, material, color, comfort, etc.). The overall approach towards compliance of Protective masks and its role at communication.

### Results and Findings

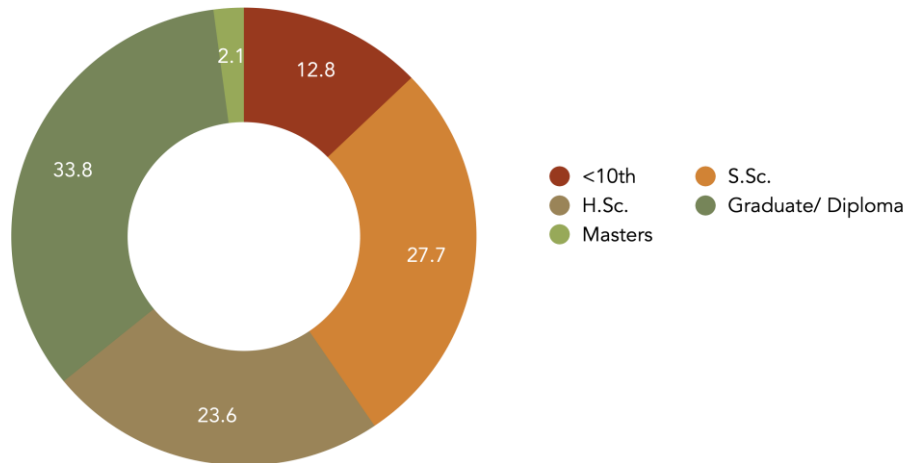
The participants from the identified process industries and OEMs were interviewed to assess the impact of the pandemic on the protective wear segment and communication in times of pandemic at the workplace. The interview schedule was used to look at the requirement for design intervention for protective masks as an added accessory of their protective clothing, such that it helps in the identification of job profile, hazards and works as an extension for their protective clothing. The participants, who are serving in these process industries/OEMs for many years, have a certain level of professional knowledge, maturity and ability to provide data for this research, which showed in Figure 4. Analyses were performed using SPSS software for Windows (version 25, 2007, IBM Corporation, Armonk, New York, United States).



**Figure 4.** Age Distribution of Workers in the Study (Data Presented as Percentage)

The minimum age of the workers in the study was 18 years, and the maximum age of the workers in the study was 59 years. The mean age of the workers in the study was  $33.9 \pm 7.4$  years. Figure 4 gives the age distribution of workers in the study. As seen in Figure 4, the maximum number of workers in the study were between the age of 25 – 40 years. Figure 5 gives the educational qualification of workers in the study.

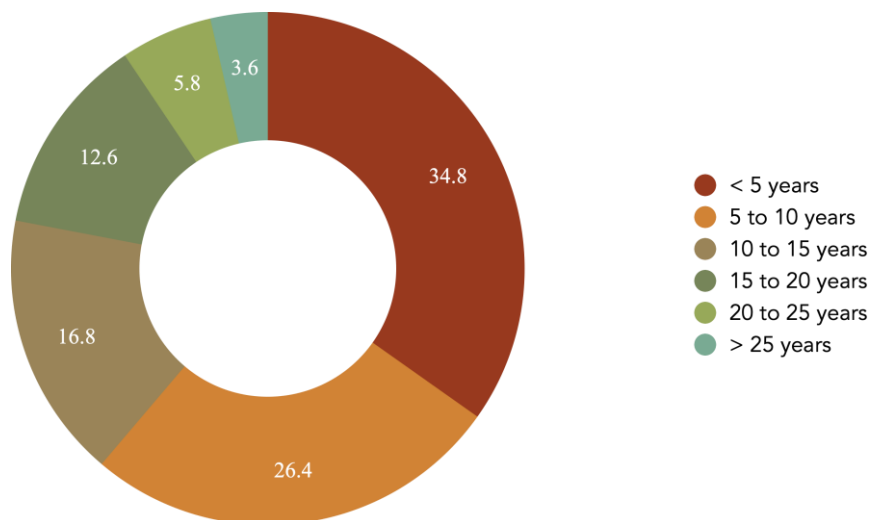
As seen in Figure 2, 12.8% of workers had completed <10<sup>th</sup> class of education, 27.7% had completed S.Sc., 23.6% had completed H.Sc., 33.8% were either graduates or had completed diploma whereas 2.1% had completed Masters (Figure 5). Thus, the maximum number of workers in the study had completed less than the H.Sc. level of education.



**Figure 5.** Educational Qualification of the Workers (Data Presented as Percentage)

The minimum work experience of the workers in the study was 1 month, i.e. they had newly joined the company, whereas the maximum work experience of the workers in the study was 35 years. On average, workers had an experience of  $10.1 \pm 7.4$  years. Figure 6 gives the

distribution of years of experience of the workers in the study. As seen in Figure 6, 61% of the workers had less than 10 years of work experience, whereas 38.8% of workers had more than 10 years of experience.



**Figure 6.** Number of Years of Experience of Workers (Data Presented as Percentage)

Table 1 shows the level of awareness of the participants on using the protective masks.

Based on the table, most of them were aware that protective mask is very important in the times of

pandemic at process industries and OEMs. All the respondents were aware regarding the hazards that are present in the industries is as important as the usage of the protective clothing[12]. Supervisors are encouraging to wear masks and protective clothing, moreover, it is followed up by the safety officer conducting the training of Personal Protective Clothing (PPC) for the workers. Based on the result, the industry Safety Departments had understood and supported that training had been regarded as one

of the compulsory measures or requirements that the construction companies would have to provide for the workers as well to ensure that the workers are well-equipped with the knowledge to carry out the work at the construction site with minimal safety hazards[13]. Videos on various pandemic control measurements were done to the participants to create awareness. Hence all these attempts suffice the objective for promoting personal safety practices at workplaces.

**Table 1.** Workers & safety professionals, engineers’ response to PC

<b>Workers &amp; Safety Professionals, Engineers Response To Protective Masks</b>	<b>Mean Score</b>	<b>Rank</b>	<b>Rating</b>
Compliance of Protective masks by participant at Process industries & OEMs	4.89	1	Agree
Importance of Protective Masks	4.8	2	Agree
Design Components suffice your requirement	3.78	3	Agree
Role of Fashion in Protective masks	3.5	4	Agree
(Open ended questionnaire) What changes would you like to see in the protective masks?			

The participants were also interviewed to understand the reasons for non-compliance of protective masks. Table 2 recorded that discomfort was the primary factor for non-compliance. The workplace tends to get hot and

humid, and wearing protective masks which are not breathable led to non-compliance of the masks. It was also observed that they felt communication was restricted and had confusion in identifying workers.

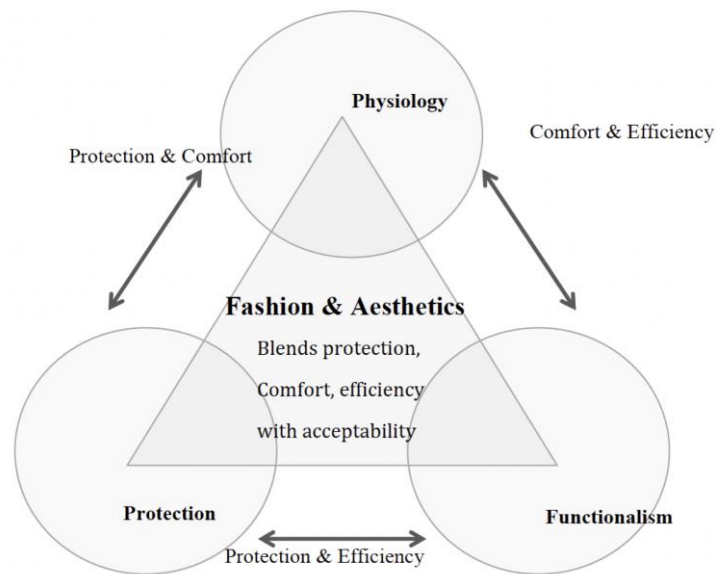
**Table 2.** Reason for Non-compliance of protective masks

<b>Reason for noncompliance of Protective Masks</b>	<b>Mean Score</b>	<b>Rank</b>	<b>Rating</b>
Uncomfortable	4.5	1	Agree
Restricted communication	4.5	2	Agree
Creates confusion about identity	4.3	3	Agree
Unattractive	4.3	4	Agree

Table 2 stressed on the need for design intervention for protective masks for better compliance at workplace. The authors, based on their research, went across to modify J. Kersak and M. Marcic’s design framework (figure 7) to understand designing protective masks and it’s

acceptability permissions and consents were taken from the industries to ensure no disturbance and harm occurred during the procedures for evaluations and voluntary participation of the participants.





**Figure 7.** Design Framework for Developing Protective Masks

Based on the design framework shared in figure 7, protective masks were designed to suit the job profile and have references of potential work hazards. Semiotics and symbols were used to communicate the same as it was observed that communication with masks on was one of the factors for non-compliance. The masks include a combination of finishes with anti-microbial,

flame retardant and moisture absorbency for enhanced comfort and safety. These icons help in understanding the potential hazards, in turn improving the safety compliance at the workplace. The icons developed are showcased in figure 8 that represent the hazards and finishes like lathe machine, fire resistant, anti-static and moisture management.



**Figure 8.** Design Framework for Developing Protective Masks

The protective masks developed were aligned with the protective clothing designed for the workers of process industries and OEMs. The fabric identified was 100% cotton denim because of its strength and ability to apply finishes. Figure 9 represents the protective clothing developed using a 9oz denim with reflectors and suitable finishes like anti-

microbial, stain release for workers working with lathe machine and spray painting. The masks were designed to match the aesthetic and functional requirements of the protective wear. Figure 10 represents a 3d rendering of the mask designed for understanding of the design development and clarity of appearance and fit of the mask.



Figure 9. Protective Wear and Specification Sheet for Protective Masks



Figure 10. Protective Wear and Specification Sheet for Protective Masks

## Discussions & Conflicts

The researchers were able to identify 50 workers within 5 process industries and OEMs to conduct the research and understand the acceptance, behaviour and reaction to protective masks. Table 1 was able to depict the findings related to objective 1 and share insights into the acceptance of the protective masks in these industries. Through the observation method it was noted that things that were an accepted norm, to converse and have a clear communication, was a challenge during these times of wearing a protective mask. The workers were also not able to identify each other with all the masks while wearing protective clothing as a uniform at the work place. This reinforced the objective of the research for the need to develop protective masks that help with better communication at the workplace while ensuring safety of the workers. The designed masks were evaluated by the workers, and respondents were

very well received. Though the designed masks didn't create individual identity, they certainly created a sense of community identity while spreading awareness about the job profile hazards.

## Conclusion

Clothing contributes to how people define and perceive themselves and is a necessary part of their everyday lives. Clothing promotes a feeling of well-being and has the potential for a multidisciplinary functional approach. To be acceptable and comfortable, products must look stylish and attractive and function reliably in relation to the technical and aesthetic concerns of the wearer. Good aesthetic and technical design, driven by meaningful end-user research, can help exploit niche markets where form and function work in harmony in the research and development of comfortable and attractive products that can assist us in many aspects of our daily lives[14].

Based on the results and discussions, it was observed from Table 1 and Table 2 that though the workers were wearing masks out of the need for safety, they didn't find the masks comfortable. The masks restricted their communication and caused confusion about their identities at the workplace. The protective masks designed through the design framework (figure 7) comprising of symbolic references (figure 8) had the potential of addressing the needs of the wearer. It created a better sense of acceptance and yet provided a community identity of workers working with a certain job profile and potential work hazards. Thus, fashion has played its major role, in serving the industry by giving a design solution, which gives all employees an identity, irrespective of the role or task assigned hence creating a community, which stands out from the common group of people even outside the industry.

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