

PROJECT DISSERTATION

ON

Feasibility of setting up Melt Blow production line in India during COVID

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(2k18/MBA/077)

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CERTIFICATE

This is to certify that the dissertation report titled “**Feasibility of setting up Melt Blow production line in India during COVID**”, is a bonafide work carried out by **Mr. Shivansh Dureja** of **MBA 2018-20** and submitted to Delhi School of Management, Delhi Technological University, Bawana Road, Delhi-42 in partial fulfillment of the Requirement for the award of the Degree of Masters of Business Administration.

Signature of Guide

Signature of Head (DSM)

Place:

Seal of Head

Date:

DECLARATION

I, **Mr. Shivansh Dureja**, student of MBA 2018-20 of Delhi School of Management, Delhi Technological University, Bawana Road, Delhi – 42, hereby declare that the dissertation report “Feasibility of setting up Melt Blow production line in India during COVID” submitted in partial fulfilment of Degree of Masters of Business Administration is the original work conducted by me.

The information and data given in the report is authentic to the best of my knowledge.

This report is not being submitted to any other University, for award of any other Degree, Diploma or Fellowship.

PLACE:

SHIVANSH DUREJA

DATE:

ACKNOWLEDGEMENT

It is pleasure to acknowledge many people who knowingly and unwittingly helped me, to complete my project. First of all, let me praise God for all the blessings, which carried me through all those years.

First & foremost, I would like to express my regards to **Dr Vikas Gupta** for his constant encouragement and support. I would also like to express my immense gratitude towards all the lecturers of our college for providing the invaluable knowledge, guidance, encouragement extended during the completion of this project.

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Shivansh Dureja

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INTRODUCTION

As we are clearly aware of the disruption brought in about by the COVID-19 virus we can expect that the global supply chains are going to be disrupted with long lasting impact on the economy specially SMSE's . This is going to put tremendous strain on the businesses since the cash inflows have almost stopped completely and outflows and other expenses are still continuing. Especially in the case of businesses which are overleveraged.

A lot of businesses are seeing this as threat but we also use this as an opportunity as use this time to generate some cash flows to cushion our existing business with cash inflows and buy some undervalued assets due the fire sale by stressed businesses.

In this pandemic the governments are making it compulsory for the people to wear masks and due to the shutdown the supply is not able to meet its demand. Furthermore due to huge back log at ports and very high rates internationally therefore it creates a huge opportunity for creating good masks.

Since it is expected for a lot of manufacturers to set up more machines for masks and big output melt blow fabric lines taking next to 6 months to set up it creates the perfect market condition to set up low output melt blow lines which can be set up quickly.

The demand for 3 ply masks is assured to rise since the 2 ply masks offer next to nothing performance and pandemic has created huge paranoia which assures us people would be willing to spend on masks.

Furthermore with international prices soaring to ₹4200/kg it shows import from china is highly unlikely

All the above stated factors led the Delite Plastic Industries to look forward to ease the bottlenecks in mask manufacturing and look into providing safe and reliable product at reasonable prices. With previous experience in the mask trading and links with the supply chain the firm can leverage this opportunity to turnaround and make the best out of this situation.

Company Profile

Established in the year 1960 Delite Plastic Industries is the most trusted manufacturer and exporter firm showcasing industrial expertise in the offered range of Packaging Films, Protection Tape, Laminated Pouches and much more. Owing to the modernized R&D facilities we are presenting the best in class Agricultural Films, Packaging Films, and Printed Films. The workforce values the deepened client insights and presents a much-anticipated product range featuring beneficial attributes of superior puncture resistance, smooth surface finish, excellent moisture barrier properties, light weight and ease of handling. The core competency of our organization lies in our client-focused business approach which makes us accountable to listen closely to the evolving market demands. Further, there are set benchmark standards in the industry by catering to the challenging packaging demands of varied industrial sectors including agro, pharma, chemical and food processing. The line of products is the finest blend of technology and innovation and due to the designing expertise of our team members, we are able to offer the quality products with eye catchy finish. Further, we strive to become a partner of choice by offering the provision of customization for size, fitment and closure lock along with thickness and colour specification.

The plastic business in India has made critical accomplishments since its humble yet promising start by beginning production of polystyrene in 1957. Plastic industry in India represents a promising industry and simultaneously helps in fostering the employment opportunities in India.

Plastics have brought about significant changes in our lives, solving every nitty gritty needs in cost-effective manner. But, India's per capita utilization of plastics is as yet 13 kg contrasted with 100 kg in first-world nations and a world aggregate of 27 kg. Consumer plastics principally include polymers, for example, polypropylene, high and low thickness polyethylene, and vinyl chloride. Extensively plastics can be grouped into two kinds to be specific Thermosetting and Thermoplastic. The category of plastics generally incorporates HDPE, LDPE, PP and vinyl plastics, to give some examples.

The plastics business is highly fragmented. There are about 40,000 plastic processing units, of which three-fourth are in the small-scale segment, which additionally represents a fourth of the absolute polymer utilisation. Around 30 percent of the net polymer consumption represents reused plastic. Plastics have a high volume – to-weight proportion, which makes their collection and transportation a significant cost factor.

The Indian plastics industry has been developing at an exceptional growth rate of 11 percent throughout the years. Hence its latent capacity is being used appropriately. The lift in the plastics business is because of the fast development of segments such as electronics, packaging, healthcare, consumer durables and telecommunication sectors. Yearly around 6,000,000 tons of plastic is manufactured in the nation, with the plastic packaging segment growing fastest.

In India, this has been touted as a "sunrise industry" in the 'Seventh Plan report'. The industry gives imperative contributions to every single key area of the economy like agriculture, infrastructure, healthcare and consumer goods. The industry is not only focused on servicing cost-effective merchandise to the ordinary people but also in enhancing the standard of living for everyone. One of the most globalized parts of Indian industry, the plastic business' foremost job in meeting India's formative difficulties is broadly recognized. Against this foundation, detailed research has been done to make a SWOT examination of Indian Plastic Industry

Strength

- A favorable cost benefit quotient and a versatile range of applications encourages the growth of plastics
- Other major reasons for the plastic processing industry's growth are growth in the end use segments and higher penetration of plastics in various industry segments
- Infrastructure - Building & Construction, Public Utilities
- Agriculture - Distribution, Storage
- Packaging - FMCG goods & fast food industry

Weakness

- India is overall deficit in plastics - PE, PVC and engineering plastics
- major import source countries are Saudi Arabia, Qatar, UAE, Korea, USA, Singapore, Thailand, Germany, Spain and Malaysia
- highly fragmented and small and micro-players constitute majority of the units
- India's plastics market depends on labor intensive equipment which has adversely impacted the productivity.
- Unreliable power and high energy costs in India as compared with other countries are also constraints which hamper capacity utilization.

Opportunity

- significant scope for the consumption to rise keeping in mind India's current demographic situation
- India's per capita consumption of plastic products is one- third of Brazil and approximately one-fifth of China
- Flexible packaging is a sub segment of packaging industry and it is producing revolutionary products. These products focus on enhancing the shelf life of products by keeping intact the nutritional value of the enclosed product for e.g. Milk pouches & modified atmospheric packaging and has also reduced the cost of old style packaging considerably.
- Long fiber reinforced thermoplastic (LFRT) is a new product which is used in making automotive products. It has the benefits like Greater design freedom, Potential for parts consolidation, Weight reduction, Extreme toughness/Durability, Dimensional stability, Corrosion & chemical resistance, Elimination of secondary operations like painting and welding, Lower total system cost

Threat

- introduced legislation restricting the sale of plastic bags, in a bid to reduce littering and plastic pollution
- On the one hand, plastic seems a miracle material, with beneficial uses ranging from medical devices to making vehicles lighter and more fuel-efficient. On the other hand, it is a curse, allowing for the seemingly cheap mass production of disposable materials that fill up landfills, cloud the oceans, choke wildlife, and sully vistas. Filled with additives that lack a safety record, plastics have been linked with a slew of health concerns, including certain types of cancer and infertility

Objective of the study

The secondary objective of the study is the following

- Analyze the feasibility of melt blow fabric for the elite plastic industries
- Try to understand the consumer behavior relating to the Mask
- Try and come up with the strategy about how to implement them

Scope of the study

The scope of project is limited to setting up a melt blown line at reasonable prices that to as soon as possible.

The project may also explore the opportunity of setting up a manufacturing of n95 masks if the funding can be achieved. Also we would be looking towards PP face mask wire to be used in masks.

The project must include the following;

- Setting up mask manufacturing machine. Technical and equipment required
- Marketing strategy
- Financing strategy
- Market Study

THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

Conceptual framework

Covid-19 (coronavirus sickness 2019) is respiratory tract contamination with a recently perceived coronavirus thought to have begun as a zoonotic infection that has transformed or in any case adjusted in manners that permit human pathogenicity.

Sickness was temporarily called 2019-nCov disease at beginning of flare-up (2019 novel coronavirus contamination) episode started in China however has since spread to numerous different nations; it was authoritatively proclaimed by WHO to be a pandemic on Walk 11, 2020

Sickness goes in seriousness from asymptomatic or gentle to the extreme; a noteworthy extent of patients with clinically clear contamination create extreme ailment.

The death rate among analyzed cases (case casualty rate) is commonly about 2% to 3% yet differs by nation; genuine generally speaking death rate is questionable, as the all outnumber of cases (counting undiscovered people with milder sickness) is obscure.

Information on this ailment is deficient and advancing; besides, coronaviruses are known to change and recombine regularly, introducing a continuous test to our comprehension and to clinical administration.

A pathogen is a beta coronavirus, like the specialists of SARS (extreme intense respiratory disorder) and MERS (Centre East respiratory condition).

Named an individual from the animal categories serious intense respiratory disorder related coronavirus.

Assigned as SARS-CoV-2 (extreme intense respiratory condition coronavirus 2); prior temporary name was 2019-nCov.

The rise of Covid-19 corresponded with the biggest yearly human movement on the planet, i.e., the Spring Celebration travel season, which brought about a fast national and worldwide spread of the infection. At the beginning time of the episode, most cases were dissipated, and some connected to the Huanan Fish Discount Market (J.T. Wu et al., 2020).

The flying segment has additionally been affected by the spread of coronavirus. The flare-up has constrained household bearers' to drop and briefly suspend flights working from India to China and Hong Kong. Transporters, for example, Indigo and Air India have stopped tasks to China. The impermanent suspension of trips to China and Hong Kong would prompt residential transporters passing up net income targets.

As a populace of 1.3 billion stays inside to battle the Covid-19 infection, India is thinking that its hard to hurry up and questions are being gotten some information about what the 21-day lockdown can do to the essential coordinations division of the nation.

Critical financial aftermath of the Coronavirus is the subsequent wasteful aspects the nation over as of now overburdened coordinations scene which utilizes more than 40 million individuals and contributes \$200 billion or more to the economy. The tremendous portion, viewed as the help of the nation, holds basic significance as it interfaces different markets, providers and clients specked the nation over. The segment is seriously hit as the vast majority of the business players don't have any reinforcement, recuperation plan or discontinuous activity plan.

This area despite everything needs an innovative turn of events. In this way, absence of modernized device and hardware to cleaning the products/supplies before conveyance may additionally add to the issues.

The American philanthropist and co-founder of Microsoft Corporation Bill Gates said during the 2015 Vancouver TED conference.

“If anything kills over 10 million people in the next few decades it's highly likely to be a highly-infectious virus rather than a war. Not missiles, microbes.”

“We’ve invested highly in nuclear deterrents, but we've invested very little in a system to stop an epidemic.”

“The problem wasn’t that there was a system that didn’t work well enough. The problem was that we didn’t have a system at all,”

One of the most significant medical problems the world appearances is the danger of a worldwide infection flare-up called a pandemic. Organic dangers identified with pandemics and plagues can influence the strength of labourers, especially in explicit occupations, for example, labourers in social insurance, transport administrations or creature reproducing or labourers who add to possibility measures.

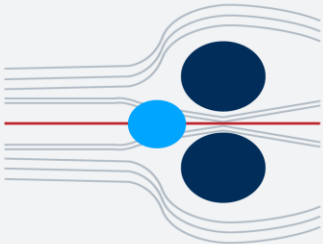
Research shows the effectiveness of mask in fighting with COVID. Wearing of mask can significantly reduce the chances of catching the various upto 70 % (1) if the mask is worn properly. Due to a sudden shortages there are no proper mask being variable, even if they are available they are at a huge mark-up. The biggest bottle neck that has been identified has to be the melt blow fabric

Melt-blown non-woven fabric is recommended. The extremely fine fibre structure of this cloth can well filter the particles in the air. If it undergoes electret treatment, it will also have electrostatic adsorption capacity, which will further enhance the particle filtration capacity.

This is how even the smallest particles get caught in the filter fleece

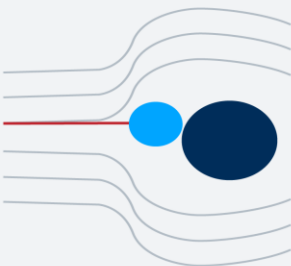
Four physical mechanisms ensure that even tiny particles cannot pass through the filter fleece

Sieve effect



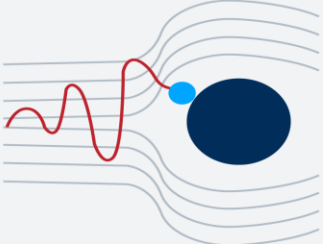
Large particles get caught between the fibers.

Inertia effect



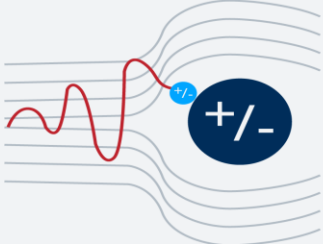
Larger particles do not follow the airflow and stick to fibers.

Diffusion effect



Very small viruses do not follow the airflow and eventually adhere to fibers.

Electrostatics



As with a duster, an electrical charge draws tiny particles to the fibers.

■ Fiber ■ Particle

If you can't buy melt-blown cloth, you can use materials with good hydrophobic properties but slightly larger structural pores, such as polyester fibres, that is, polyester. It does not reach the 95% filtration efficiency of melt-blown cloth, but because it does not absorb water, it can effectively protect against droplets after being folded in multiple layers.

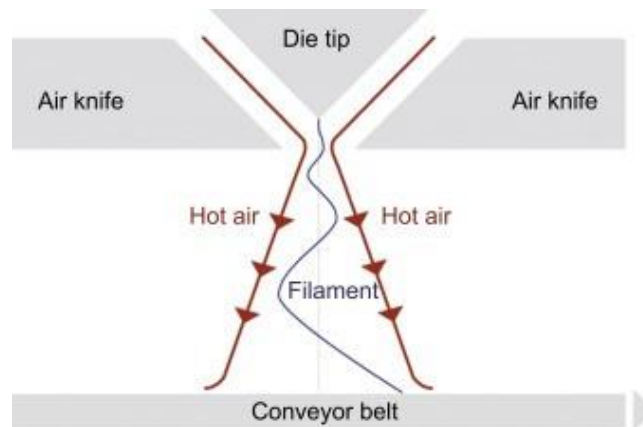
Some people say that using SMS non-woven fabric, this is a three-in-one material with two layers of spun-bond non-woven fabric and one layer of melt-blown non-woven fabric. It has excellent filtering and liquid insulation properties and is often used as medical protective clothing. However, if it is to be used to make a mask, it also needs to have good breathability and not hinder normal breathing

Thus this research is directed to see if the MSME can contribute to the nation by providing safe and economical solution to easing the bottleneck in mask production and making them safer by providing melt blown fabric at an economical price. Moreover the company realises that there is a shortage of fabric in market thus it could even prove to be a very good investment decision as well.

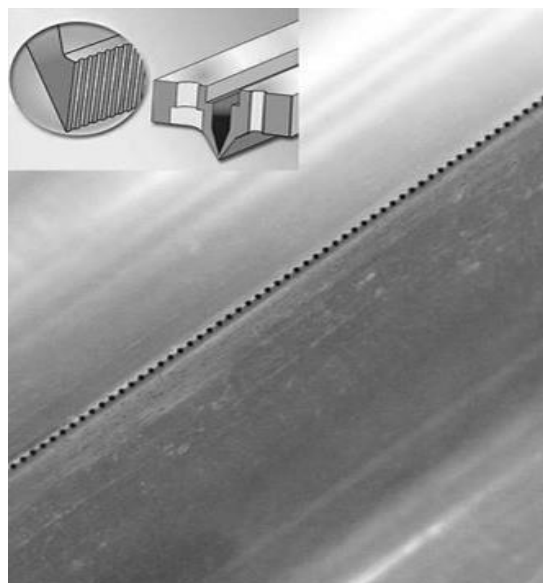
Literature Review

Melt blown

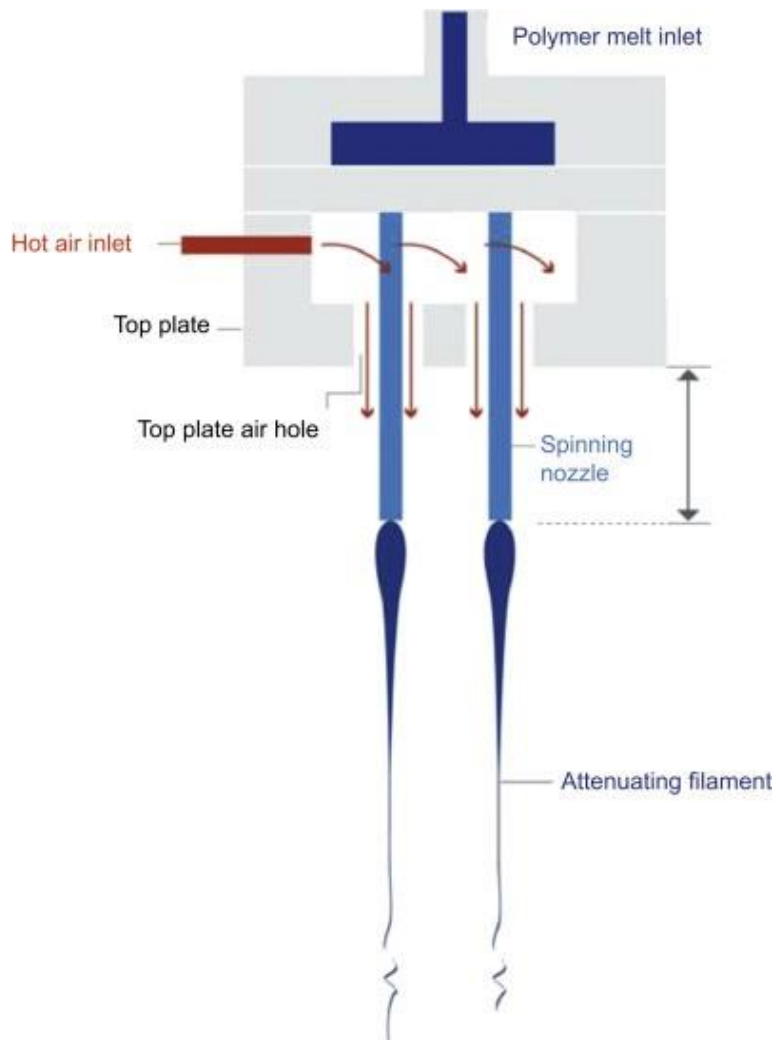
The melt blowing process is a non-structural production method that involves the direct conversion of polymer into a continuous crystal, combined with the conversion of fiber material into a nonwoven fabric. The first development of this technology base in the commercial area began in 1945. The general description of the procedure is similar to the spunlaid fabric, but in detail, both types of procedures are very different. Using vibrated technology, the spinner anchors are accelerated using hot, fast air driven directly into a separate area, resulting in the formulation of fibers and props for different melting technologies. The temperature of the hot air is close to the temperatures used. The obtained fiber amplitude of magnitude is slightly larger than the lower spunlaid process, 1-5 μm . The calculated fiber velocity of the spinner outflow is measured and the intensity of the spinner filament causes the fiber velocity higher than the sonic velocity., airspeed. Since the used air geometries are not suitable to create supersonic speed, the air speed cannot be the single source of forces for the reducing the size of the filaments.



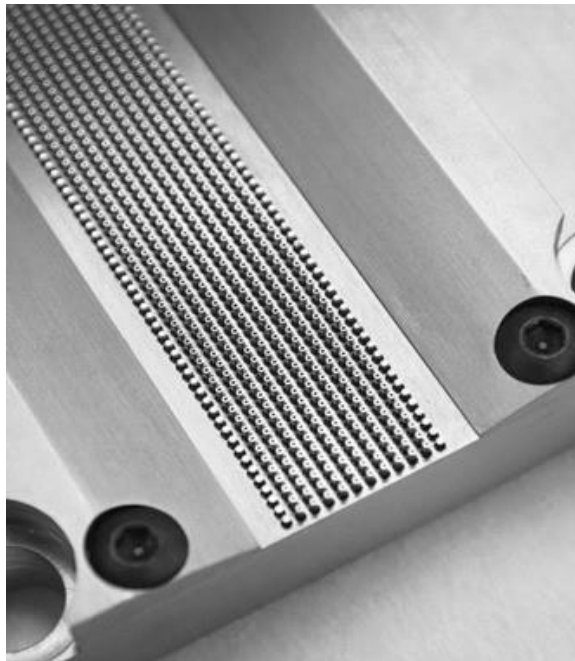
Exxon types die.



Exxon type die – bottom view on spinneret.



Multirow die



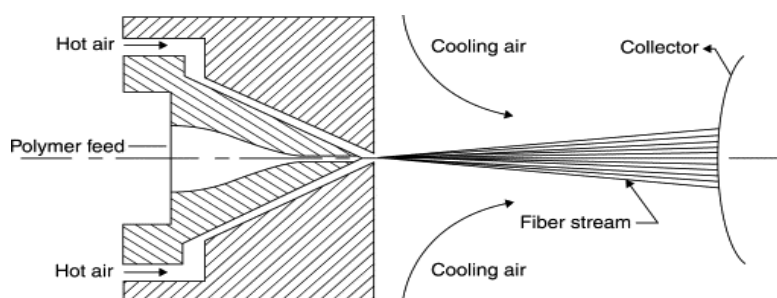
Multirow type die

The addition of the forces out of the air speed for the downsizing of the filaments and out of drag forces created within the free air jet is typical for the melt blown process. This effect of combined forces results in a variation of filament diameters along the filaments,

so the measured filament diameter distribution is relatively broad. Melt blown fabrics are mainly used for their barrier, filtration and their absorption properties.

Melt blown processes

The melt blown process is a one-step process that converts polymer resin into low diameter fiber nonwoven web or tow (Andreas Desch, February 2011). The melt blown process, and its variants, is the only large-scale commercial process that is presently being used to directly produce melt spun fibers with diameters in the submicron range without splitting or chemically dissolving away polymer. It is a nonwovens operation that directly creates fabrics of various widths and thicknesses on large rolls. The products are mainly used in filtration applications, barrier fabrics, oil absorption mats, and battery separators. It is a rapidly growing business segment due to a large increase in the demand for better filtration and membrane medium. The major polymers used in the process are low molecular weight olefins.



Schematic of the melt blowing process.

The key to the melt blowing process is the spin head. The basic principle is the extrusion of low viscosity polymer melt through a single row of very fine holes placed close together in the order of 1000–4000 holes per m. These holes are usually drilled or made by fusing together two plates that contain etched channels. High velocity hot air is blown at the exit of the holes from both sides of the row of holes at an angle. This air keeps the molten polymer hot and attenuates the molten polymer into a fine fiber. At the same time a flutter is developed in the air stream that causes the fibers to flap rapidly back and forth as they are cooled by ambient air becoming entrained in the process. Finally the fibers are collected on a screen belt or drum.

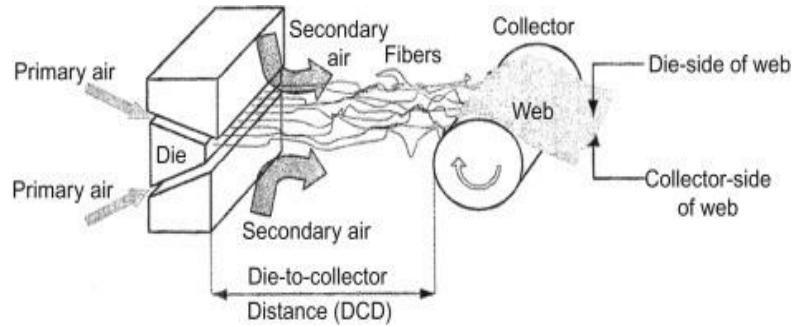
The fibers produced by this method are generally very weak with low tenacity and modulus. one reason is that low molecular weight (low viscosity) polymer is required to make the process work well. The other factor is that the hot air keeps the polymer in the melt state as it is being attenuated, which is necessary because of the rapid acceleration of the polymer as it exits the spin hole. This results in low axial molecular orientation in the fiber as it is formed.

There are several issues that influence the melt blown process which are different from other major fiber spinning processes. The first is the design of the extruder screw which is commonly manufactured specifically for the low densities and low viscosities associated with the polymers used in the process. The polymer must also be filtered to a greater level than required in most other fiber spinning processes. Hot compressed air controlled to an exacting temperature must be provided to the process and the angle of insertion and volume (air gap) of the air must be controlled precisely over the length of the spin head. The use of a single row of holes greatly restricts the fiber mass output of the process per meter of web width. This results in production and cost issues. Several attempts with limited results have been made to design heads that solve this issue and still produce low diameter filaments.

Melt-blown webs

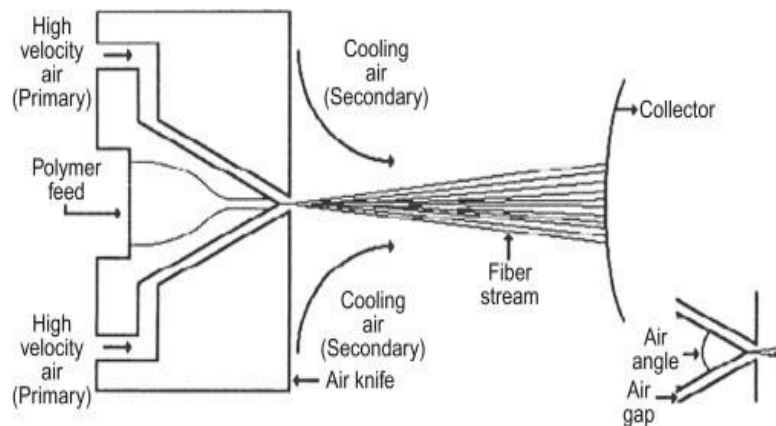
A schematic of the melt-blown process is diagrammed in Figure below. The line as diagrammed is blowing the fibers in a horizontal path to the collector.

Commercial lines with vertical flow are also in operation.



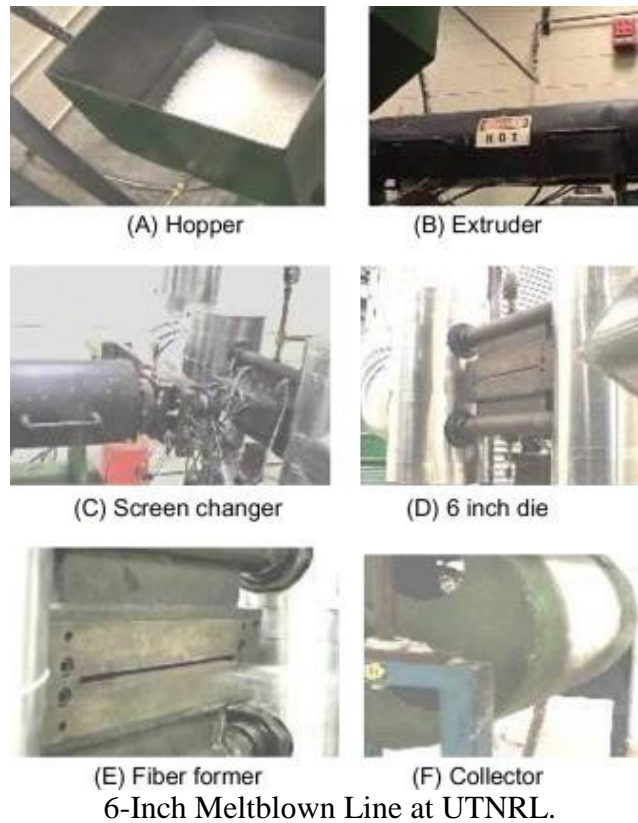
The Melt-blowing Process

The key difference between the spunbonded process and melt-blowing is in the die assembly. In the melt-blown process hot air converges with the fiber as it emerges from the die, whereas in the spunbond process the hot air flow is at a cross flow to the emerging fiber. The converging flow of the melt-blown process, diagrammed in Figure, serves to attenuate and draw the fibers so that the resulting web is composed of finer fibers than the fibers of spunbonded webs. The melt-blown web is softer, bulkier, and weaker. It has a smaller pore size and provides for better filtration efficiency. In most filter applications the medium has to be supported by another web, or used as part of a composite structure.



Airflows in the Melt-Blown Process.

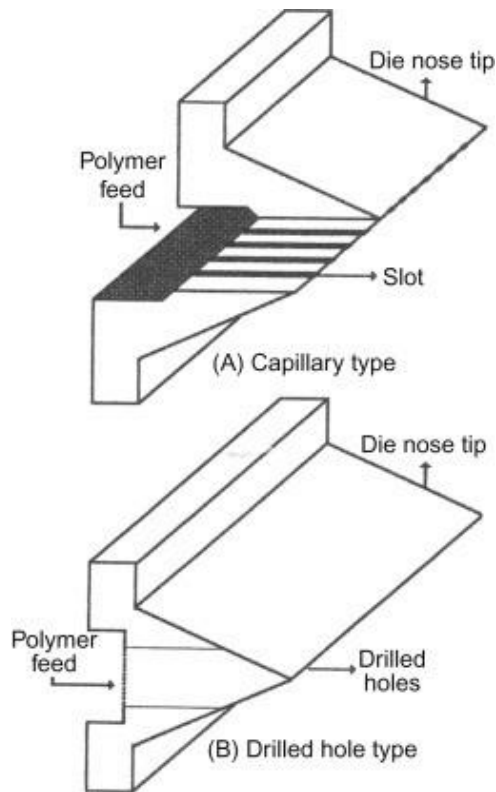
The collage of Figure below is a photo display of the 6-inch pilot melt blowing line at the University of Tennessee Nonwoven Research Laboratory (UTNRL), Knoxville, Tennessee, USA. The process starts with polymer in the form of pallets, granules, powder that is poured into the hopper of Figure. From the hopper the polymer gravity drops into the feed throat of the extruder. Inside the extruder is a rotating screw shaft that forces the polymer through three heating zones that melts the polymer. The extruder is shown in Figure. The operation of the extruder is similar to the one diagrammed in the schematic of Figure above. In the case of the UTNRL pilot machine, the extruder provides sufficient pressure to force the molten polymer flow through the screen, through the die assembly and as fiber unto the collector. The screen changer is shown at the end of the extruder in Figure. From the screen changer the polymer feeds into the back of the 6-inch die assembly, also shown in Figure. The screens serve to separate solid contaminants and unmelted chunks from the molten polymer. There are two screens, so that when one becomes filled, it can hydraulically be removed from the polymer flow stream and the other one inserted in place.



The distributor to the die assembly is a parabolic coat hanger type similar to the one used in the spunbond line discussed above. The parabolic shape is evident in Figure, a photograph of the coat hanger taken during line disassembly for cleaning. Polymer enters from the feed pipe, at the top of the device, and exits through the melt-blown die at the bottom. The coat hanger configuration provides for even polymer distribution across the die.

Figure shows the front of the die assembly where the fibers emerge. on both sides of the die, insulated piping can be seen. The insulated piping feeds hot air into two manifolds which are the pipe-like structures seen above and below the die opening. The manifolds regulate the high velocity streams of hot air that converge with the forming fibers as shown in Figure above. Typical hot air temperatures are 215 °C to 340 °C. The air velocities through the air channels above and below the polymer feed die openings range from 0.5–0.8 times the speed of sound.

There are two types of die nosepieces: capillary type and drilled hole type. These are pictured in Figure above. Capillary openings are actually slots that are milled into both sides of the flat mating surfaces that form the die nosepiece. This is shown in Figure above. Figure above illustrates the drilled hole types. The die holes are either mechanically drilled or drilled by electrical discharge machinery.



Schematic of Die Nosepieces for Melt-Blown Lines.

During processing, the entire die assembly is heated to 215 °C to 340 °C in order to produce uniform defect-free webs. Figure shows the newly formed fiber emerging from the die on its way to the collector. The fiber emerging from the die is traveling from left to right whereas the collector is pictured from the other side of the machine so that the fiber approaching it in Figure is coming from the right. The metal drum collector in Figure, is rotating counterclockwise. The melt-blown process is a major process for producing nonwoven filter media. The major development areas for the process are webs with finer fibers for greater filtration efficiency and webs containing bicomponent and multicomponent fibers. With respect to the latter, Hills Inc. of West Melbourne, Florida has developed proprietary melt-blowing technology to produce fibers with the following cross sections:

- Homopolymer
- Side by side
- Sheath/core
- Pie segments
- Islands in a sea

Research Methodology

The design of the research is descriptive in nature. Descriptive studies are all around organized, they will, in general, be inflexible and its methodology can't be changed once in a while.

Descriptive studies are attempted most of the time.

- When the researcher is keen on knowing the attributes of specific groups, for example, age, profession.
- When the researcher is keen on knowing the extent of individuals in a given populace who have carried on in a specific way, making a projection of specific things.

Research, as we probably are aware, is a speciality of logical examination. It alludes to the precise technique comprising of articulating the issue detailing a theory, assortment of the realities or information investigating the reality and arriving at specific resolutions either as arrangements towards the concerning issues or in certain speculation for some hypothetical plan. To put it plainly, scan for through targets and orderly technique for finding an answer for the issue in research.

A research strategy is an approach to efficiently tackle the exploration issue. It might be comprehended as an examination of concentrating on how the study is done logically. In it, we study the different advances, the study procedure that is commonly received to contemplate the exploration issue and essential rationale behind them.

The research approach incorporates the accompanying advances:

- Formulate the goals of the study.
- Collection of the essential and auxiliary information.
- Interpreting the information and reaching the inferences.

An examination configuration is the course of action of condition and investigation of information in a way that expects to consolidate pertinence to explore reason with an economy in technique. It is the general operational example or system of the undertaking. What data is to be gathered from which sources by which methods? Three study structures are:-

- Exploratory study
- Descriptive study
- Experimental study

1. An exploratory study to pick up recognition with wonder or to accomplish new knowledge into its investigations.

2. A descriptive study to depict precisely the qualities of a specific individual, the circumstance of a group. 20

3. Experimental study to decide the recurrence with which something happens or with it is a partner with at some point else.

I have chosen the Descriptive study plan for my examination.

The study will be Descriptive; the individuals were picked for the investigation. The gathered information will be examined according to need of targets and theory.

Data Collection from Secondary Sources

Data was gathered from optional sources, for example, client overview, papers notices, vehicle bulletins, and so forth.

Other than these, the utilization of the web was additionally made in gathering applicable data. The information gathered from the previously mentioned sources has been sufficiently organized and utilized at suitable places in the report. The data assembled included:

- Newsletters.
- Research journals
- Advertisements

Data Collection from Primary Source

So as to assemble data about melt blow film the bottleneck for mask production in India. I have created 4 questionnaires on Google forms and circulated them among different population samples.

Each form was circulated in different population group which is useful in knowing the perspective of different respondents towards Melt blow film a bottleneck for mask production in India.

Scaling Techniques

Pie chart with the help of Microsoft excels and other Statistical techniques will be used.

Data Analysis

After getting the questionnaire filled from the selected respondents, the data was presented in form of pie-charts. To analyse the data in a useful and meaningful manner, simple statistical tools like percentages were used.

Questionnaire Development and Pretesting

It is the method of choosing units in the example. There are two fundamental strategies for examining.

1. Probability inspecting: In this strategy for examining every unit of the populace has a clear possibility of being remember for the example.
2. Non – probability inspecting: here to specific strategy for choosing the units of the example is received. The premise of choosing can be basically opportunity accommodation and reason.

Inspecting plan: - The arrangement calls for two choices.

- a. Sampling Unit: - who is to be overviewed?

Universe or target population for the present study consists of people in India.

- b. Sampling Size: - How many people should be surveyed?

Sample size consists of 50 Respondents.

. Respondents chosen for study are mostly millennials either college students or working professionals in major metropolitan cities of India mostly between the age group of 22 to 35 years.

TOOLS AND TECHNIQUES OF ANALYSIS

Tools for Analysis

- Bar diagram - Bar graphs will be utilized for looking at clear cut information of at least two qualities that will be assumed control after some time or on various conditions, for the most part on little informational indexes.
- Pie-diagram - Round graph separated into parts, representing relative sizes or frequencies.

DATA PRESENTATION AND ANALYSIS

Case Study

Intro to the case

We at Delite plastic Industries had some prior experience of selling the mask, though the monthly volumes were not that high but on January 24th we suddenly got an offer to buy 50000 3M N95 8210 Respirators @ 32 which was unusually high for a single day sale.

We at the other hand were delighted since there had not been much sales in the peak season due disruption in business cycle. We all anticipated that it was due to the dignitaries attending the 26 Jan function, but we had little idea that it was due to the pandemic that broke out in China and its announcement just 2 days prior about the pandemic that had spread across the whole country and was transmissible human to human.

Once the lockdown were imposed the retail prices shot up to around 300 and even 500 per mask in certain places. This was a certain missed opportunity of a huge windfall just due to lack of information.

Sino Pec one of the biggest crude oil refinery had also set up a state of the art Melt Blown production line in astonishing 7 days, with plans to add 7 more lines with a total of 14,400 tons capacity in the near future this cemented the certainty of shortages of material all around the world and the huge uptick in the demand of the Melt Blown fabric for the face mask.

Many Indian local start-ups like Nano clean had been positioned perfectly for this outbreak with earning impressive 5 CR revenue a month while not been able to fulfil the demand.

With a lot of interviews with the mask manufacturers in our business circle we got to know that due to unavailability of Melt blown fabric there was a general trend that most of the 3 ply mask manufacturers did not even use a melt blown layer inside the mask, opting for a non-woven spun bound fabric instead which offered no benefits since the pore size were too big therefore it offered no protection against its very purpose i.e. the virus.

This situation was very alarming due to the fact that unavailability of melt blown film was a certain bottle neck in the availability of reliable PPE. Numerous studies have even shown that a good quality mask reduces the chance of getting infection by up to 60% which is a certain reliability of melt blow in blocking the virus this fact was further validated by national

organisations like CDC and DRDO using this fabric in their prototype as well as a specification for their procurement tender which was given to Venus safety & health pvt ltd.

Data Collection

It was an industry wide research where data from most of the stakeholders of the supply chains was collected. There were primarily 4 sources of primary data

- The mask manufacturers- they were basically contacted to understand how they were working what was their costing and what was their understanding about the Melt Blown market. Furthermore interaction with manufacturers helped us understand the trends and the size of fabric prevalent in the market.

The data was mainly collected through telephone and analysis was done with the help of data given by them and some of the data from machine manufacturers

- The Proprietors- The data about the company and their strategic intent was collected from the proprietors. The partners also provided us with the help of accessing their business relations by getting us in touch with the various firms currently operating in the field of Mask and related goods.

Data was collected through face to face interactions as well as through their financial statements.

- The target audience- The target audience helped us understand the consumer behaviour which helped us fine tune our strategy as well as their awareness towards melt blown fabric

The data was collected through survey that was floated in college groups

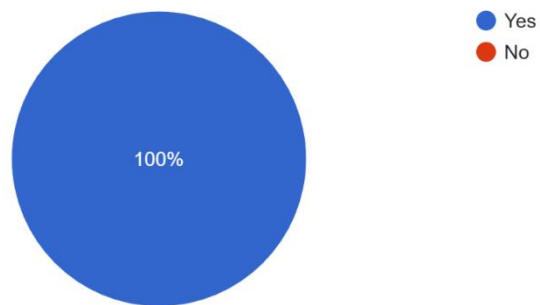
- Equipment Manufacturers- they helped us understand the cost of machine as well as the specifications of the machine. They helped us understand the cost of manufacturing and the cost price before marketing expenses.

The data was collected through a lot of business portals and email that were exchanged with the Machine and die manufacturers

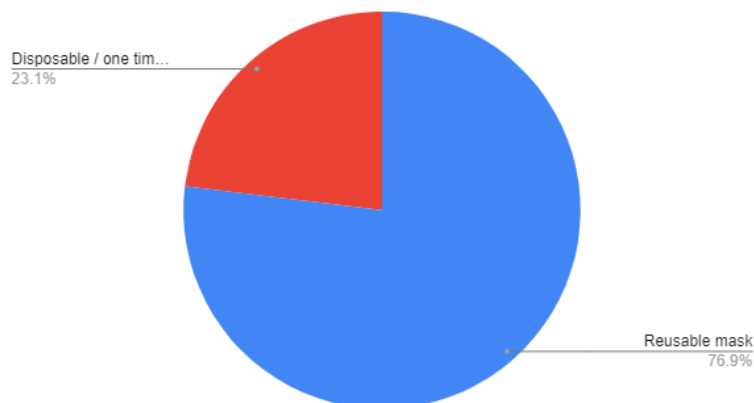
DATA PRESENTATION AND ANALYSIS

Data Analysis

Do you use mask ?
40 responses



Which type of masks do you use ?



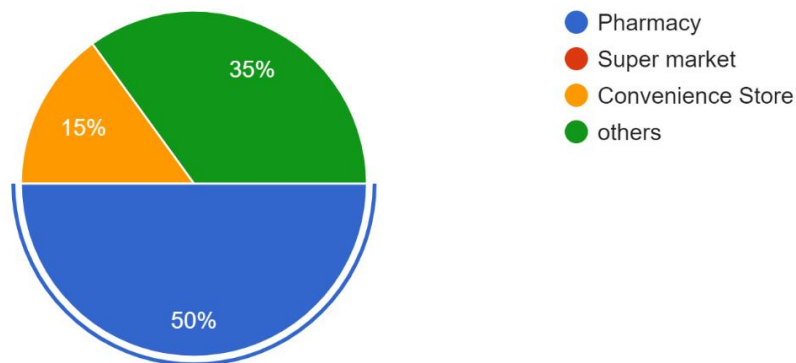
Interpretation

Figure 1 suggests that all the people have started to wear a mask who have filled the questioner showing that there is a huge demand for masks which indirectly suggests the potential of melt blow in Delhi alone

Figure 2 suggests that 72.5 % of respondents are re using their masks which suggests that they are probably using respirators and reusing them suggesting that people would be willing to spend more on reusable masks

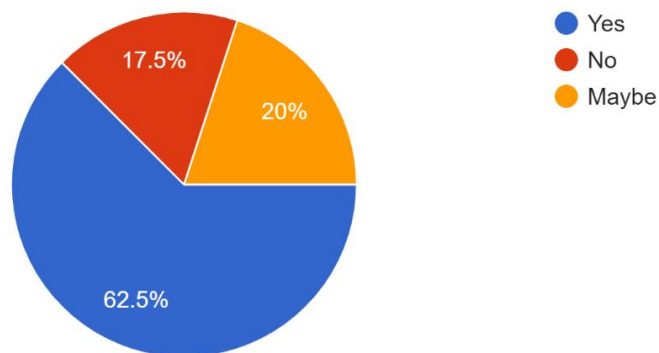
Where do you mostly buy the masks from ?

40 responses



Do you know there is a certain way to wear a mask?

40 responses



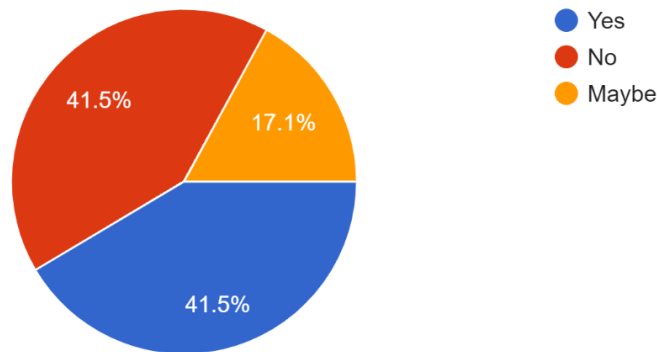
Interpretation

Figure 3 -The survey shows that most of the masks were sold through a pharmacy i.e. 50% so the mask manufacturers can explore these venues for their marketing

Figure 4 The survey suggests almost 40 % of the respondents do not know how to wear a mask so there is a need to spread awareness, this assumption is valid since most of the respondents were college graduates and people with less access to education also need to know the correct procedure

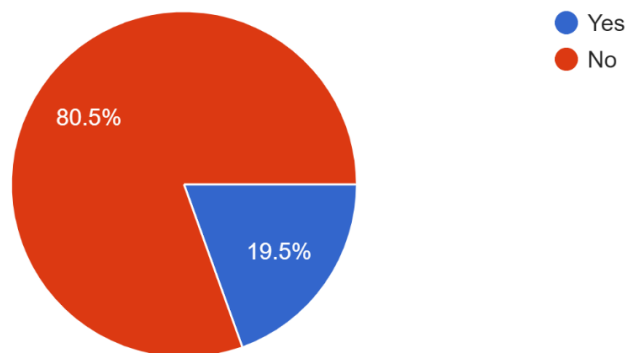
Do you know how exactly the masks work and do you know how to distinguish between a safe and not safe mask?

41 responses



Do you know about the filtration media that should be used in the masks i.e. the the Melt Blown Fabric ?

41 responses

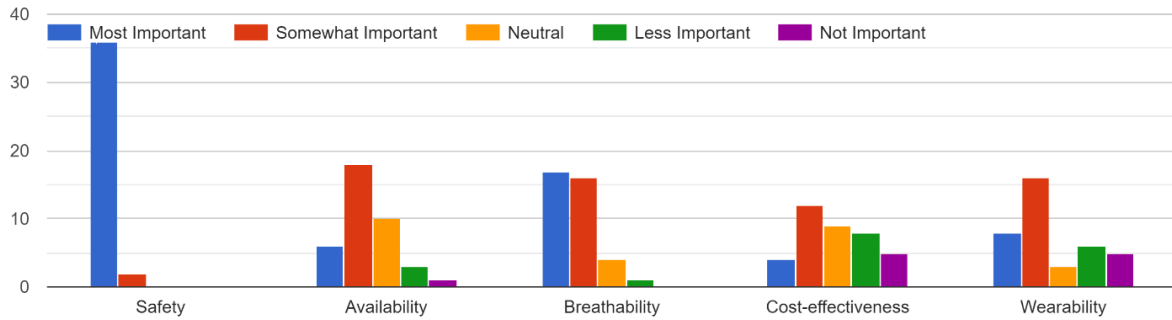


Interpretation

Figure 5 This graph shows that the consumers do not know about how to exactly use the masks, which shows that there is lack of awareness about the safety issues that can arise if the mask is worn inappropriately. This shows the people are ignorant towards the type of mask they are wearing.

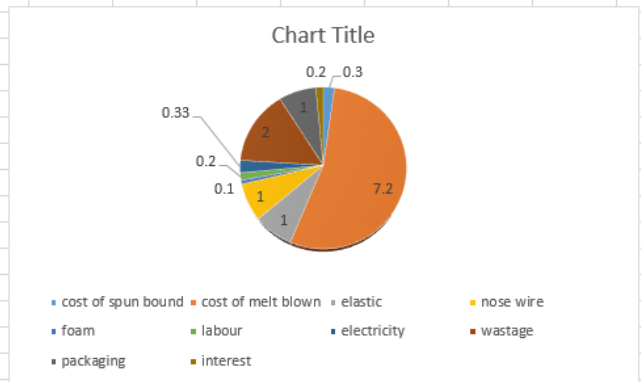
Figure 6 This graph shows there is lack of awareness about the melt blown fabric and they are cheated in India since most of the masks don't even have a melt blow layer inside which compromises the mask and masks them ineffective against virus.

What is the most important factor when you buy a mask?



cost of spun bound	0.3	2.265861
cost of melt blown	7.2	54.38066
elastic	1	7.55287
nose wire	1	7.55287
foam	0.1	0.755287
labour	0.2	1.510574
electricity	0.33	2.492447
wastage	2	15.10574
packaging	1	7.55287
interest	0.2	1.510574

13.24



Interpretation

Figure 7 This graph shows the things that a consumer values when they buy a mask, and as assumed safety is the most important factor. Surprisingly people are not much concerned about the cost which the earlier graph also suggests. People want their mask to be comfortable therefore they are willing to spend for comfort.

Figure 8 This graph shows a breakdown of the cost of Cup respirators and as we can see due to the increased cost of fabric, melt blown around 60% of the total cost of a mask. This shows it is the biggest bottleneck in the availability of cheap masks.

Cost	weight/mask	price/kg					
			min	hour	20 hour day	25 days month	
cost of spun bound	2 gram	150	0.3				
cost of melt blown elastic	6 gram	1200	7.2				
nose wire	2 pc	1	1				
foam	1 pc	1	1				
			9.5				
labour	4 people	60000	0.2				
electricity	100000 asmd.		0.333333				
			10.03333				
wastage	20%		2.006667				
packaging			1				
interest	1% PM \$60000		0.2				
Total			13.24				
selling price		40					
cost price		13.04					

Production capacity	480 KG/Day	24*7 production				
cost of whole mchin	\$86000	6500000	200000	100000	Rs 70,00,000	
assumed production	300 kg					
price per KG	400	600				
monthly production	9000	12000				
cost of material	200	200	200			
month	Cash outflow	Cash inflow	profit			
may	1800000	5400000	3600000			
june	1800000	5400000	3600000			
july	1800000	5400000	3600000			
aug	1800000	5400000	3600000			
sept	1800000	5400000	3600000			
oct	1800000	5400000	3600000			
nov	1800000	5400000	3600000			
december	1800000	5400000				
	1800000	5400000				

Figure 9 This shows that a manufacturer with a relatively large capacity would require only 1.8 tons of melt blow fabric per month but the machine we were planning to set had a capacity of almost 9 tons so a lot of manufacturers will have to be contacted and considerable time will be spent on marketing.

Figure 10 This shows that if the manufacturer will be able to breakeven in 2 months. This is quite possible since the manufacturers are selling the fabric at half of the market price and there being a shortage of the fabric. The only import thing is if the factory would be able to give continuous production without much breakages and snags in production by the machine.

Findings and recommendation

Findings

The biggest findings from analysing the responses of mask manufacturers was that due to the breakage of the supply chains there was unavailability of items required for manufacturing a mask. From raw materials like PP granules to specialized granules for melt blow fabric which required special electrostatically chargeable mixers like Zinc Stearate, to other requirements like nose wire or even packaging for mask were short in supply therefore their prices were 10%-20% higher. Even the labour required were in short supply.

Due to the spread of virus the overall risk to operate a factory had gone up considerably therefore there was a need of carefully scripted Standard Operating Procedures as well as safety protocols that can ensure safe working environment and ensure continuous uninterrupted production.

There was a clear unawareness among both the consumers and the producers regarding the Melt blown fabric. There were a lot of inferior products which were not electrostatically charged which defeated the whole purpose of using melt blow fabric

The prices charged from the manufacturers of mask were extraorbitant in conversation with the mark up of nearly 6.5 times the manufacturing cost. This had discouraged a lot of mask manufacturers from using the fabric since it made more than 50% of the cost of making a mask

Around Rs 1 for a disposable mask i.e. 40 % and almost Rs 7.2 per cup respirator ie almost 60 % of the total cost for a mask.

The most prevent size for the fabric was from 125-175 mm. This nececited that the machine that had to be bought should has the role size as big as possible since this reduced wastage while manufacturing. So we prefer 600 mm machine for the melt blown

Slowing sales, overleveraged, slow flow of money in the economy credit cycles bogged down, good relations with mask manufacturers, manufacturing prowess, spare in house labor.

It was observed that on talking to the equipment manufacturers that this fabric has other application as well therefore those uses can also be used when the prices return to their normal prices, thus further reducing the risk.

Recommendations

Marketing strategy

Due to the over leveraged position of Delite Plastic Industries and the slowdown of sales the company had become risk averse so they should try and take least amount of risk.

The company can try to sell other products for mask which can be made online like mask nose wire with LDPE coating. It is a low risk decision because it can be made in house with minimum investment since

They should try to keep prices low so that there is no unsold inventory initially and dump the products at lower prices so that the inventory is not piled up. As we can see the breakeven is in 2 months at a price of Rs 600 per kg so we should try and target this pricing.

We should try and build relationships with existing manufacturers to ensure they take all our fabric. The company is trying to get into a contract with Sumaja Enterprises which had got a tender of UP government and these two organizations already share jovial relations with each other.

Other thing that they could do is that try and sell their product to traders with precut sizes which would reduce their effort and increase their markup. Taking advantage of existing in-house slitting and rewinding capabilities.

Listing on online portals could also create awareness about the product thus creating leads for the sales team. Portals like India Mart, Trade India and Alibaba can be used to create awareness.

Efforts could also be made to explore alternative uses like water filter candles made from melt blown fabric could also be explored since it will reduce the risk

Technical requirements

After extensive research they have finalized the machine with 600mm role with all the specifications given in the annexure

A special in house mixture of pp with 1.85% zinc stearate has to be produced which can be easily done in house

An engineer needs to be consulted since a lot of components can be sourced from India itself. Almost everything but the die can be sourced from India

Time is of the essence therefore a quick decision needs to be taken. Due to delays in transportation.

Since the sea ports are back locked therefore the machine will have to be imported by air thus increasing the cost.

The equipment required for manufacturing are as following

- Melt blow die
- Ultrasonic die cleaner
- Hot air compressor and heater
- Spinneret
- Corona treatment for electrostatically charging material
- Specialized low mfi PP granules

Operational and safety guidelines

All areas in the site including the given below should be disinfected completely using user-friendly sanitising sprays:

- Doors of premises, office, and other areas.
- Canteens and other common areas
- Meeting room, Conference halls/ open areas available/ balcony/ entry door, the door of the premise, bunkers, toilets, building, etc.
- Machines and lifts.
- Bathroom, toilet, washbasins; water coolers, etc.
- Walls/ all different areas
- For workers coming from outside, a special transportation facility will be arranged without any dependency on the public transport system These vehicles should be allowed to work only with 30-40 % passenger capacity.

- All vehicles and machinery entering the premise should be disinfected by spray mandatorily.
- Mandatory thermal scanning of everyone entering and exiting the workplace to be done
- Medical insurance for the workers to be made mandatory.
- Not more than 2/4 persons (depending on size) will be allowed to travel in lifts or hoists.
- Use of staircase for climbing should be encouraged.
- There should be a prohibition of gutka, tobacco, etc. and spitting should be strictly banned
- There should be a full ban on non-important Visitors at premises.

Financing Strategy

Looking at the financial statements and the future commitment of the firm, it is very clear that that the company is over leveraged. This suggests that the risk appetite of the company is much reduced, suggesting company will want to play safe bets.

The company has access to concessional rates of funds from the banks due to buyers credit with provides loan for a mere 6% PA interest rate.

Moreover efforts have been made by the government providing funding for essential goods at subsidised rates, those routes can also be explored

Due to Covid the sales will have to be made on cash basis and credit will have to be eliminated due to the increased cost of working capital.

Limitations

The restrictions of the study were as per the following:

- Firstly, most confinement of the examination is created from the little size of the sample. Under time and monetary imperatives, the investigation was performed distinctly with a little part of the populace for the whole populace. this may impact the generalizability of the examples and ought to get erroneous outcomes.

- Second of all, the decision of the review area includes a constraint. just Delhi NCR and noteworthy metropolitan urban areas are chosen for directing the overview. In this way, the outcome would be illustrative of the clients of the exact region rather than the objective populace as a whole on the grounds that various urban areas may reflect distinctive shopper conduct.

- The study tried to contact a lot of suppliers and quotations of those suppliers who were willing to give information but due to covid only Chinese equipment manufacturers were able to reply, so we did not have much options for machine either.

- The financial statement of Delite plastic industries were very scattered and not well kept so it was difficult to study all the data since it was scattered under a lot of different companies.

However, care was taken all through the investigation to downsize the negative effect of those Restrictions basically the need for additional examination is perceived.

Annexure

Bibliography

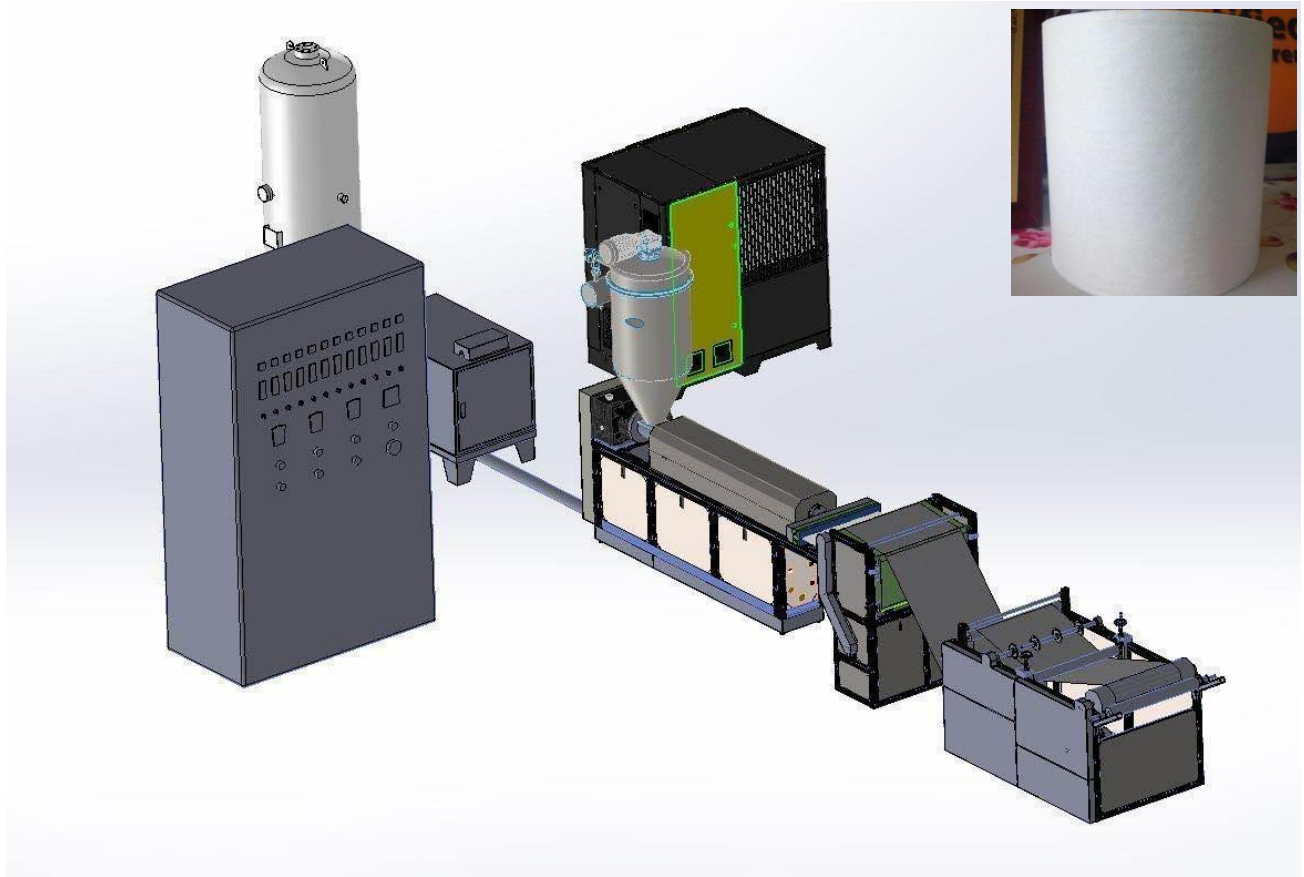
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4. <https://www.sciencedirect.com/topics/engineering/melt-blown-process>
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9. https://www.researchgate.net/publication/289214705_New_raw_materials_for_a_new_generation_of_meltblown_fabrics
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11. http://www.xinhuanet.com/english/2020-03/17/c_138887455.htm

Appendices

(1) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2662657/>

(2) Machine specifications and quotation FOB

Melt blown non woven fabric production line for 600mm 熔喷布 600mm 宽设备配置清单



I.Equipment List

NO 序号	Item No. 品名	QTY 数量	Unit 单位	Remarks 备注
1	Air compressor, gas tank 空压机·储气罐	1		
2	Heating oven, 加热烘箱	1		
3	3. SJ50/30 Single Srew Extruder SJ50/30 单螺杆挤出机	1		

4	Auto-Dry Feeder 自动干燥上料机	1		
5	Mould 熔喷布模具	1		模具 700mm 宽
6	Receiving car, slitting Unite,winding Unit 接收车,分切, 收卷	1		
7	Large electric cabinet controls the entire line 电控柜	1		
8	Mold cleaning box Insulation brick and constant temperature control 模具清理箱	1		
Total	FOB USD 86,000			

II. Technical parameters of equipment.

1. Air compressor, gas tank

空压机 · 储气罐



1. Provide stable origin gas 提供稳定气源

2. Power: 12Kw 功率 : 12Kw

3. Size: 1800 * 650 * 1200mm Weight: 450kg 尺寸 : 1800*650*1200mm 重量 : 450kg

4. Distribution of 0.3 ~0.5 cubic gas tanks 配 0.3~ 0.5 立方储气罐

2. Heating oven 加热烘箱



1. Power: 8Kw 功率: 8Kw

2. Two groups of heating systems, each group has 8 heating rods, and the temperature of each group of each heating rod can be adjusted arbitrarily. 两组加热系统，每组 8 个加热棒，每个加热棒每组温度可以任意调节。

3. Directly heating more than 70 degrees of dry wind from the fan to save power 直接加热来自风机的 70 多度干燥风，更加省电。

4. Size: 700*580*600mm Weight: 200kg 尺寸: 700*580*600mm 重量: 200kg

4. SJ50/30 Single Screw Extruder

SJ50/30 单螺杆挤出机



1. Extruded polypropylene particles 挤压聚丙烯颗粒
2. Hard gear box directly connects the screw and motor 硬齿轮箱
直接连接螺杆和电机
 3. Screw barrel hardened with liquid nitrogen for long life
螺杆炮筒液氮加硬, 使用寿命长
 4. 12 ceramic heating rings, single 0.8kw, total 11.5Kw
12 个铸铝或者陶瓷加热圈, 单个 0.8kw, 总共 11.5Kw
 5. Main Power: 18.5Kw motor , more stable 主机功率
:18.5Kw 主电机 · 更稳定
 6. Machine capacity: 450kg/day 产能 : 450kg /天
 7. Size: L2250*W500*H1050mm Weight: 200kg 尺寸: 长
2250*宽 500*高 1050mm 重量: 200kg

5. Auto-Dry Feeder
自动干燥上料机



1. Automatically add polypropylene material 自动加聚丙烯原料

3. Power: 0.5kw 功率: 0.5kw

4. Stainless steel housing 不锈钢壳体

5. Size: 500*500*1200mm Weight: 50kgs

尺寸: 500*500*1200mm 重量: 50kgs

5. Mould

熔喷布模具

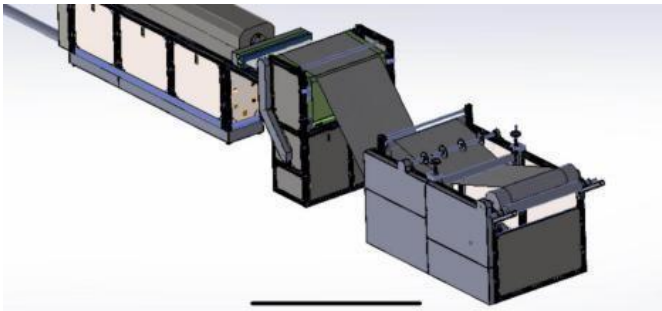


1.Spinneret width:700mm 喷丝板宽度：700 mm

2.Mould Material: Special mold steel 模具:特制模具钢

3.Power: 24Kw, two PCS 1.5Kw heating rods, stable insulation and small fluctuations. 功率:24Kw, 加热棒 1.5Kw*2 根, 温度稳定·波动小

6.Receiving car, slitting Unite,winding Unit 接收车,分切, 收卷



1.Meltblown Silk into Cloth Received Unit. 熔喷丝成布接收车

2.Power: 5KW 功率:5KW

3.The small electric cabinet controls the winding speed and adjusts the thickness of the melt-blown cloth,Width can be customized.

小电柜控制收卷速度·调节熔喷布厚度·宽度可以定制做

3. Automatic cut winding into 3 rolls of mask cloth (175mm), 4 sets of blades, cut on both sides. 自动分切成3卷口罩布(175mm)4组刀片·两边切边

4.Optional electrostatic standing machine to melt spraying cloth with static electricity. 可选配静电驻机给熔喷布增加静电

5.Size: L2230mm * W1860mm * H1420mm.

尺寸:长 2230mm*宽 1860mm*高 1420mm

6.Weight: 1000kg 重量:1000kg

6. Large electric cabinet controls 电控柜



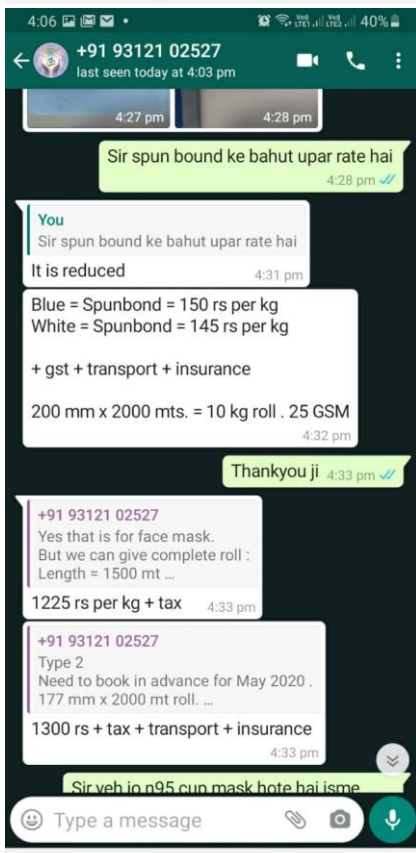
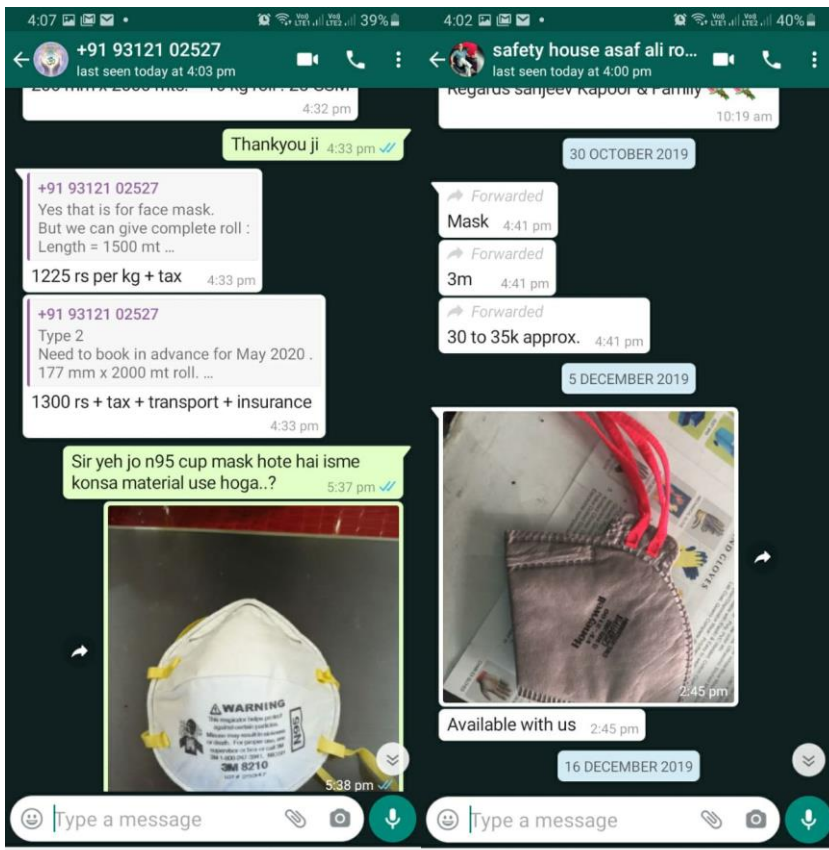
1. Control the entire line of equipment, Adjust temperature and speed. 控制整条线设备，调节温度，转速
2. Size :850 * 430 * 1950 Weight: 150kg 尺寸:850*430*1950 重量:150kg

7. Mold cleaning box 模具清理箱



1. Heat and carbonize the remaining polypropylene material in the mold, Timing switch, Auto-off. 加热碳化模具里的残存聚丙烯原料，计时开关，自动关闭
2. Power: 8Kw (actually 2.8Kw)
功率:8Kw(实际使用 2.8Kw)
3. Size: 1200 * 750 * 800mm Weight: 330kg 尺寸:1200*750*800mm 重量:330kg

Prices of melt blown



Sources of images used

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Questioner

Market Survey

Questionnaire to understand the consumer behavior for the mask and awareness about safety standards and Melt blown filtration

Do you use mask ? *

Yes

No

Which type of masks do you use ? *

Disposable / on time use mask

Reusable mask

Where do you mostly buy the masks from ?

Pharmacy

Super market

Convenience Store

others

Do you know how exactly the masks work and do you know how to distinguish between a safe and not safe mask?

- Yes
- No
- Maybe

Do you know about the filtration media that should be used in the masks i.e. the the Melt Blown Fabric ?

- Yes
- No

What is the most important factor when you buy a mask? *

	Most Important	Somewhat Im...	Neutral	Less Important	Not Important
Safety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Breathability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost-effective...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wearability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you know what the rating on the masks describe eg. N95, N99, KN95?

yes

no