



Faculty of Engineering
Department of Textile Engineering

REPORT ON

Effect of Dry Wash on Denim Garments

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of **Bachelor of Science in Textile Engineering.**

Advance in Apparel Manufacturing Technology

15th January to 15th March

DECLARATION

We hereby declare that, this work has been done by us and not copied from elsewhere; we also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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LETTER OF APPROVAL

It is herewith certified that **Md. Rashed Hawlader & Md. Rakib Hossain** bearing ID:142-23-3864 & 142-23-3961 , Department of Textile Engineering, Daffodil International University, Dhaka, Bangladesh, has carried out their B.Sc thesis entitled "**Study on different types of dry wash process** " under my direct supervision. They have successfully carried out their research work and ready to present their dissertation, which is required in partial fulfillment of their B.Sc degree. This is an original study of the author and no part of this thesis has been to any other university or institute for any degree. The thesis contains no materials previously published or written by any other person except reference is made in the text of the thesis.

I have gone through the final draft of the thesis and recommend its submission for the degree of Bachelor of Science in Textile Engineering.

A handwritten signature in black ink, appearing to read 'Mousumi', is written over a horizontal line.

Supervisor

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Special Thanks to our family for their unconditional support, love and inspiration which gave us incentive to complete this research work successfully. We would like to thank all of our friends with whom we have worked and to all our well-wishers for their moral support throughout this research work.

DEDICATION

It is our genuine gratefulness and warmest regard that we dedicate this work to our beloved Parents & respected Teachers.

ABSTRACT

Denim garment is most widely used due to its appearance, comfort, strength, durability and low cost, which gives the customers utmost satisfaction. Denim garment does not inherit customer's desired properties in the primary stage of manufacturing, but can be incorporated desirably by applying some finishing treatment, most widely known as dry washing process, in the denim garment. The most widely used dry washing processes for denim garment to develop new a look and effect are hand brush, destroy, tagging, pressing wrinkle, whiskering and PP spray. We applied combination of dry washing process on raw sample to develop certain effect in the denim and measured the change of physical properties due to application of different dry washing process. First, a combination of dry washing process (certain number) is applied on raw sample and repeated on other four similar raw samples. Similarly other five combination of dry washing process, are applied on raw samples. Due to the application of these combinations of dry washing process on raw samples, they undergo changes of some physical properties like GSM. This gives an indication of change of physical properties due to application of different dry washing processes for imparting desired effect on denim garments.

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Chapter-1 Introduction

1.1 Introduction

The process which is applied in the dry condition of garments is called dry process. Actually this process is done at unwashed condition. Dry process is the ornaments of denim garments. Without dry process denim garments doesn't look nice. Dry process is the most important finishing treatment for denim, is done to impart tagging, grinding, destroy, whiskering permanent wrinkle, P.P spray, hand crapping and 3D effect on denim. Denim is a durable cotton twill-weave woven that typically used to make jeans. For many years blue denim for jeans, was made from all cotton fibers. In the last 10-15 years, there's been a trend towards blended fibers to create a more comfortable garment with greater ease of movement for the wearer. First and foremost, denim is a durable fabric made from a special twill weaving process where the dyed yarns run lengthwise of the fabric to predominate appearance called warp yarn and the white or undyed yarns run across the width direction called weft. Without washing denim garment is uncomfortable to wear, due to its weaving and dyeing effects. It essentially needs a finishing treatment to make it softer, suppler and smooth which enhance wearer's comfort. Denim washing is one of the most widely used finishing treatments that have wide range of usage due to its effects on appearance and comfort. Now a days some dry process are applied on twill garments also.

1.2 Aim of the Study:

Our aim in this thesis is...

- To acquire practical knowledge about different types of dry wash process.

1.3 Objectives:

- ❖ To know about the different types of dry wash process
- ❖ To achieve practical knowledge
- ❖ To analyze and watch dry wash effects
- ❖ To introduce with different types of machine used in dry wash process
- ❖ To know about different types of Chemical & elements used in dry wash process.

1.4 Scope of the Study:

Islam Garments Ltd. is a well recognized composite factory in Bangladesh at Gazipur.

Actually there has a lot of scope to learn about dry wash process. Every types of machine is present here which is required for denim wash such as 3D,PP-SPRAY,GRINDING,DESTROY,TAGGING besides here we can learn about Hand-Scrapping, Whiskering as well as White Paste Spray(Used on twill fabric) process. Workers were very friendly &helpful to us that why we could have learn very easily. Actually here we were able to work with them by hand and that was the best opportunity for us. Besides we had no 3D machine in our lab but here we came to know about this important process.

1.5 Limitation:

Although there has a lot of scope of learning different types of dry wash process but there has some limitation also. They do produce denim fabric .They have no denim manufacturing unit .They import denim fabric from the others industry. Without producing denim fabric they perform all the other process. Cutting to completing a garments of jeans pant is done here .They do not produce the denim product for the buyers order, they produce it for their own show room (Raw Nation), that's why all the dry washing process didn't run for always.

Chapter-2 Literature Review

2.1 HISTROY OF DENIM:

In fashion history, denim continues to puzzle. No one truly knows the perfect answer where jeans began. The phrase denim is thought to derive from several sources. No one is totally certain where the words come from. A majority of source books suggest that denim derives from the English translation of the French phrase 'serge de Nimes'. Denim fashion history is thus associated with Serge de Nimes. When talking about denim the name Levi's is one of the first to be mentioned. Levi's which stands for Levi Strauss is normally called the forefather of jeans. When tracing back the history of these trousers to its origins it is true that Levi Strauss played an important role concerning their development and distribution. Levi Strauss found out that the gold diggers' hard work in the mines made their clothes get worn out very quickly and he produced stout working trousers out of the sail cloth he had taken with him which he called "half overalls". When he continued producing these trousers he used cheap cotton fabrics coming from Genova. At the end of the sixties of the 19th century he replaced the brown sail cloth by an indigo dyed, wear resistant cotton fabric coming from France. The name of this fabric was "Serge de Nimes". Serge is the French Expression for combined twill and Nimes is the French town where the fabric comes from. The fabric's name Serge de Nimes was quickly turned into "Denim" in American colloquial language. By applying this indigo-dyed combined twill the first jeans out of Denim was almost born or better sewn. About 1947 denim made a break-away from work clothing image, chiefly in the area of sportswear and rainwear and an occasional appearance in high fashion collections as a "different-looking" evening dress. In 1970 American youth adopted denim as their favorite fabric. Part of a "back to nature" movement that emphasized ecology and the natural denim being a fabric created from a natural fiber was a primary factor. Since 1960 the jeans business has undergone an explosive transformation, from a source of tough, cheap clothing for cowboys, blue-collar workers and penniless youth into a fashion conscious market for a widening mass of people of almost all ages

2.2 Garments Wash:

The garment wash is a new technology in the garment trade. Normally washing mean cleaning something. But in the garment trade, only cleaning of garments is not the garment wash. Garment washing is a technology which is applied to change or modify the outlook, appearance, comfort ability, and design of garments. Garment washing is applied on solid dyed garments or solid printed fabric. Now I would like to discuss the different types and objects of wash in the garment industry.

2.3 Types of Garments Washing:

In garments industry, there are mainly two types of washing process for garments products. Those processes are wet washing process and dry washing process. Here also wet washing process is divided

by eight ways and the dry washing process is divided by five ways, according to the fabric quality and buyer requirements. But most common and applied wash in garment is normal wash, which is also known as detergent wash. In the wet washing process enzyme wash, stone wash and bleach wash is most popular to the buyer and the manufacturer. On the other hand, Potassium per magnet spray and hand scraping is common for dry washing process in the garments industry.

2.4 Dry wash:

The study is related to the combination of dry washing process on denim and their effect on denim. Dry washing process is the most important finishing for denim to improve the look which influences the physical properties of denim. Most important dry washing processes used for denim are destroying, hand brush, tagging, whiskering, potassium permanganate (P.P) spray, and crinkle. A number of combinations of dry washing process are carried out on denim to get desired effect. The change of the physical properties of denim due to combination of dry washing process is measured in terms of GSM, tear strength, and no of EPI & PPI. Now-a-day's dry washing process is most widely used to get the effect on denim by replacing the conventional process. These processes are carried out to control the physical properties of denim. He distressed denim that we see around everywhere undergo a wide variety of wet as well as dry treatments to get the desired effects. Destroying denims is as much an art as it is a technique. The direction in fashion is varied across all areas particularly in denim dry finishing, whether worn or torn to wrinkled or pressed, these trends can appeal to a wide range of consumers. These can be achieved by variety of denim dry processing technique, which are mainly dependent on physical and on chemical abrasion of the surface dye there by producing different wash-down looks to the denim fabrics.

2.5 Types of dry wash:

- ❖ DESTROY
- ❖ TAGGING
- ❖ WHISKERING
- ❖ RESIN
- ❖ 3D WRINKLE
- ❖ HAND SCRAPPING
- ❖ GRINDING
- ❖ WHITE- PASTE
- ❖ PP-SPRAY

2.5.1 Destroying

Destroying is an art of making denim unique & used look. To make destruction pen type of stone tools being used in mid of wash process to apply on desired area. It can also be achieved by cutting it thru knife the warp yarns & keep the weft yarn as is to show white thread. Holes also can be made by cutting weft & warp yarns. These are all manual processes & every garment will look unique & different than others. Different types of machine used for destroy the garments. Such as- Grinding Machine, Emery Cloth, Hacksaw Blade, Needle, Knife etc.

2.5.2 Tagging

Tagging or more commonly tag pinning is a very in fashion style in denim garment in these days. The procedure is very simple and proceeds as; garment is folded on required area and tagged through folds. Number of folds can be two to four or five in regular in tacking. Pin holes are sometimes a problem to this process. Care is to be taken to avoid this. This damage can be prevented by increasing the number of folds in one pin or by selecting the size of pin which is not loses to fold. This problem can never be eliminated but can be minimized to considerable limits. Automated tacking machines are used more successfully in some units. These machines are bit expensive but are far more efficient and secure than tag guns.

2.5.3 Whiskering

Mustaches or whiskers are one of the most important designs of a used look garment. The idea of whiskers is taken from the worn out lines and impression patterns generated by natural wearing on hips and front thigh area. On old jeans, a number of patterns can be found consequential to fabric, body shape of user or sitting posture. Various methods are designed to create this impression on jeans. Engraved patterns are used here to give whiskering effect.

2.5.4 Potassium Permanganate (P.P) Spray

Potassium permanganate spray is done on jeans to take a bright effect on sand blast area. One important thing about potassium permanganate spray is, this is usually a sporting process to increase the effect of sand blast. Potassium permanganate solution is sprayed on blasted area of jeans garment with the help of normal spray gun. This potassium permanganate spray appears pink on garment when fresh and turns to muddy brown on drying. The garment is hanged in open to dry after potassium permanganate spray and

when the potassium permanganate turns its colors completely then it is considered to ready for next process. A potassium permanganate spray concentration ranges from .25 gm per liter to 15.00 grams per liter depending to required results and fabric types. Usually indigo died fabrics are treated with low concentrations whereas black sulfur fabric requires high concentrations to treat with. Sulfur is not much affected with potassium permanganate and hence requires high concentrations and even sometime multiple spray operations. It is more effective to add potassium permanganate brushing to aid the spray effect.

2.5.5 Resin (3D Effect):

Resin (Formaldehyde free) being used for achieving 3D effect (3 Dimensional), Rigid Look etc. This process can be done by spraying or dipping the garments in to Resin, Catalyst, Silicone & PU solution in right combination according to the fabric strength & desired effect needed. After application of resin solution in right proportion, make manual designing as needed on the thigh, hip & back knee area to get 3D dimensional effect. After making it, it should be manually dried with hot press or hair dryer & then must be cured in oven at right temperature, time as mentioned in resin product manual. If resin not cured properly, 3 D effect will not be permanent & can cause skin irritation/rashes to the wearer.

2.5.6 Hand Scraping:

Hand scraping is step which is generally being done in rigid form of garments to get distress look. Location can be front thigh & backseat or it can be overall / global application as per standard. Emery paper (silicon) is being used to scrap the garments in particular placement. Emery paper comes in different number generally starts from 40 till 600 and above, higher the number finer the emery paper, lower the coarseness of the paper. In garment industry from 220, 320 & 400 number papers are most popular & widely used. Purpose of doing this process is make used worn out look to the garments. The most important factor is to select right number of paper according to the fabric strength & intensity need. Feathering /merging white sanded part to dark blue area in such way that it should look natural & not artificial.

Scraping can be done on inflated rubber balloons for better effect (horizontal or vertical it's up to operator's convenience), even it can be done on plain wooden board of garment size & hand pressure should be uniform in order to get better results.

2.5.7 Grinding

Grinding is being done on pocket edges & bottom hems edges by running against abrasion surface or stone to achieve worn out effect. Many different make of machines & pen grinding tools are available in the market which runs with pneumatic system.

Grinding is done of garments by pen type of stone tools. It can be done in mid of the wash process. In many workshops it is done before any wash process as a first process after stitching. Stone tools similar to grinders used in wood and stone industry are utilized to work on garments with a few amendments to their design.

2.6 Effect of Denim after Dry Process:

Hand Scraping/Hand Brush:

Scraping can be done on inflated rubber balloons for better effect (horizontal or vertical it's up to operator's convenience), even it can done plain wooden board of garment size & hand pressure should be uniform in order to get better results.

Destroy:

One of the most popular distressing effects currently, 'Destruction' is an art which make denim look unique & used.

Tagging:

This effect can be designed anywhere on the garment in different styles. Most favorite areas for tacking are on waistband, bottom hems, back pocket and front pocket corners etc. On front or back sides of garment, tacking can also designed horizontal of vertical patterns on full length panel.

Whiskering:

Whiskers are one of the most important design of a used look garment. The idea of whiskers is taken from the worn out lines and impression patterns generated by natural wearing on hips and front thigh area.

Potassium Permanganate Spray:

PP Spray is being done on denim garments to achieve local abraded area to appear whiter than back ground indigo color shade.

Wrinkle/3D:

Permanent wrinkles given on denim surface are known as crinkle effect. Resin application is done on denim to retain crinkle.

First have to do spray resin on the specific area we want to create 3D effect. Without resin spray 3D effect is not possible.

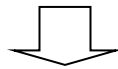
Chapter 3 Methodology

3.1 Method for Hand Brush:

First of all the garment is mounted on rubber balloon. After mounting the garment air balloon is filled with air to expose the area to operate. The emery paper (320) is being used to scrape the garments in particular placement & design of garments to get the distressed look. Then the garment is sent for further processing. Finally the garment is washed to get the desired effect.

Process Sequence:

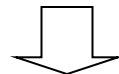
Insert / Load the Jeans into the work station.



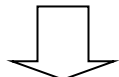
Open the air balloon to fill the air at required pressure



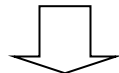
Turn the pocket bag to opposite side.



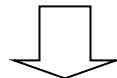
Turn on the air switch / lever, the supporting plate comes up & holds the both leg of the Jean



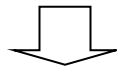
Release the center support, by turning off air switch.



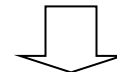
Operate the air switch to turn the mannequin to half rotation side for scrapping.



Repeat the operation 3, 4 & 5.



After completion of the process, Release the air.



Unload the Jeans and cycle repeat.



Before Wash



After Wash

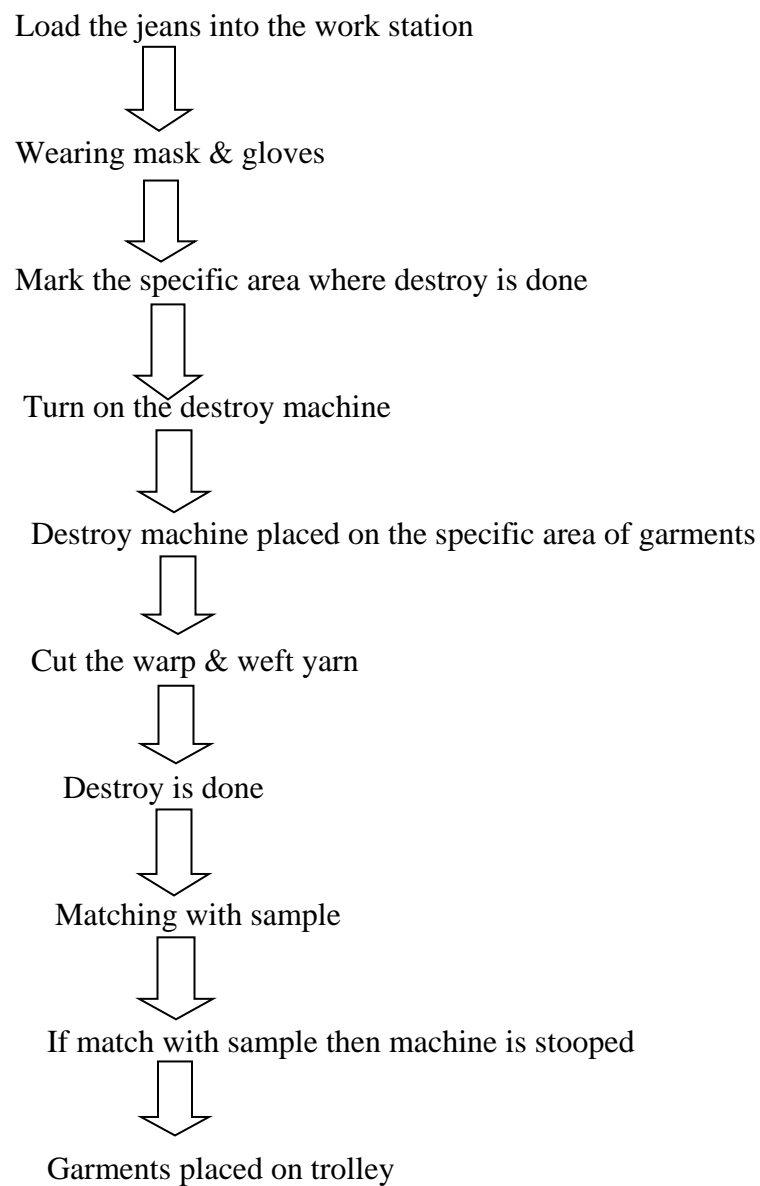
Material Used
Emery Cloth.

3.2 Method for Destroy

Method Of Destroy:

Destroy effect is achieved manually by using knife. Destroy is done by cutting the warp yarns through knife & keep the weft yarn as is to show white thread. First of all the knife is run along the direction of weft yarn about 10 times to cut the warp yarn up to a certain area. The area around the destroyed area is worn out to blend the destroyed area with the surrounding fabric. Finally the garment is washed to get the desire defect.

Process Sequence:





Before Wash



After Wash

Materials used

Knife, Destroy Machine.



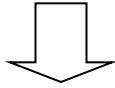
3.2.1 Destroy Machine

3.3 Method of Tagging

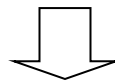
Tagging effect is created by swift tag machines with the help of plastic or nylon tag pins in rigid form of garment to get contrast. First, garment is folded on required area and tacked through folds by using tag pin machines. Then washing is done on the upper side of garments which results crease mark and dark shade inside of tagging. After tagging, tag pin is removed from garment making softening.

Process Sequence:

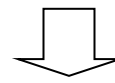
Turn on the machine switch



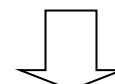
Fold the garment that have to be tacked



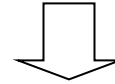
Place the folded garment in the tacking machine



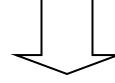
Press the bottom lever.



For the hand tacking Place the tacking gun on the folded area



Tagging done



Place the garment in the trolley



Before Wash



After Wash

Materials used

Swift Tag Machines, Tag Pin.



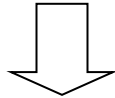
3.3.1 Tag Machine

3.4 Method for Whiskering

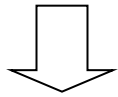
First, engraved patterns are made for making whisker effect. Before that the pattern is drawn on rubber sheet and engraved them with blade. Then garment is places on sheet and scrapping done specific area to draw this effect on garment. Then washing is done on the garments to get desired effect.

Process Sequence:

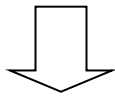
Insert the Jeans Pant into the work station.



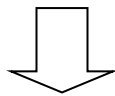
Insert the inside pocket bag under the bottom side pattern.



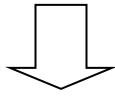
Check and Set the desired area to be whiskered.



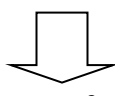
Hold the sand paper on right / left hand



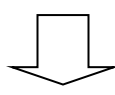
Start the scrapping to get required whiskering effect.



Remove the inside pocket bag from bottom of the pattern.



Unload the Jeans pant from work station.



Start the same procedure for next Garment and cycle repeat



Before Wash



After Wash

Materials used

Engraved Pattern, Sand Paper



3.4.1 Pattern



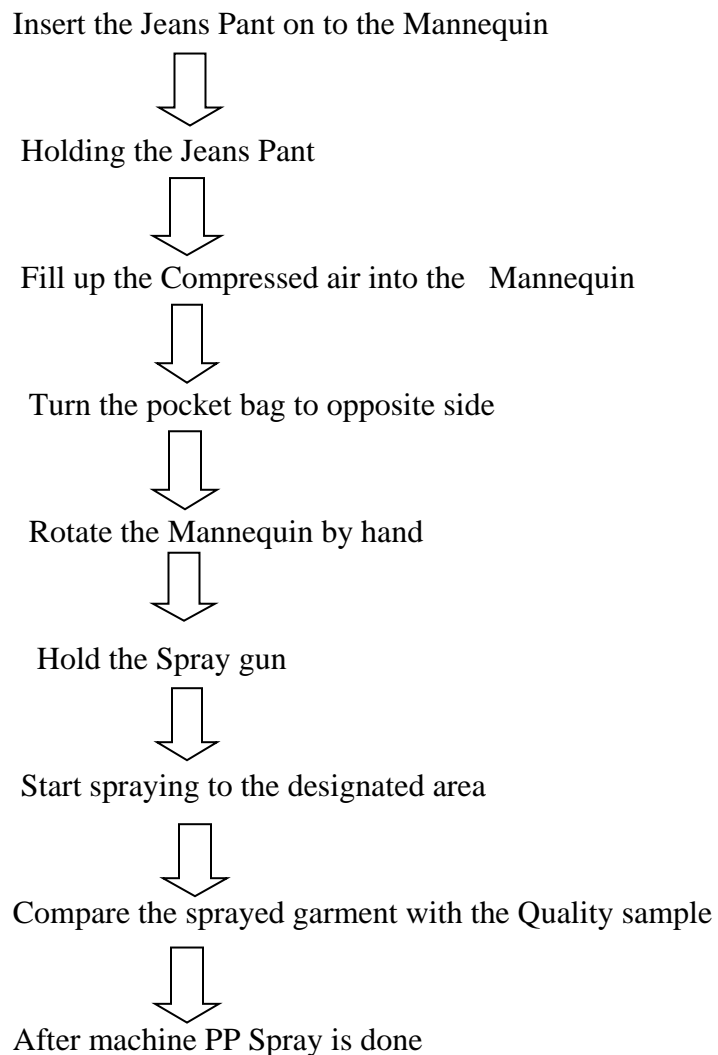
3.4.2 Sand Paper

3.5 Method for Potassium Permanganate

(P.P) Spray

First, the garment is mounted on balloon and filled with air to get effect of PP spray. Garment is scrubbed over pattern carefully. Then potassium permanganate solution is sprayed on the blasted area of jeans garment with the help of a normal spray gun. This potassium permanganate spray appears pink on the garment when fresh and turns to muddy brown on drying. The garment is hanged in open to dry after potassium permanganate spray and when the potassium permanganate turns its colors completely then it is considered to ready for the next process. After carrying enzyme or bleach cycle more natural & white effect is achieved. Then neutralization process is carried out with sodium meta-bi-sulphate.

Process Sequence:





Wash In Time



After Wash

Materials used

Potassium Permanganate, sodium meta-bisulphate,
Spray Gun.

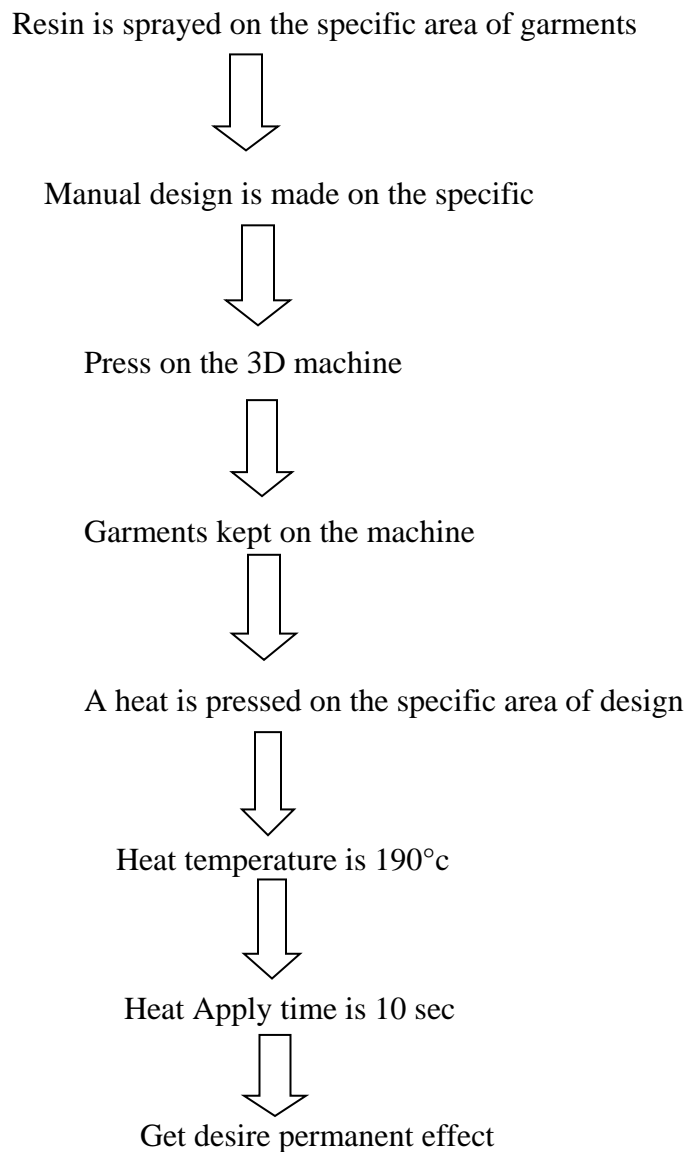


3.5.1 Spray Gun

3.6 Method for 3D

First, resin (formaldehyde free) is sprayed on the specific area of garment to create 3D effect. After applying resin solution in right proportion manual designing is made on the thigh, hip & back knee area to get three dimensional effects as needed. Then it should be manually dried with hair dryer at temperature 190°C. Then curing is done properly in oven at right temperature and time as mentioned in resin product manual to get permanent effect by avoiding skin irritation to the wearer.

Process Sequence:





Before Wash



After Wash

Materials used

Resin, Catalyst, Silicone, PU solution, Dryer.



3.6.1 3D Machine

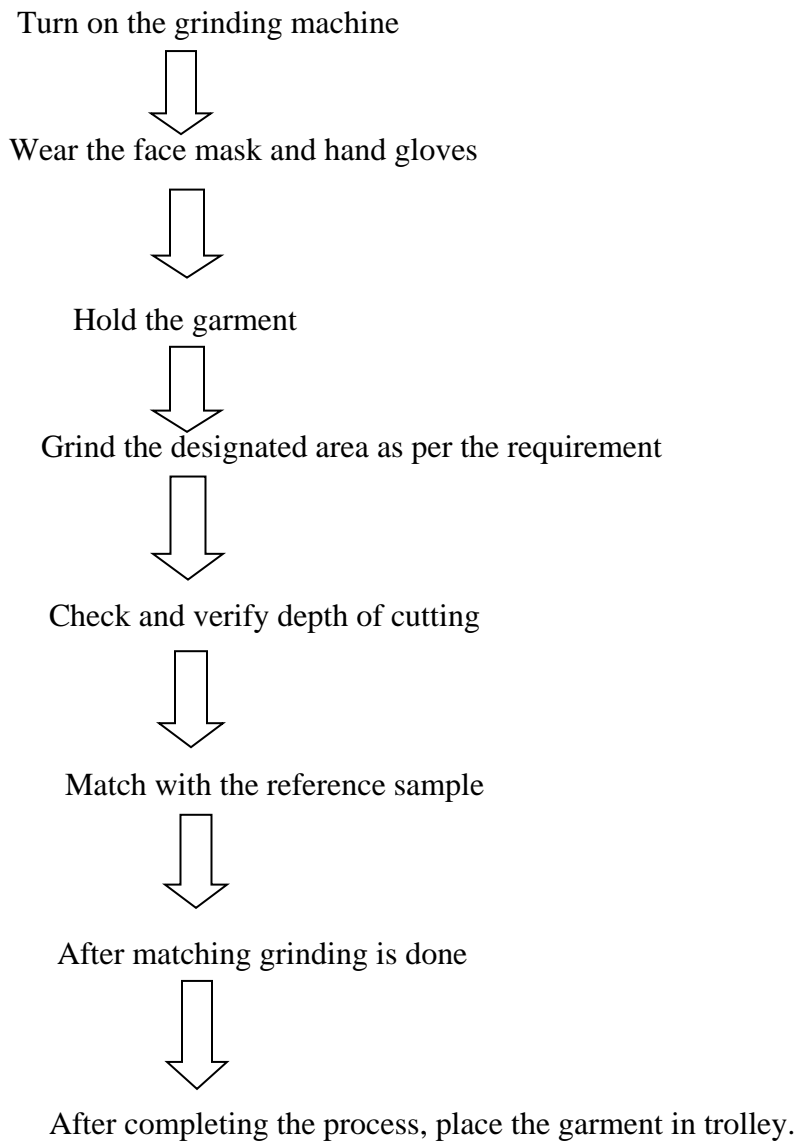
3.7 Method of Grinding:

Grinding is the process by which we will get the used effect of garments.

This process is completely done at edges area.

If the garments has two time wash that time we will wash it after first wash to avoid the damages of garments.

Process Sequence:





Before Wash



After Wash

Materials used for Grinding:

- Grinding Machine



3.7.1 Grinding Machine

Chapter-4 Results & Discussion

4.1 GSM variation:

Here we found some changes in dry washing process. Raw sample and washed sample has got different result. Every dry process is not impacting equally on the denim. Changes are varying relating to the dry process done.

Name of the Dry wash process	GSM of Sample 1	GSM of Sample 2
No dry washing process (RAW Sample)	440	440
Whiskering	436	435
Destroy	432	431
Hand Scrapping	434	432

Table: GSM variation

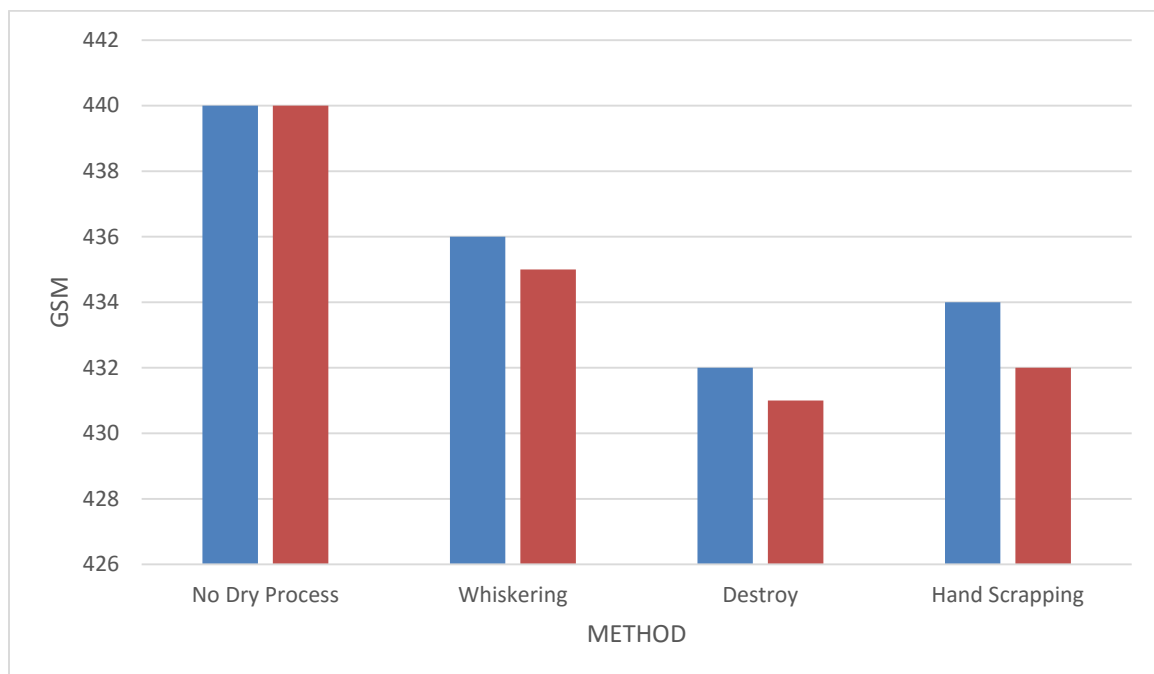


Chart: Column Chart of GSM Measurement

Here carrying out different types of dry washing technique together we found decrease in GSM. Here, whiskering, destroy, hand scrapping has got decrease in GSM. Whiskering, destroy, hand Scrapping have got more removal of colors with yarn and fiber, that's why GSM decrease more. Here we experienced more decrease of GSM due to destroy & hand

scrapping as warp yarn totally damaged through destroying process. These two process impacts more on the fabric GSM.

4.2 Effect of dry wash:

In Hand Scrapping:



After hand Scrapping done we get used look effect on the garments.

In Destroy Process:



After destroy process done we get unique, destruction & old effect. Here also can make hole by cutting warp & weft yarn.

In Tagging Process:



By tag gun or plastic staple machine binds or fold the edge of the garments. Here we get tagging effects.

In Whiskering Process:



Here by whiskering method worn out line / impression generated. Here we get used look effect.

In PP Spray Method:



Here we achieve local abraded area to appear whiter than back ground indigo color shade. This is very popular method.

In 3D method:



It is the activity of making 3 -D Effect on the jeans to give a natural Wrinkled appearance.

In Grinding Process:



Here we get the fraying of edges or the worn out effect on the garments.

Chapter-5 Conclusion

Conclusion:

Dry wash is very important wash process on denim garments. There are many types of dry wash. By these process we get various effect on garments. Such as unique, used look, worn out look etc. The effects of dry washing process on denim under investigation could be realized by the comparison of GSM. It is further noted that pre-washed denim are almost stiff and harder than the required washed denim. So in order to meet the quick change of customer demand for fashion apparel, dry washing process can be an effective way. The scope of denim dry finishing is very broad. Only innovative products will be able to open up new markets and new horizons for denim industry. To achieve this it is essential to invest in further research and development.

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