

Denim Dry Finishing: Flourishing the Value of Denim

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Denim is more than just a cotton fabric; it inspires strong opinions within the hearts of historians, designers, teenagers, movie stars, reporters and writers. Interest bordering on passion can be found among textile and costume historians today, especially in the debate over the true origins of denim. These experts have put decades of work into their research; here is a summary of the prevailing opinions about the birth of denim, followed by a discussion of the way Levi Strauss & Co has helped to contribute to denim's movement around the world. Approximately five billion pairs of jeans are produced worldwide each year. Jeans have been a popular item of clothing for several decades with a long manufacturing history. Jeans were first used by dock workers in Genoa several centuries ago as they valued the material for its durability. In this paper we discussed about the Denim dry finishing and its importance.

Garment finishing is one of the finishing methods applied on garment, with the use of new technologies and equipment enables to obtain the desired results. For finishing of denim fabrics, a range of treatment methods is used. They all are aimed at new possible effects of fabric appearance, namely mill wash or rinse wash, stonewash, moon wash, sand wash, bleach, over dyed-look, damaged-look, scrubbed-look, sand blast, PP spray, Whisker effects, 3D effects and etc. Particularly the dry finishing creates many effects on denim fabric, it will stimulate the customers to buy, and also it increases the market potential of the denim market.



Figure 1 : Hand sand effects on denim

Dry Finishing

The distressed jeans 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 techniques which are mainly dependant on physical and on chemical abrasion of the surface dye there by producing different wash-down looks to the denim fabrics.

Denim Hand Sand / Scraping

Hand sand is step which is generally being done in rigid form of garments to get distress look. Location can be front thigh & back seat or its can be overall / global application as per standard. Emery paper is being used to scrape the garments in particular placement & design.

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 plain wooden board of garment size & hand pressure should be uniform in order to get better results.

Sand Blasting

Sand blasting is the process of scrubbing off the garment by blowing high speed air mixed with very fine particles of sand. This is a very successful and most widely used process for fashion articles. When the surface area of the garment is blasted, white cotton appears beneath the blasted area and the effect appears is very similar to the worn out jeans. Sand blast provides a very uniform result which cannot be achieved with its alternates. Its specialty is the merging effect that is blended with such a beauty that it has no difference with natural effect.



Figure 2 : Sand Blasting Effects on Denim

High pressure of air produces a powerful backward thrust to operator so it is always recommended to fix the gun in appropriate stands rather than placing it on shoulders or using it with bare hands. On some fabrics sand blasting is not successful for it covers the characteristics of fabric. Especially in fabrics which are famous for slub patterns it flattens the look. Specified areas for sand blasting are front thigh, back seat, back panel near bottom or front panel around knee. Some time full body blasting is also done for giving a unique look to fabric. Hot spots may be designed for more real look on front knees or back seat by intense blasting in these areas. Two methods of sand blasting were commonly used by the denim Garment producers:

- Mechanical
- Manual



Figure 3 : A method involving creating Sand Blasted Denim

In the mechanical method, sand was mixed in a chamber with pressurized air and sprayed on the garment to rub off the color of the fabric from the sprayed area. The function of chamber was to prevent the sprayed sand from spreading and polluting the environment.

In the manual method, sand paper was used to create the effect. The sand paper was attached to a wooden block, which was rubbed on the surface of the garment. This process was labor intensive and two persons were required to create the effect on one garment.

This department was usually on contract, to be paid on pieces rate basis.

Whiskers/Moustaches, Chevron, Knee Star and Hot Spot

On denim, Whiskers/moustaches, chevrons are nothing but the worn out lines / impression generated by natural wearing on hip & thigh area. There are many designs & pattern available. This is being done manually with help of sharp edge emery paper roller on fine wood stick or pasted on plastic material. Before starting execution placements & pattern must be marked on garments, this will help operator to execute the pattern right to match the aesthetics of garment.



Figure 4 : A whisker effect (worn out lines) on Denim

Hot spots are heavy/ intense area on thigh or knee which is made purposely to create used look & on knee area if any whickers line are there, called knee star. All the above operations are carried out in width direction hence its appears intense than hand sand with less strokes, because hand sand is carried out in length direction.

Tacking & Grinding

Is a process which is being done by swift tag machine with the help of plastic or nylon tag pins in rigid form of garment to get very heavy contrast (rigid & washed) on waistband, bottom hems, back pocket & front pocket corners etc. after completing wash cycle, it must be removed from garment before making softening. 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.



Figure 5 : A Grinding effect on Denim

Potassium Permanganate Spry / Rub & Bleach Spray

Potassium permanganate ($KmNO_3$) 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. It is always followed by neutralization process. Sodium Meta bisulphate is most commonly used neutralizer. A number of products are available in market for neutralization process like sodium Meta bisulfate selected on the bases of effect required on blasted area.

Potassium permanganate spray in best is done in specific spray booths, where rubber dummies are installed for holding garments. Garments are mounted on the dummies and air is filled so the garment is full fit exposed. Specific dummies are used for different sizes and styles, like for kids, men, trousers, jackets, shirts etc. The booths are fitted with proper air exhaust system. This system leads the spray to treatment room where the chemical mixed air is usually passed through the water showers. Potassium permanganate is dissolved in water and the clean air is blown to open. Shower water is further treated with mild quantities of neutralizer before adding to main drain. But where the potassium permanganate spray is used in low concentrations then there is now need to treat shower water. This mild potassium permanganate mixed water is rather useful for water reservoirs to keep the water clean and germs free.

Potassium permanganate spray concentrations range from 0.25 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. It is very important to equip the operator with gloves, gas mask and gaggles. Long time breathing in potassium permanganate spray may cause health complications so proper preventive measures are to be taken for this department.



Figure 6 : PP spray effects on Denim

Garments are mounted on air filled rubber dummies and chemical is sprayed on blasted areas. The variables in spray process are as follow

- 1. Distance of spray gun to garment** - less distance will give more defined and sharp effect where as distant spray will result to more mild and merged effect. Distance ranges from one foot to two and a half foot.
- 2. Air to Water Ratio of Gun** - this is to be set very carefully. Low air pressure possibly will through KMnO₄ drops on garment resulting to bright white spots whereas high pressure will produce very low bright effect spray effect to areas where it is not required.
- 3. Potassium Permanganate Solution Concentration** - of course, this will control the extent to brightness.

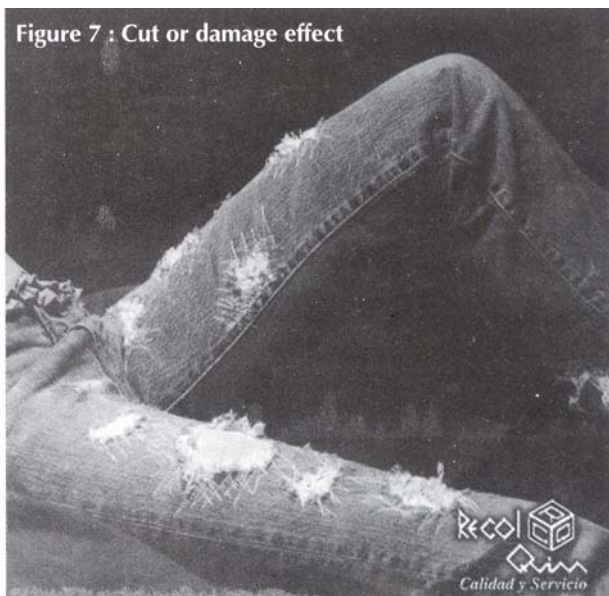
PP spray is being done on denim garments to achieve local abraded area to appear whiter than back ground indigo color shade. This can be applied by spray gun by towel dipped in to pp solution & rubbed on desired area followed by neutralization in wet process. This process can be done in rigid after doing hand scrape or in the middle of the wash.

Patch and Repairs Along With Bleach Parts

These are totally manual processes to give uniqueness to denim and to make it look Vintage. First cut or damage the units intestinally to desired area & then make hand repairs or machine repair to look natural. Dilute bleach can be used to spot the desired

area followed by neutralization in wet process. These process are time consuming hence productivity is low & reproducibility is very difficult but similar aesthetics can be achieved.

Resin Application (3D Effect)



Resin (formaldehyde free) being used for achieving 3D effect, rigid look etc. This process can be done by spraying or dipping the garments in to resin, catalyst, silicon & 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 3Dimensional 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. Highly skilled operators need to execute this process in order to get consistency & uniformity. Whole garment can have crushed look by resin dip & crushed manually followed by oven curing. Silicon plays an important role in getting softer hand after oven.

Conclusion

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. Globalization has opened the door to competition at the highest level. Every industry should now produce products that are best in terms of quality and price. Customers today have a wide range of choices and the one who produces the best quality at a high competitive price will survive and prosper.



Figure 8 : 3D effect on Denims

The driving force for change in Denim dry finishes are the need for a competitive strategy by cost conscious finisher to add the value. Compatibility is essential to provide one short multifunctional finishes that can be applied simultaneously. Innovative and enhanced results are possible through application of various types of Denim Finishing's, which in turn would bring greater financial profits. For it the garment manufacturers are required to develop a futuristic vision and take appropriate measures to overcome the problems of Denim processing.

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