

Sustainable Denim Finishing



| FINISHING PROCESS | TRADITIONAL METHODS | NEW TECHNOLOGIES | SAVINGS WITH NEW TECHNOLOGY |
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| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">STONE WASHING</p> | <p>PUMICE STONES</p> <ul style="list-style-type: none"> • Pumice Stones are used for stonewashing denim to give a faded, worn-out look to the fabric. • The stones are washed with the denim garments together in large washing machines. • Pumice Stones can cause damage to washing machines through wear and tear. • It can also be challenging for workers to remove the residue, dust and sludge that the stones produce after washing. • There is a higher labor cost involved with Pumice Stones, since the stones and particles must be physically removed from the pockets of garments after stonewashing | <p>NOSTONE®</p> <ul style="list-style-type: none"> • Tonello created abrasive stainless-steel drums in collaboration with Levi Strauss & Co. The panels can be fastened to any of Tonello's machines. They are removable, so the machines can still be used for normal washing/ dyeing processes. • There are different levels of abrasion with the NoStone® technology that are determined by the fineness of the texture on the plates. • The time in the machine also determines the level of the stonewash effect. • The NoStone® process reduces water consumption, production costs, emissions, waste, processing time and manual labor. | <p>  WATER  ENERGY </p> <p>  TIME </p> |
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">WASHDOWN</p> | <p>BLEACH</p> <ul style="list-style-type: none"> • Bleaching is a step in denim finishing that is used to decolorize indigo. The level of discoloration to the fabrics or garments depends on the amount of bleach used, the temperature, and duration of the wash process. • The most widely used chemicals used in the industry are sodium hypochlorite, calcium hypochlorite, hydrogen peroxide, and potassium permanganate. • Consistency can be challenging to achieve, and there may be variation in the appearance of multiple dye lots. • The chemicals involved with bleaching can cause corrosion to machines, weaken the fabric, and high exposure can be harmful to workers. | <p>OZONE & ENZYMES</p> <ul style="list-style-type: none"> • Ozone is a powerful bleaching agent that is generated from oxygen. Ozone works quickly and requires fewer rinses compared to other bleaching methods. At the conclusion of the bleaching process, any remaining ozone is converted back into oxygen and water. • Enzymes can be used as an alternative to harsh chemicals used during the bleaching process. Enzymes known as laccases alter the indigo dye through oxidation. Only the dye and appearance of the fabric is changed, so the fabric quality, strength and elasticity remain unchanged. • Enzymes can also be added in combination with the NoStone® technology, previously mentioned, to accentuate the effect of the NoStone® process. | <p>  WATER  ENERGY </p> <p>  TIME  CHEMICALS </p> |
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">WHISKER EFFECT</p> | <p>POTASSIUM PERMANGANATE</p> <ul style="list-style-type: none"> • Potassium Permanganate (PP) is an oxidizing agent that is used for local bleaching/finishing on denim. • PP spray is used on jeans to lighten a specific area and create whisker effects on denim. • PP spray can have harmful effects on workers by irritating and burning the skin and eyes when workers come into direct contact with it. Without safe ventilation systems and equipment, factory workers can be at risk for short-term and long-term health issues when working with this chemical. | <p>LASER</p> <ul style="list-style-type: none"> • Another technology available to mimic the finishing effects of Potassium Permanganate is a laser. • Available from both Tonello and Jeanologia, the laser machine can create vintage effects, whiskers, patterns, patches, and even intentional holes and tears in a garment. • The laser technology uses less water, chemicals and energy to create a wide variety of denim looks. Laser boosters can be applied to the fabric in order to intensify the effect of the laser to mimic heavier bleaching applications. <p>POTASSIUM PERMANGANATE ALTERNATIVES</p> <ul style="list-style-type: none"> • Other chemical systems have been developed which do not release Manganese, a non-biodegradable heavy metal, into the environment. • These potassium permanganate alternatives are often non-toxic or significantly less toxic to the environment than potassium permanganate and provide a very similar bleaching effect as potassium permanganate. | <p>  WATER  ENERGY </p> <p>  TIME </p> |
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">SANDING</p> | <p>MANUAL SANDING AND SAND BLASTING</p> <ul style="list-style-type: none"> • Manual sanding is used to create faded areas by physically scraping the surface of denim garments with a variety of tools. • Manual sanding can also be used to create rips and other worn effects in localized areas. This process is labor intensive and inconsistent. • Sand blasting uses compressed air to forcefully spray sand at the garments. • Sand blasting is extremely hazardous to workers, which has led many organizations to ban the technique. | <p>LASER</p> <ul style="list-style-type: none"> • Laser, as mentioned above, can also be used to mimic hand sanding and sandblasting. • The laser can be pre-programmed with patterns that can mimic exactly the desired look achieved through manual sanding and sandblasting with significantly less labor and physical hazards. | <p>  ENERGY </p> <p>  CHEMICALS </p> |