



Evolution of Leather in Fashion Industry

MR. UTKARSH GOLEY

Abstract— Leather has been a valued material for clothing and accessories for centuries, and its use has evolved along with fashion trends and technological advancements. From ancient times when leather was used for practical purposes, to the modern fashion industry, where it is used for both functional and decorative purposes, leather has undergone significant changes in its production and usage. In recent years, there has been a growing awareness of ethical and sustainable fashion, leading to a shift towards alternative materials and production methods. The leather industry has responded to this by exploring new techniques and materials, such as vegetable-tanned leather and leather substitutes made from plant-based materials. The evolution of leather in the fashion industry is also closely tied to cultural and social trends. The use of leather has been associated with rebellion and counterculture in the past, and today it is often used to evoke a sense of luxury and sophistication. Despite the challenges and controversies surrounding its production, leather continues to be a popular material in the fashion industry, with designers and consumers alike valuing its durability, versatility, and aesthetic appeal. As fashion continues to evolve, so will the role and use of leather in the industry. This research paper provides a detailed overview of the evolution of leather in the fashion industry throughout the different decades and centuries.

Keywords— Evolution, Fashion, Leather, Sustainable.

I. INTRODUCTION

While studying evolution of leather, one must be aware about leather. Animal skins and hides are chemically treated to generate leather, which is a durable, flexible, and long-lasting material. The primary sources of leather in the world include cattle, sheep, goats, horses, bison, pigs, hogs, and aquatic animals like seals and alligators. The important term arises here is hide & skin.

Although they are sometimes used interchangeably, the words "hide" and "skin" do have different connotations when referring to the animal components they describe:

Hide: The term "hide" primarily refers to an animal's thick, hard, and long-lasting exterior coat, which is often found on large mammals like cattle, horses, or buffalo. Animals reared primarily for their meat or other by-products, such leather, are used to produce hides. Hides are frequently utilized for heavy-

duty applications like leather goods, upholstery, and footwear because they are thicker and more durable than skins.

Contrarily, the term "skin" is more inclusive and refers to any animal's outer layer, regardless of thickness. It can also refer to the skins of reptiles, birds, and fish, as well as the softer, thinner hides of smaller animals like sheep, goats, pigs, or deer. Skins are ideal for lighter applications like clothing, accessories, and smaller leather goods since they are typically softer and suppler than hides.

The size, thickness, and resilience of the animal's exterior covering serve as the primary indicators of whether something is a hide or a skin. Skins are normally smaller and more malleable than hides, which provide greater flexibility and versatility. Hides are typically larger and thicker, providing more substantial and sturdy material. The difference may not always be strictly adhered to, though, as the specific phrases employed can vary among situations and sectors.

Strength, durability, and a natural aesthetic appeal make leather highly prized. Numerous things have been made from it, including furniture, upholstery, book covers, belts, wallets, shoes, apparel, and accessories (such as these). Depending on the animal source and the particular tanning procedure utilized, various varieties of leather are available. Cowhide, sheepskin, pigskin, and exotic leathers like snakeskin or alligator skin are a few examples of common leather varieties.

Due to its high quality and craftsmanship, leather is frequently regarded as a premium material. The popularity of synthetic or faux leather, which is created from synthetic materials but intended to resemble real leather in appearance and feel, is also rising. Because it doesn't involve animal products, this option is sometimes favored for moral or environmental grounds.

Another important aspect if this research work is Fashion industry. The term "fashion industry" refers to the vast network of companies, groups, and people engaged in the creation, manufacture, marketing, and distribution of apparel, accessories, and associated goods. It includes a wide range of professions and industries, such as fashion design, textile production, clothing manufacture, retailing, advertising, modeling, and fashion media.

Trends, styles, and customer preferences are significantly shaped and influenced by the fashion business. It is a dynamic and quick-moving sector that is propelled by on-going innovation and development. Fashion manufacturers and designers are in charge of coming up with fresh and distinctive looks that incorporate aesthetic, social, and cultural aspects.

F. A. Author is with the ITM University, Gwalior, India, as an Assistant Professor in School of Arts & Design (corresponding author, phone: =91-7415400302; e-mail: Utkarsh.soad@itmuni.ac.in).

They are the designers who come up with the clothing lines, giving each season its look and feel.

Although it is not often acknowledged, leather has actually performed an essential role in the advancement of human civilization. Leather was used for incredibly useful purposes for a very long time before it was utilized to make purses and garments. Leather goods wouldn't start to be regarded as trendy or as emblems of luxury until the Middle Ages.

Early humans only utilized hides for temporary shelters or longer-term tepee-style tents because they had no need for clothes. When people just used leather to protect themselves from harsh sun or rain, the first evidence of tanning hides for this purpose dates back to 400,000 years ago.

Cloaks and jackets became necessary as the climate continued to change. Tools made of bone have been found dating back to roughly 7,000 years ago, and they were able to combine multiple pieces of leather thanks to a substance that resembled thread. Leather was probably also used for the earliest clothing, but it was only worn when it was deemed necessary.

II. PRODUCTION OF LEATHER

[1], [2], [5] The processing of leather is generally done in several stages. The main motive of it is to transform the raw animal hides into a durable and usable material. It is done in the following step-

2.1 Curing - Curing is the first step in the processing of leather, during which raw animal hides or skins are preserved to stave off rot. Inhibiting bacterial growth and enzymatic activity, which would otherwise result in the degradation of the hide, is the main objective of curing. There are various curing techniques, and the choice is made based on the final product required and the resources that are available. Here are a few typical treatments:

- **Salt Curing:** Large amounts of salt are applied to the hides in the salt-curing process, which aids in removing moisture and prevents the formation of bacteria. To ensure thorough penetration, the layers of salt are layered and compressed into the hides. After being salt-cured, hides can be preserved for a long time without further processing.
- **Brine Curing:** Immersing the hides in a concentrated saltwater solution is known as brine curing. The brine is used to soak the hides, which penetrates the skin and helps to preserve them. Smaller hides or skins are frequently processed using this technique.
- **Dry Curing:** Direct application of a dry salt mixture to the hide is required for dry curing. The salt mixture preserves the hide by removing moisture from it. After that, the hides are stacked and left to dry in a dry area.
- **Chemical Curing:** To preserve the hides, chemical agents like formaldehyde or

chrome salts are used in chemical curing. These substances are antibacterial and stop the development of bacteria. In the manufacturing of leather, chemical curing is frequently employed.

The hides are normally stored or sent to tanneries for additional processing after curing. It's key to remember that curing is an essential stage in getting raw hides ready for subsequent tanning procedures but does not turn them into leather on its own.

2.2 Soaking - The hides are soaked in water during soaking to rehydrate them and get them ready for further processing. An outline of the soaking procedure is given below:

- **Water Immersion:** To ensure that the skins are completely submerged, clean water is used. Depending on the type of hides and particular processing requirements, the temperature and length of the soaking procedure may change.
- **Rehydration:** The main goal of soaking is to replenish the moisture that was lost during curing and make the skins suppler. Water permeates the hides, making them softer and making it easier to remove contaminants.
- **Removal of Debris:** Soaking helps to dissolve residues like blood, salt, and dirt that are on the hides. Debris removal can be aided by agitation or mechanical methods like stirring or tumbling.
- **Enzymatic treatments:** In some circumstances, chemicals or enzymes may be added to the water used for the soaking to help break down the proteins, fats, and other organic material that adheres to the hides. This makes it easier to get rid of these contaminants later on.
- **Water Change:** To maintain process cleanliness and guarantee effective impurity removal, the soaking water may be changed occasionally depending on the degree of contamination and desired cleanliness.
- **Duration:** The thickness and quality of the hides, as well as the particular requirements of the tannery, can all affect how long the soaking procedure takes. To ensure complete rehydration and contaminants are removed, soaking typically lasts for many hours or even overnight.

By replenishing moisture, softening the fibers, and making them more responsive to the subsequent chemical and mechanical procedures required for leather manufacture, soaking the skins gets them ready for further treatment.

2.3 Liming - Following the soaking stage in the production of leather is the critical liming phase. In order to make it easier to remove hair, epidermis, and other undesired elements, the soaked hides are treated with lime or other alkaline compounds. An outline of the liming procedure is given below:

- Lime Solution: Calcium hydroxide, often known as hydrated lime, or slaked lime, is dissolved in water to create a lime solution. For the hides, this results in an alkaline environment.
- Liming Bath: The soaked hides are completely submerged in the lime solution during the liming bath. To guarantee comprehensive and uniform treatment, the skins should be placed uniformly throughout the bath.
- Removal of Hair and Epidermis: The alkaline nature of the lime solution aids in the breakdown of the hides' hair and epidermis layers. The proteins in these layers are affected by the lime, which causes them to expand and loosen.
- Dehairing: To help remove hair and epidermis from the hides, mechanical tools like paddles or rotating drums are frequently used. The agitation facilitates the removal of the loosened hair during later processing by helping to dislodge it.
- Duration: The type and thickness of the hides, as well as the particular requirements of the tannery, all affect how long the liming process takes. It usually lasts from a few hours to a day or longer, giving the lime enough time to permeate and dissolve the hair and epidermal layers.
- pH Modification: To maintain an ideal alkaline environment, the pH of the lime solution is monitored during the liming process and modified as appropriate. This guarantees efficient dehairing and reduces the possibility of either over liming or under liming.
- Draining and washing: The hides are washed to eliminate extra lime solution after the liming operation is finished. They are then given a thorough washing to get rid of any remaining lime and contaminants.

It is essential for getting rid of extra material and getting the hides ready for subsequent processes that will turn them into leather.

2.4 Fleshing: In order to get the hides ready for processing, extra flesh, fat, and other connective

tissues are taken off. An outline of the fleshing procedure is given below:

- Removal of Extra Flesh: The main goal of fleshing is to get rid of any extra flesh and fat that is still on the hides. Manual or mechanical methods are both capable of doing this.
- Manual Fleshing: Skilled employees meticulously scrape away the superfluous flesh from the hides using knives, fleshing beams, or other portable equipment during manual fleshing. They remove any leftover connective tissues as they go methodically across the surface of the hide.
- Mechanical Fleshing: Mechanical fleshing equipment is frequently employed in the mass manufacture of leather. These devices have blades or abrasive surfaces on revolving cylinders or drums. The superfluous flesh and fat from the skins are removed by rotating blades or abrasive surfaces in the process.
- Control of Thickness: To promote uniformity, the thickness of the hides can be managed during the fleshing process. The skins are scraped to the correct thickness, taking into account the particular specifications for the intended leather product, by skilled personnel or machine settings.
- Efficiency in Fleshing: The objective is to flesh effectively while minimizing the loss of priceless fiber and keeping the integrity of the hide intact. To remove extra flesh without harming the hide's underlying structure, skilled workers or the right machine settings are essential.
- Fleshing Inspection: After fleshing, the skins are examined to make sure the extra flesh and fat have been sufficiently removed. Manual trimming or scraping is used to remove any leftover unwanted tissues.
- Additional Processing: Following the fleshing procedure, the hides are prepared for additional processing steps like bating, pickling, and tanning, which will further convert them into leather.

By removing impurities and producing a smooth, uniform surface, the fleshing procedure is crucial in preparing the hides for tanning. For subsequent processing procedures that result in the manufacturing of high-quality leather, it aids in forming a more aesthetically pleasing hide structure.

2.5 Deliming: Following the fleshing and liming processes, the deliming procedure is an important step in the production of leather. After liming, the

hides' alkaline pH needs to be neutralized in order to bring them to the proper pH for processing. Here is a description of the delimitation procedure:

- **Acidic Solution:** To balance the alkalinity of the hides, an acidic solution is created. Formic acid or sulphuric acid are examples of frequently used acids. The tannery's procedures and requirements determine the concentration and particular kind of acid to use.
- **Delimiting bath:** The hides are submerged in the acidic solution for the delimiting bath. The pH level is lowered as a result of the acidic environment helping to neutralize any remaining lime in the hides.
- **pH Correction:** The hides are given a set amount of time to soak in the delimiting water. To guarantee proper delimiting, the pH of the solution is checked and adjusted as necessary. The goal is to achieve the desired pH level for the processing procedures that follow.
- **Chemical Reactions:** The remaining lime in the hides reacts with the acidic solution to produce salts that disintegrate and wash off. This procedure aids in clearing the hides of any leftover pollutants and lime.
- **Draining and washing:** The hides are washed to eliminate extra delimiting solution after the delimiting procedure is finished. After that, they are carefully cleansed to remove any remaining acid and other contaminants.

Delimiting is important because it gets the hides ready for other processing procedures including bating, pickling, and tanning. Delimiting ensures that further treatments to turn the skins into leather can be applied successfully by neutralizing the lime and regulating the pH level.

It's important to note that depending on the required leather properties, different tanneries may utilize different delimiting procedures and chemicals. Depending on their experience and the sort of leather they manufacture, tanneries may use varied techniques or secret formulas to achieve delimiting.

2.6 Bating: It entails applying enzymes or other chemicals to the delimited hides to further soften and clean them while eliminating any remaining proteins and other contaminants. Here is a summary of the bating procedure:

- **Enzyme Solution:** A bating solution is made by combining water with enzymes or other substances. Proteolytic enzymes, such as pancreatin, or bacterial enzymes, like protease, are frequently utilized in the bating process.
- **Bating Bath:** The bating solution is used to submerge the dehydrated hides. To

guarantee comprehensive and uniform treatment, the skins should be placed uniformly throughout the bath.

- **Enzymatic Action:** The leftover proteins, collagen, and other contaminants in the hides are affected by the enzymes in the bating solution. These compounds are broken down, causing the skins to become softer and facilitating the removal of undesirable components.
- **Mechanical Agitation:** By agitating or tumbling the hides in the bating bath, you can increase the enzymatic action and make sure that the enzyme solution permeates the whole surface of the hides. This mechanical action contributes in the entire cleaning process by removing contaminants.
- **Duration:** The length of the bating process varies based on the type of hides, desired level of softness, and particular tannery needs. It normally lasts from a few hours to overnight, giving the enzymes enough time to efficiently act on the hides.
- **Draining and washing:** The hides are washed to eliminate extra bating solution once the bating procedure is finished. After that, they are thoroughly washed to remove any remaining proteins, enzymes, and contaminants.

Bating is a multi-purpose step in the leather production process. The hides get even softer and suppler as a result. Additionally, it aids in the removal of leftover proteins, debris, and other impurities, leaving leather cleaner and more refined. In order to give the finished leather product the desired properties and look, further treatments like pickling, tanning, and dyeing must be performed.

2.7 Pickling: In order to balance the pH, get rid of any remaining alkalinity, and get the hides ready for later tanning, it includes treating the hides with an acidic solution. An outline of the pickling procedure is given below:

- **Acid Solution:** To make a pickling solution, dissolve acids in water, such as sulphuric acid or formic acid. The tannery's procedures and requirements determine the concentration and particular kind of acid to use.
- **Pickling Bath:** The hides are submerged in a pickling solution in a pickling bath. The pickling bath's acidic atmosphere helps balance the pH of the hides and get rid of any leftover alkalinity from the bating procedure.
- **pH Modification:** The hides are given a set amount of time to soak in the pickling bath. To guarantee successful pickling, the pH of

the solution is checked and changed as necessary. The objective is to reach the desired pH level for the following tanning procedures.

- **Removal of Alkaline Residue:** Alkaline residue is eliminated by the acidic pickling solution, which reacts with any lime or other alkaline substances left over from earlier processing processes. Unwanted elements are removed and the alkalinity is neutralized through this process.
- **Draining and washing:** The hides are drained to get rid of extra pickling solution after the pickling procedure is finished. After that, they are carefully cleansed to remove any remaining acid and other contaminants.

The pickling procedure lowers the pH and gets rid of any remaining alkalinity to get the hides ready for later tanning. This process aids in establishing the appropriate conditions necessary for the tanning agents to permeate the hides successfully and provide the desired leather properties.

2.8 Tanning: In order to turn the prepared hides into stable, long-lasting leather, the tanning process is a crucial step in the leather-processing process. In order to keep the collagen fibers in the hides from disintegrating and to give the leather its desirable properties, tanning entails chemically bonding them.

An outline of the tanning procedure is given below:

- **Selection of Tanning Agent:** Tanning agent selection is based on a variety of elements, including the desired leather qualities, the intended application, and the availability. Vegetable extracts (such tannins from tree bark), chromium salts, and synthetic tannins are common tanning agents.
- **Process of Tanning:**
 - a) **Vegetable Tanning:** When using vegetable tanning, the prepared hides are submerged in a bath of tannin-rich vegetable extracts. The hides are given a lengthy soak, usually several weeks, to allow the tannins to permeate and interact chemically with the collagen fibers.
 - b) **Chromium tanning:** Chromium tanning involves soaking the hides in a solution of chromium salts, such as chromium sulphate. Vegetable tanning takes longer than chrome tanning, which normally lasts a few hours. Leather becomes supple and soft as a result of the stable complexes that the chromium salts create with the collagen fibers.

- c) **Synthetic Tanning:** Phenolic or acrylic resins are two examples of synthetic tanning agents that can be employed. These substances are frequently used to obtain particular leather qualities or in specialized applications.

- **Post Tanning Steps:**

- a) **Neutralization:** After tanning, the hides may go through a neutralization process to get rid of any extra tanning ingredients and balance the pH. This makes the leather safer to handle and helps prevent any negative responses.
- b) **Dyeing:** To give the tanned leather color, several dyes or pigments can be used. Depending on the intended result, dyeing might happen at various tanning stages.
- c) **Fatliquoring:** To improve the leather's softness, flexibility, and water resistance, it is treated with oils, fats, or emulsions.
- d) **Drying and Finishing:** Moisture is taken out of the leather after it has been tanned and fatliquored. To acquire the required appearance, texture, and properties, it is then put through a variety of finishing operations, including sanding, buffing, embossing, and putting surface coatings.

Depending on the tannery's procedures, the type of leather, and the final product that is intended, the specific tanning process and the order of processes may change. Every tanning technique has benefits and produces leather with unique characteristics. Tanneries meticulously regulate the process variables to produce high-quality leather that complies with client specifications and industry standards.

2.9 Draining: Before moving on to the next stage of processing, the hides must be drained of extra liquids, such as water or chemicals. An outline of the draining procedure is given below:

- **Physical Manipulation:** In order to promote drainage, the hides are often taken out of the treatment bath and treated to physical manipulation. Various methods, such as shaking, squeezing, or wringing out the extra liquids, can be used to accomplish this.
- **Gravity Drainage:** By hanging the hides vertically or setting them on an incline, gravity can help in the drainage process. As

a result, the extra liquid might drain and separate from the hides.

- **Mechanical Assistance:** To further drain the extra liquid from the hides, tanneries may use mechanical assistance like presses or rollers. These tools squeeze out any leftover liquids by applying pressure on the hides.
- **Time Duration:** The type and thickness of the hides, the exact treatment they received, and the desired moisture content for the following processing steps, among other things, can all affect how long the draining process takes. The typical duration is from a few minutes to a few hours.
- **Moisture Control:** The draining procedure's goal is to get rid of extra liquids while keeping the hides' level of moisture somewhat constant. This guarantees that the skins are not too dry or saturated and are prepared for subsequent treatments.
- The next stage of leather processing, which may involve procedures like fleshing, bating, dyeing, conditioning, or finishing, can begin once the draining process is finished.

The draining procedure is crucial to get rid of extra moisture and chemicals, allowing for easier further processing and producing the appropriate leather properties. The treatment of the hides is guaranteed to be efficient and effective with proper drainage, which also enhances the overall quality of the finished leather product.

2.10 Splitting - The splitting procedure is a step in the leather-processing process that includes separating a hide or skin's thickness into a number of layers. Splitting is done to produce many types of leather, each with unique properties and uses. An outline of the splitting procedure is given below:

- **Splitting Machine:** A specialized machine known as a splitting machine or a splitting band knife machine is typically used to do splitting. A sharp, revolving band knife or blade on this device slices the hide in a straight line.
- **Setting Thickness:** To set the required split thickness, the operator changes the machine's parameters. The split layers' and the main leather portion's eventual thickness are determined by this.
- **Splitting Method:** The operator inserts the hide or skin into the splitting device, where a revolving band knife or blade slices through the material's thickness. In order to produce continuous strips or layers, the hide is gradually fed through the machinery.
- **Lower Split Layer:** The remaining area of the hide is referred to as the lower split layer

after the top grain layer has been removed. Compared to the top grain layer, this layer is often less smooth and has a somewhat distinct appearance. For suede or split leather, the lowest split layer can be further split to produce additional layers with varying thicknesses.

- **Multiple splits** can be created from a single hide, depending on the original thickness of the hide and the desired final thickness of the split layers. Since each split is normally thinner than the one before it, different grades of leather can have different thicknesses.
- **Finishing:** To achieve the appropriate look, texture, and properties, the split layers may go through further processing steps after splitting, such as dyeing, conditioning, and finishing.

Splitting enables tanneries to create several grades of leather suitable for particular uses, maximizing the utilization of a hide or skin. The split layers can be used alone or in conjunction with other components to produce a variety of leather goods with various properties and looks.

2.11 Shaving: Shaving is used to make the leather's surface more flawless and to achieve a more uniform thickness. An overview of shaving is provided below:

- **Shaving apparatus:** A shaving machine, also known as a leather-skiving machine, is primarily used to perform the shaving procedure. The leather surface of this machine is removed in small layers using a sharp blade or knife.
- **Blade Adjustment:** Adjusting the blade involves setting the required thickness and depth of cut on the shaving machine. This makes it possible to precisely control how much material is removed.
- **Shaving Method:** After feeding the leather into the machine, a sharp blade or knife is used to scrape away small layers of the leather's surface. Depending on the machine's design, it moves the leather up against the blade or the blade up against the leather.
- **Control of Thickness:** Shaving the leather surface produces a uniform thickness. Based on the particular needs of the leather product being produced, the operator can modify the machine settings to attain the desired thickness.
- **Removal of Imperfections:** Shaving the leather surface helps to get rid of flaws, scratches, and other imperfections like scars. A smoother and more uniform surface is

produced as a result of the sharp blade or knife skimming off these flaws.

- **Continuous Monitoring:** Throughout the shaving procedure, the operator keeps a close eye on the leather to make sure the thickness and quality are within acceptable limits. The machine settings may be modified as necessary.
- **Final Examination:** The leather is normally examined after shaving to make sure it satisfies the required quality standards. This involves evaluating the shaved surface's thickness, smoothness, and general appearance.

By achieving a uniform thickness and eradicating surface flaws, shaving significantly contributes to improving the quality and consistency of leather. Once the leather has been shaved, it is prepared for additional processing, which may involve dyeing, embossing, finishing, or other procedures depending on the leather's intended use.

2.12 Re-Tanning: To improve its qualities and attain the required attributes, it entails further treating the leather after it has been tanned with extra tanning agents or chemicals. An outline of the re-tanning procedure is given below:

- **Selection of Re-tanning Agents:** Re-tanning agents are selected based on the intended result and the particular leather properties required. Vegetable extracts, synthetic tannins, oils, resins, waxes, and other compounds are examples of these agents.
- **Re-tanning Bath:** The leather is soaked in a bath containing the chosen re-tanning ingredients after it has been tanned. The re-tanning compounds can interact with the collagen fibers in the leather since the leather is completely submerged, allowing for penetration and interaction.
- **Re-tanning Duration:** Depending on the desired results, the leather is left in the re-tanning bath for a certain amount of time, which can range from several hours to several days. The time frame enables the leather to properly absorb and respond with the re-tanning ingredients.
- **Enhancing Characteristics:** The re-tanning agents used at this stage can enhance the leather's performance in general as well as its softness, suppleness, color fastness, resistance to heat, and resistance to water.
- **pH Modification:** To maximize the efficiency of the re-tanning agents, the pH of the re-tanning bath may be modified during the re-tanning process. To maintain correct

chemical reactions, pH levels are checked frequently and changed as necessary.

- **Post-Re-tanning Treatment:** After the re-tanning procedure, the leather may go through additional treatments including dyeing, fatliquoring, or conditioning, depending on the intended result. The characteristics and appearance of the leather are further improved by these treatments.
- **Drying and Finishing:** The leather is dried to remove any moisture following the re-tanning procedure and any additional treatments. Then, different finishing procedures are used to give it the desired texture, appearance, and properties, such as polishing, sanding, or applying surface coatings.

By enhancing particular features and achieving the necessary performance characteristics, the re-tanning procedure increases the value of the leather. Based on the intended use and client specifications, it enables modification of the leather's properties. After final finishing, the re-tanned leather is prepared for use in a variety of leather goods.

2.13 Fatliquoring: An important step in the leather-processing process called "fatliquoring" includes treating the leather with oils or fats to increase its softness, flexibility, and water resistance. The physical characteristics of the leather are enhanced during fatliquoring, making it more malleable and cozy to handle. An outline of the fatliquoring procedure is given below:

- **Selection of Fatliquor:** Fatliquor selection is dependent on the intended result and the particular leather properties that are required. Natural or artificial oils, emulsions, or concoctions of other ingredients can all be used to make fatliquors. Fish oils, vegetable oils, mineral oils, and synthetic fatliquors are examples of common fatliquors.
- **Fatliquoring Bath:** The leather is submerged in a bath containing the chosen fatliquor during the fatliquoring process. The fatliquor solution soaks into the leather and lubricates the fibers, softening and enhancing flexibility. To help fatliquors penetrate the leather, the bath can be heated.
- **Penetration and Absorption:** In order to ensure proper penetration and absorption of the fatliquor, the leather is placed in the fatliquoring bath for a predetermined amount of time, usually between a few minutes and several hours. The length of time depends on the desired level of leather flexibility and suppleness.

- pH Adjustment: To maximize the efficacy of the fatliquor, the pH of the fatliquoring bath may be changed. To maintain adequate chemical reactions and penetration, pH levels are checked frequently and changed as necessary.
- Emulsification: Fat liquors can occasionally take the shape of an emulsion. Emulsions are made up of minute oil droplets mixed with water. After applying the emulsion to the leather, the water evaporates, leaving behind the oil droplets that saturate the fibers of the leather.
- Drainage: Following the fatliquoring procedure, the leather is drained of extra fatliquor. You can do this by hanging or suspending the leather to let the extra fatliquor drip off, or you can use a machine to squeeze the extra fatliquor out.
- Drying and conditioning: Extra moisture from the fatty leather is removed by drying. Additionally, conditioning compounds may be used to improve the leather's softness and suppleness, maintain moisture balance, and avoid drying out.

The fatliquoring procedure guarantees that the leather will continue to be cozy, supple, and flexible. It increases its water resistance, increasing its suitability for a variety of applications. After the leather has been fatliquored, it is prepared for finishing procedures like dyeing, polishing, or applying surface coatings to give it the required appearance and properties.

2.14 Dyeing: A crucial step in the production of leather is the dyeing procedure, which entails giving the leather color. It is possible to dye leather to get a consistent color, highlight the natural grain, or produce one-of-a-kind effects on the surface. An outline of the dyeing procedure is given below:

- Preparation: To achieve appropriate dye penetration, the leather is usually washed and any surface coatings or finishes are removed before dyeing. The leather surface may need to be washed, polished, or sanded to do this.
- Selection of Dye: Surface dyes and penetrating dyes are the two categories under which leather dyes fall. Surface dyes produce a colored coating on the surface, whereas penetrating dyes are absorbed into the structure of the leather. The kind of dye chosen is determined by the intended outcome and the properties of the leather.
- Dye Bath or Application: Depending on the type of dye and the intended outcome, the

leather can be colored using a variety of techniques.

- a) Dye Bath: The leather is submerged in a dye bath containing the chosen dye solution in the dye bath method. To make sure that the dye penetrates evenly, the leather is agitated or churned. In order to improve dye absorption, the dye bath might be heated.
- b) Spraying or Brushing: Using spraying tools or brushes, surface dyes or pigments can be applied directly to the leather surface. To attain the desired depth and intensity of color, several layers may be used.

- Penetration and Absorption: Depending on the type of dye and the manner of application, the dye molecules either penetrate the leather fibers or stick to the surface. To ensure appropriate absorption or adherence, the leather is left in the dye bath or for the dye to dry on the surface.
- Fixation: To ensure color fastness and stop bleeding or fading after dyeing, leather is frequently put through a fixation procedure. Setting the dye molecules inside the leather structure may entail employing a fixative or heat.
- pH Modification: The pH of the dye bath can be changed to enhance dye absorption and color development. To guarantee optimal dyeing, pH levels are checked and changed as necessary.
- Washing and Rinsing: To get rid of extra dye and unfixed dye particles, the leather is washed or rinsed. This procedure makes sure the leather's surface is clean and helps reduce color bleeding.
- Drying and finishing: The leather is dried to get rid of moisture after coloring. To acquire the required appearance, texture, and qualities, it is next put through a variety of finishing operations like polishing, embossing, putting surface coatings, or adding protective finishes.

Leather can be dyed to become a variety of colors, increasing both its visual appeal and adaptability. To get consistent and durable results, proper dyeing methods and color selection are crucial. To further improve the qualities of the leather, further treatments like conditioning or waterproofing might be used after dyeing.

2.15 Staking: It is often referred to as softening or stretching, is a crucial step in the processing of

leather that entails mechanically working with the leather to improve its softness, flexibility, and general feel. Staking results in soft and flexible leather by helping to relax the fibers of the leather, align them, and distribute oils or fatliquors. An outline of the staking procedure is given below:

- **Staking Machine:** A specialized tool called a staking machine is typically used to do staking. A sizable drum or a set of rollers with spikes, pins, or blades make up the machine.
- **Placement of Leather:** To ensure perfect alignment and tension for efficient staking, the leather is placed on the staking machine's drum or passed between the rollers.
- **Mechanical Manipulation:** The rollers or drum rotate when the staking machine is turned on. The leather is mechanically manipulated when it travels through or comes into touch with the spikes, pins, or blades.
- **Stretching and Softening:** The staking machine's spikes, pins, or blades stretch the leather, loosen its fibers, and eliminate any stiffness. Additionally, the mechanical movement helps the leather's fats or oils disperse, improving its suppleness and softness.
- **Speed and Pressure Control:** The staking machine's speed and pressure settings can be changed to get the required level of leather softness and flexibility. Depending on the type, thickness, and particular requirements of the leather, these values could change.
- **Monitoring and Evaluation:** As the leather is being staked, workers closely watch it and judge its suppleness. To get the desired outcome, the machine parameters may need to be changed.
- **Final Inspection:** The leather is normally examined after staking to make sure it adheres to the specified quality standards. This involves evaluating the leather's suppleness, flexibility, and general feel.

The staking procedure improves the properties of the leather, making it more comfortable and useful for a variety of uses. Staking helps the leather become more drapable, less stiff, and have a desirable hand or touch by mechanically modifying it. Depending on the intended result, staking can be done on many types of leather, including full-grain, top-grain, or split leather.

2.16 Setting: In the context of leather processing, the phrase "setting" often refers to the last stage of finishing, during which the leather is set or dried to

its ultimate shape and size. An outline of the setting procedure is given below:

- **Shaping:** The leather may be molded or shaped to get the desired final shape or form. To produce the correct shape, such as for bags, shoes, or other leather goods, this can be done manually by expert personnel or through the use of molds or forms.
- **Tensioning:** To keep its shape and stop it from shrinking or warping during the drying process, the leather is frequently tensioned or stretched over a frame or onto a shaping tool. By doing this, the leather is guaranteed to dry with the appropriate proportions and structure.
- **Drying:** In a regulated setting, such as a drying room or a drying rack, the tensioned leather is allowed to dry. To avoid uneven or excessive drying that could cause the leather to deform or crack, proper air circulation and temperature management are crucial.

The leather must be set properly in order for it to maintain the desired size, shape, and structure. The intended form of the leather is maintained by carefully tensioning and drying it and it is then prepared for further processing or use in leather goods.

It's crucial to keep in mind that the setting procedure can change based on the particular specifications of the leather product being produced and the tannery's procedures. To attain the intended shape and outcome, many leather goods may need unique procedures or specialized tools.

2.17 Conditioning: The leather is treated with conditioning compounds throughout the crucial conditioning phase in order to restore moisture equilibrium, improve suppleness, and preserves the leather's quality and look. Leather can become dry, brittle, or prone to cracking without conditioning. An outline of the conditioning procedure is given below:

- **Choice of Conditioning Agents:** Conditioning agents are picked based on the intended result and certain traits of the leather. These substances may be oils, emulsions, or specialized conditioners made especially for caring for leather.
- Depending on the type of agent and the desired outcome, many application techniques can be used to apply conditioning agents to leather:
 - a) **Brushing or Wiping:** Conditioning agents can be applied to the leather surface by brushing or wiping them on. To apply the conditioner evenly, use soft, lint-free towels or brushes.

- b) Spraying: Some conditioning products are available in spray form, making it possible to apply them evenly across wide areas or elaborate patterns. Spraying ensures even distribution and absorption.
 - c) Immersion: Some varieties of leather, like those used for small leather products or accessories, may be submerged in a conditioning solution. This technique enables the conditioner to permeate the leather's whole thickness.
 - d) Absorption and Penetration: The leather absorbs conditioning ingredients, which restore the natural oils and balance the moisture. To ensure optimal absorption, the leather is given some time to rest, which may take several hours or even overnight.
- Painting order: Various coatings can be applied to leather to improve its appearance, protection and durability. Common coatings include:
 - a) Clear top coat: A clear topcoat such as lacquer or polyurethane is applied to the surface of the leather to form a protective layer, making it more durable and more resistant to scratches, stains and fading.
 - b) Colored surface: Pigmentation is the process of applying a color coating to the leather surface. These finishes further enhance color consistency, cover minor imperfections, and improve wear and stain resistance.
 - c) Aniline finish: Aniline finish is a clear or translucent coating that maintains the leather's natural grain and texture while providing minimal protection. Aniline finishes offer a soft, natural feel, but may not be as stain and abrasion resistant as other finishes.
 - d) Embossing: Embossing uses an engraved plate or roller to apply pressure and heat to the surface of the leather to create a pattern, texture, or imitation of exotic leather.
 - Buffing or buffing: After the coating has been applied and cured, the leather can be sanded or buffed to improve its luster, smoothness and overall appearance. This process involves the use of brushes and buffing equipment to achieve the desired sheen and shine.
 - Edge processing: If the edges of the leather are exposed, these can be finished or treated to give them a clean, smooth look. Edge pickling, chamfering, or applying an edge coating are common edge finishing techniques.

By replacing the leather's natural oils and moisture, the conditioning process contributes to maintaining the quality and durability of the material. Conditioning compounds help leather retain its elasticity, stop it from drying out, and keep it from breaking or becoming brittle. The correct care and preservation of leather depend on regular conditioning.

It's crucial to remember that the particular conditioning procedure and substances employed can change depending on the type of leather, the desired result, and the tannery's procedures. Depending on their experience and the sort of leather they produce, tanneries may use various formulations or specialized conditioners.

2.18 Finishing: The finishing process in leather manufacturing is the final step in treating leather to improve its appearance, texture, durability and other desirable properties. Finishing includes various techniques, coatings and treatments to achieve the desired end product. An overview of the finishing process is as follows:

- Surface treatment: Prior to applying the finish, the leather surface may undergo preliminary steps such as cleaning, polishing and sanding to remove impurities, surface imperfections or residue.
- Dyeing or dyeing: If you want to enhance or change the color of the leather, you can use the dyeing or dyeing process. By applying dyes and pigments to the leather surface, various colors and effects can be produced. Staining can be done before or after other finishing treatments, depending on the desired result.

The finishing process is essential in leather manufacturing as it not only enhances the aesthetics but also improves the leather's durability, performance and user experience. Proper finishing treatments ensure that leather meets desired specifications and customer requirements in a variety of applications such as footwear, upholstery, accessories and apparel.

2.19 Buffing: In the leather finishing procedure known as buffing, the surface of the leather is mechanically abraded to either remove defects or create a smoother, more uniform texture. Buffing can be done

using a variety of tools and methods to get distinct results. An outline of the buffing procedure is given below:

- **Buffing Equipment:** Depending on the desired outcome and the size or type of leather being processed, buffing can be done using several types of equipment. Abrasive wheels, belt sanders, and rotary drum buffers are examples of common buffing equipment.
- **Abrasive Materials:** Several different abrasive materials can be utilized while buffing. Depending on the desired level of abrasion or smoothing needed, these may include abrasive belts, sandpaper, or abrasive wheels with various grit sizes.
- **Buffing Methods:** Depending on the tools being used and the particular requirements, various buffing methods can be used. These methods may consist of:
 - a) **Drum buffing:** The leather is put in a revolving drum with an abrasive substance during drum buffing. The abrasive substance smooths out the roughness of the leather surface as the drum turns.
 - b) **Belt Sanding:** The leather surface is sanded using belt sanders and abrasive belts. As the leather is run through the sander, the abrasive belt smooths out any surface flaws or unevenness.
 - c) **Wheel Buffing:** Abrasive wheels that revolve against the leather surface are used for wheel buffing. The smoother finish is produced by the abrasive wheels, which also eliminate flaws.
- **Buffing Intensity:** Depending on the intended outcome and the properties of the leather, the buffing process' intensity can be changed. This entails managing the equipment's speed, the pressure used, and the length of the buffing procedure.
- **Surface Finishing:** To give the leather surface the right look and feel after buffing, other finishing procedures may be used, such as the application of surface coatings, protective finishes, or embossing.

The leather surface's look and smoothness are improved through buffing. It can be used to make the texture more uniform, get rid of flaws, or get the leather ready for extra finishing procedures. For the buffing procedure to produce the desired results without harming the leather, careful control is required.

2.20 Inspection & Grading Process: As part of the inspection and grading process, the quality, traits, and suitability of the leather are evaluated using a set of standards and criteria. In order to assess the leather's grade, which can affect its worth and prospective uses, skilled craftsmen thoroughly inspect the leather. An outline of the inspection and grading procedure is provided below:

- **Visual Inspection:** Trained individuals visually inspect the leather to determine its general appearance, color, texture, and surface qualities. They search for any flaws that can impact the quality of the leather, such as scars, wrinkles, holes, or blemishes.
- **Evaluation of Grain:** The quality and consistency of the leather's grain are assessed. The surface layer of the leather is referred to as the grain and can be either full grain, top grain, corrected grain, or split grain. During this phase, it is also possible to assess whether any natural markings, such as bug bites or healed scars, are present.
- **Measurement of Thickness:** To make sure the leather satisfies the standards, the leather's thickness is measured using the necessary tools, such as a thickness gauge or micrometer. Thickness consistency is crucial, particularly for applications where homogeneity is required.
- **Strength Evaluation:** Physical testing like tensile strength or tear resistance tests are used to determine the leather's strength and durability. These tests determine whether the leather satisfies the necessary requirements by measuring its resistance to stress and strain.
- **Flexibility and Suppleness:** By bending or folding the leather to test its reaction, the leather's flexibility and suppleness are assessed. The leather should have the proper degree of pliability and shouldn't crack or appear rigid.
- **Surface Smoothness:** The leather surface's smoothness is assessed to make sure it satisfies the specified standard of refinement. During this phase, the presence of creases, scratches, or unevenness is evaluated.
- **Color Uniformity:** The leather's color is checked for uniformity and consistency. The grade or suitability of the leather for a given application may be impacted by color variations or inconsistencies.
- **Grading and Sorting:** The leather is given a grade or classification based on the

evaluation of the aforementioned elements. Grades can change depending on the customer's needs and industry standards. Higher-grade leather frequently demonstrates exceptional qualities and is appropriate for high-end applications.

Only top-notch leather is chosen for particular uses thanks to the examination and grading process. Manufacturers and customers can trust the performance and quality of the leather they use by following to accepted standards and criteria. Additionally, it makes it easier to classify and organize leather according to its properties, enabling more efficient. Additionally, it enables correct categorization and sorting of leather according to its properties, enabling more effective utilization in a variety of leather products.

III. EVOLUTION OF LEATHER.

[4], [3]The leather fabric has been evolved in various ways in various civilizations.

3.1 Ancient Mesopotamia:

In ancient Mesopotamia, which is today's Iraq and the surrounding territories, leather played a key part in clothing design. It was a versatile material that was frequently utilized for apparel, accessories, and footwear, displaying the time's practicality and artistic sensibility.

Both men and women wore leather clothing in prehistoric Mesopotamia. The kaunakes, a long, loose-fitting robe fashioned from sheepskin with the wool still attached, was one of the most popular styles of leather apparel. The kaunakes had a unique look with its rough and fluffy surface and offered warmth in chilly climates.

Vests, robes, and tunics were also made of leather. People from all socioeconomic groups wore these clothes, which were frequently made of cowhide or goat leather. Usually, they had basic designs that put more of an emphasis on practicality than ornate embellishment. However, certain people of greater rank could buy more expensive leather clothing with additional trimmings or decorations.

Leather was also used in Ancient Mesopotamia to make shoes. Abarques, or sandals, were common among both men and women. These sandals' comfy and long-lasting design was made possible by the delicate weaving of leather strips. For increased protection, the soles were frequently fashioned of thicker leather.

Mesopotamian dress required leather accoutrements as a fundamental component. To constrict the waist and give an outfit a more fitting appearance, leather belts were frequently utilized. Metal buckles or other ornamental accents were occasionally added to these belts.

Additionally, leather was utilized to make containers, purses, and pouches for holding personal items. These leather totes, known as kutums, were frequently adorned with complex designs and metal

accents, exhibiting the period's workmanship and attention to detail.

Sheep, goats, cows, and occasionally more unusual animals like lions were used to produce leather in Mesopotamia. To make the hides more resilient and flexible, they were treated and processed using methods like tanning.

With its utility, toughness, and comfort, leather played a vital part in Ancient Mesopotamian clothing. People from many socioeconomic strata wore leather clothing, belts, shoes, and accessories, which reflected their sense of fashion and practical necessities in the area.

3.2 Ancient Egypt:

Leather was a flexible material that had a number of uses, including making garments, accessories, and shoes. As a sign of prestige and luxury, leather was predominantly worn by the wealthiest segments of society, including nobles and the upper class.

Shendyt, a kilt-like skirt worn by pharaohs and other prominent figures in ancient Egypt, was one of the most recognizable leather clothing items. Typically constructed of excellent leather, the shendyt was ornately adorned with complex designs and themes. A wide ornate belt was frequently worn with it to draw attention to the waist and enhance the look of royalty.

Sandals, which were often worn by both men and women, were likewise made of leather. The majority of the time, these sandals were expertly made and decorated with beads, gold, or precious stones. The more elaborate and expensive the sandals were, the greater the person's rank.

Leather was also used in accessories like belts, purses, and jewelry in addition to clothes. To constrict the waist and give a more defined form, leather belts were utilized. Personal items were transported in leather bags that frequently had complex patterns and metal accents. Leather cords or strips can occasionally be seen in jewelry pieces like bracelets and necklaces in addition to precious metals and gemstones.

Ancient Egyptians utilized leather from a variety of animals, including cattle, sheep, goats, and gazelles. To make the hides more enduring and decay-resistant, they were treated and processed utilizing procedures like tanning.

Ancient Egyptian clothes, accessories, and armor all benefited from the luxury, practicality, and aesthetic appeal that leather provided. It functioned as a status symbol and was mostly used by society's upper classes.

3.3 Ancient Greece:

Although to a lesser degree than in ancient Egypt, leather was also frequently utilized in clothing in ancient Greece. Greek culture put a high value on

simplicity and elegance in dress, and leather apparel was normally saved for select settings and social levels.

The footwear of the ancient Greeks was one of the most famous applications of leather in clothing. Men and women wore leather sandals on a regular basis. The foot-encircling straps of these shoes were normally made of thin leather and secured with buckles or ties. Leather sandals were used in a variety of social contexts, from casual settings to formal events. They were useful for the warm environment.

Additionally, leather was used to make belts and straps. Men wore leather belts to fasten their clothes and give them a more tailored appearance. These belts frequently lacked extravagant embellishments and were straightforward and practical. In the military, leather straps were also employed, especially in the shape of the baldric, a leather belt worn across the chest diagonally to support guns or other gear.

Leather was occasionally utilized in ancient Greek clothes, albeit not as frequently as it was in ancient Egypt. Soldiers and horse riders used chlamys, or leather cloaks, as an outer layer of protection. These cloaks were often constructed from leather or another type of animal skin, and they were connected at the shoulder with a fancy brooch or pin.

Greeks of antiquity also liked leather accoutrements. Pera, or leather bags, were used to carry personal items and were sometimes adorned with metal accents or elaborate stitching. Small pouches and wallets were also made out of leather.

Although leather was utilized in ancient Greek fashion, it was not used as frequently as it was in other ancient cultures. Greek attire, shown by items like the chiton and the himation, placed a greater emphasis on the drape and flow of the fabric. These clothes were often made of wool or linen, which were less costly and more commonly accessible than leather.

In conclusion, leather was less important in ancient Greek fashion than other materials like wool and linen. However, leather was still utilized for boots, belts, uniforms, and accessories, giving these clothes more usefulness and toughness.

3.4 Ancient Rome:

The use of leather in ancient Roman clothes and accessories was widespread and had a vital role in the culture. It was favored by people of all socioeconomic strata because of its strength, adaptability, and aesthetic appeal.

The footwear of the ancient Romans was one of the most famous applications of leather in clothing. Both men and women wore calcei sandals made of leather. These sandals had straps that were

beautifully woven and clasped around the foot, as well as thick leather soles. Depending on the wearer's social standing, the sandals' style and ornamentation varied, with wealthy people frequently donning more intricate designs.

Belts, a necessary piece of clothing for both sexes, were also made of leather. Cingulum or balteus belts, made of leather, were used to constrict the waist and provide decoration to the attire. They were frequently embellished with metal studs, buckles, and ornaments to show off the wearer's position and riches.

Also used in outerwear was leather. For protection during battle, Roman troops, for instance, wore leather armor called lorica. A sort of segmented armor known as lorica segmentata was made of strips of metal or leather sewn together to create a flexible and protective covering. Belts, straps, and sheaths for carrying weapons were also made of leather and utilized as military accoutrements.

Leather was utilized for decorations and adornments in addition to clothing. Personal items were carried in leather bags known as loculus or marsupium, which were frequently adorned with metal embellishments. In order to provide a sense of elegance and flair, leather was also used into jewelry, such as wristbands and necklaces.

Cattle, goats, and sheep were just a few of the species from which leather was harvested. Utilizing tanning methods, the skins were strengthened and made decay-resistant. The expert craftsmen who specialized in dealing with leather and creating various leather items were known as coriarii, or leatherworkers.

Overall, leather was a major component of ancient Roman clothing, appearing on belts, accessories, shoes, and armor. It offered both practicality and aesthetic appeal, expressing the wearer's position and preferences. People from all socioeconomic strata, including military, the aristocracy, and average citizens, used leather clothing and accessories.

3.5 Ancient Medieval Europe:

Particularly throughout the Middle Ages, leather played a significant part in Mediaeval European fashion. It was a flexible material that was frequently utilized for a variety of outfits and accessories, reflecting the era's utilitarian requirements and fashion preferences.

The use of leather for outerwear, such as leather jerkins or tunics, was one of the most recognizable aspects of Mediaeval European fashion. These clothes offered warmth and protection and were frequently constructed of thick, strong leather. They were well-liked by people from many socioeconomic strata, including peasants, knights, and soldiers. Depending on the wearer's position and personal preferences, leather jerkins might be simple and functional or decorated with ornaments.

Particularly throughout the Middle Ages, leather played a significant part in Mediaeval European fashion. It was a flexible material that was frequently utilized for a variety of outfits and accessories, reflecting the era's utilitarian requirements and fashion preferences.

The use of leather for outerwear, such as leather jerkins or tunics, was one of the most recognizable aspects of Mediaeval European fashion. These clothes offered warmth and protection and were frequently constructed of thick, strong leather. They were well-liked by people from many socioeconomic strata, including peasants, knights, and soldiers. Depending on the wearer's position and personal preferences, leather jerkins might be simple and functional or decorated with ornaments.

People from all socioeconomic strata treasured leather gloves and wore them. They fulfilled both utilitarian and fashionable needs. Leather gloves that were flexible and soft were prized for their practicality in protecting hands while preserving dexterity. Gloves with more opulence and embellishments like metalwork, embroidery, or ornamental stitching were frequently worn by those of higher status.

Leather was used to make armor in addition to clothes and other accessories. As an extra layer of defense behind metal armor throughout the Middle Ages, leather armor like the gambeson was used. Typically, layers of quilted or padded leather were used to create the gambeson, which offered flexibility and shock absorption.

During this time, leatherworking was a specialized skill, and to make leather more resilient to the elements and durable, it was prepared using a variety of methods, including tanning.

In conclusion, leather played a significant role in Mediaeval European apparel, footwear, accessories, and armor. In keeping with the time's utilitarian demands and aesthetic trends, it provided durability, practicality, and aesthetic appeal. People from all socioeconomic strata, including peasants, nobility, and knights, used leather clothing and accessories.

3.6 Islamic Civilization:

In Islamic civilization, leather had a significant role, notably in the fields of fashion and handicraft. Leather was widely used in Islamic apparel, accessories, footwear, and ornamental arts in many Islamic communities throughout diverse geographic locations and historical eras.

In Islamic civilization, people of all socioeconomic groups favored wearing leather clothing. The thobe, a loose-fitting robe worn by both men and women, is one illustration. In other areas, the thobe was made of leather and adorned with exquisite stitching,

metalwork, or patterns. In colder areas, people also wore tunics, vests, and leather coats.

Both men and women frequently used leather footwear, such as boots and sandals. These leather shoes were frequently made with care and typically included ornamental touches like stitching, embroidery, or metal accents. Horse riders and those who lived in harsher environments in particular preferred leather boots.

Islamic culture also placed a high value on leather accoutrements. Men and women used leather belts to constrict their waists and give a trendy touch to their attire. Personal items were carried in leather qalamdan or mina'i bags, which were frequently exquisitely adorned with elaborate patterns, geometric shapes, or calligraphy.

Additionally, leather was used to create ornamental arts and crafts. Musharabiya, the term for leatherwork, was the elaborate carving, embossing, or painting of leather surfaces. These magnificent leather items were frequently used as book covers, furniture covers, or wall hangings. In Islamic civilization, the craft of gilding, or the binding of leather books, was highly respected; elaborate leather covers sometimes had intricate patterns and gold or silver embossing.

Islamic artisans created advanced tanning and treatment methods to make sure leather was strong, flexible, and decay-resistant. Islamic cities were home to thriving saddler guilds that produced a broad variety of ornamental and leather products.

In addition to the Middle East, North Africa, Spain, Persia, and India, Islamic civilization has existed for many centuries in a variety of places. Since local customs, cultural influences, and regional preferences evolved across time and space, so did the unique styles and applications of leather in fashion and handicraft.

In conclusion, leather had a significant role in Islamic civilization, where it was used for ornamental arts, footwear, apparel, and accessories. It enhanced the aesthetic appeal of different elements of daily life while showcasing the talent and ingenuity of Islamic artisans.

3.7 Renaissance Period:

Due to changing societal preferences and fashion trends, leather remained a common fabric in Renaissance clothing. It was used to showcase both usefulness and aesthetic appeal in numerous parts of clothes, accessories, and footwear.

Both men and women wore leather clothing throughout the Renaissance. For males, doublets—leather jackets—were particularly stylish. These jackets frequently had a fitted design that emphasized the upper body and were constructed of flexible, smooth leather. For more formal events, doublets

may be adorned with ornamental features like embroidery, metal studs, or cutwork, or they may be simple and functional for everyday use.

During the Renaissance, leather was also employed to make women's apparel. Stays, often referred to as corsets, and were frequently fashioned of leather to support and shape the upper torso. Women also used leather skirts and bodices as part of their clothing, either by themselves or in combination with silk or velvet.

Women's clothing was also made from leather throughout the Renaissance. Leather was widely used to make stays, sometimes known as corsets, which were designed to support and shape the upper torso. Leather skirts and bodices were also used by women as apparel, either on their own or in conjunction with silk or velvet.

In the Renaissance, leather was often used as an accessory. Both men and women cinched their waists with leather belts to complete their ensembles. The hands were frequently protected while also adding beauty to the costume by leather gloves, which were regarded as crucial accessories. These gloves occasionally had ornamental features like lace, embroidery, or metal inserts.

Accessories like purses, wallets, and pouches were also made out of leather. In addition to serving as storage for personal items, these leather accessories frequently had aesthetic features like metal clasps, stitching, or carved patterns.

Leatherworking methods developed further throughout the Renaissance. To produce leather that was softer, more malleable, and more suited for complex craftsmanship, tanning procedures were improved. Leather shoe and other leather items were the specialty of leatherworkers, sometimes referred to as cordwainers.

In conclusion, leather remained a prominent material in Renaissance clothing, appearing in shoes, accessories, and clothing. It offered both practicality and aesthetic appeal, reflecting the era's changing fashions and tastes. People from all socioeconomic classes wore leather items, including gloves, belts, shoes, and clothing, elevating and sartorializing their appearance.

3.8 Baroque Period:

Leather remained a common fabric in fashion during the Baroque era, especially for footwear and accessories. It made a substantial contribution to the era's lavish and luxurious aesthetic.

In the Baroque era, leather accessories were extremely elaborate and frequently adorned with artistic features including complex embroidery, metalwork, jewels, and pearls. The items in question included belts, gloves, bags, and fans. For cinching

the waist and emphasizing the shape, people wore leather belts, some of which had ornate buckles or jeweled clasps. A popular accessory, leather gloves frequently included lace, embroidery, or ornamental stitching. Women used leather purses called as reticules or chatelaines, which were sometimes wonderfully created with complex patterns, to contain personal items.

Another area where leather was widely employed throughout the Baroque era was footwear. Both men and women wore high-heeled leather shoes, which reflected their desire for refinement and elegance. Baroque footwear frequently included elaborate cutwork, brocade patterns, ribbons, and bows as decorations. They occasionally had adornments like buckles, gems, or needlework to show off the wearer's riches and social standing.

In the Baroque era, leather was also used to make clothing and outerwear. Men wore leather jackets called justaucorps that had decorative buttons, detailed stitching, and metal accents. These jackets were often constructed of soft leather, offering a stylish and opulent outer covering. Another common outfit for males was leather breeches, which were frequently worn with stockings and high-heeled shoes.

Leather was occasionally used in women's apparel throughout the Baroque era, albeit less frequently than in footwear and accessories. As a part of formal wear or as components of theatrical costumes, leather corsets, bodices and skirts were used. These leather outfits were frequently elaborately embellished with lace, metallic details, or complicated designs.

Intricate designs were engraved on the surface of leather throughout the Baroque era using methods including embossing, tooling, and gilding, which required expert craftsmen. To improve the leather's aesthetic appeal and harmonize with the overall opulent design of Baroque clothing, it was frequently treated and dyed in deep hues.

In conclusion, leather was a major component of Baroque era fashion, which was characterized by wealth and grandeur. The opulent fashion of the time was displayed by the ornate ornamentation added to leather belts, gloves, handbags, and shoes. Although less often, leather clothing was occasionally utilized for women's clothes and outerwear. Leatherwork during the Baroque era expressed the desire for luxury and creative expression via the workmanship and attention to detail.

3.9 Industrial Revolution:

The fashion industry dramatically increased its usage of leather throughout the Industrial Revolution. The mass manufacture of leather clothing, accessories, and footwear was made possible by the mechanization of the tanning processes and the economical supply of leather.

Leather was favored in industrial fashion because of its sturdiness and usefulness. Leather clothing was used by employees in factories and other labor-intensive jobs to shield oneself from the harsh working environment. Insulation and defense against machinery, sparks, and debris were given by leather jackets and coats.

During this period, leather accessories were also widely used. Both men and women used leather belts to squeeze their waists and give them a dapper appearance. These belts frequently have simple designs that put more emphasis on usefulness than elaborate ornamentation.

During the Industrial Revolution, leather footwear—especially boots—became more prevalent. In industrial environments, workers needed strong, protective footwear for standing for extended periods of time. The requisite support and sturdiness were given by leather boots. In order to resist severe wear, these boots were sometimes strengthened with metal toes or soles.

People from all socioeconomic strata may acquire and wear leather things because to the inexpensive prices of leather goods. Although leather was frequently utilized for utilitarian and occupational uses, it was also worn for everyday clothing. Gloves, handbags, and other small leather items that enhanced fashion and usefulness could be purchased by middle-class people.

The emergence of the department store during the Industrial Revolution also increased public access to ready-to-wear leather clothing and accessories. These shops sold a range of leather goods, including wallets, boots, and gloves in addition to coats and boots.

The quality and craftsmanship of leather items were also enhanced during this time by improvements in leatherworking processes. The manufacture of leather clothing and accessories may be completed more quickly and with more precision thanks to the introduction of sewing machines and other mechanized procedures.

Overall, leather had a big impact on fashion during the Industrial Revolution. It became a popular material for clothing, shoes, and accessories due to its strength, usefulness, and accessibility. Leather clothing and accessories were often used at the period and helped shape the changing trend, from protective work wear to casual attire.

3.1019th Century

Although its use changed based on the particular styles and social climate of the day, leather remained a prominent material throughout 19th-century fashion. It was used in a variety of clothes, accessories, and shoes, fusing functionality with fashion.

Early in the 19th century, outerwear frequently included leather. Due to its strength and weather resistance, leather was frequently used to make men's jackets like the frock coat and greatcoat. Men and women both wore leather coats, particularly for work and outdoor activities. Typically utilitarian in nature, these coats had solid construction and little ornamentation.

The use of leather accessories was quite prevalent in 19th-century fashion. Both men and women used leather belts to squeeze their waists and give them a dapper appearance. They were frequently made with ornamental buckles or metal accents. Women continued to wear leather gloves for formal events, and men continued to wear them every day. Soft leather gloves were preferred for both comfort and elegance.

Throughout the 19th century, leather boots were quite popular among both men and women's footwear. The majority of men's boots were made of durable leather, while women's boots came in a variety of styles, from functional walking boots to more exquisite heeled forms. Additionally, leather shoes were used, especially for formal events, and were sometimes embellished with ornamental accents like laces, buckles, or elaborate stitching.

Additionally, leather was employed in the creation of accessories like wallets and purses. Personal items were carried in leather bags known as reticules for ladies and satchels for males. They frequently exhibited fine craftsmanship and had ornamental features like embossed patterns, metal hardware, or braided handles.

The 19th century saw improvements in leatherworking methods, which resulted in the creation of finer and more sophisticated leather items. Improvements in tanning techniques produced softer, suppler leather that could be molded and carved into elaborate patterns. The cordwainers, or leatherworkers, kept honing their art and producing high-quality leather goods.

In conclusion, leather was a major component of 19th-century clothing, appearing in footwear, accessories, and outerwear. It gave a variety of clothing items and accessories sturdiness, usefulness, and style. People of all socioeconomic strata wore leather belts, gloves, boots, and bags, which showed their practical and trendy tastes at the time.

3.1120th Century Fashion

Throughout the 20th century, leather remained a significant material in fashion, going through many fads and phases of popularity. It was used in clothing, accessories, and footwear and was frequently equated with toughness, opulence, and a rebellious spirit.

Leather coats were already in style in the early 1900s. These coats, which are frequently waist-length, were first worn for utilitarian reasons including protection during outdoor activities.

However, in the 1950s, the classic leather motorcycle jacket that was made popular by films like "Rebel Without a Cause" gave leather jackets a rebellious and fashionable meaning. Leather jackets became a mainstay of youth culture and counter-cultural movements as they started to be associated with a rebellious and edgy style.

The 20th century saw a sustained popularity of leather accessories. In particular for formal events, leather gloves were a popular accessory. Men's gloves are often more functional and practical, whereas women's gloves are frequently constructed of soft, supple leather. Leather purses, wallets, and belts are still in popularity, with different designs developing in response to shifting fashions.

In the 20th century, leather shoes were still a common choice. Both men's and women's leather boots remained a flexible and stylish choice. Leather boots, in particular, were an iconic representation of toughness and defiance during World War II when combat boots first became popular.

The popularity of leather as a fabric for athletic and casual clothing peaked in the middle of the 20th century. During World War II, leather bomber jackets gained popularity, and they later became a popular choice for outerwear. As a result of the impact of rock 'n' roll and young subcultures, leather skirts and trousers also became increasingly fashionable, especially in the 1950s and 1960s.

The Rock & Roll Culture

Rock & roll youth culture has been significantly influenced by leather, which has come to be associated with disobedience, originality, and a distinctive style. It became a recognizable part of the rock and roll aesthetic, standing for a sense of liberation, edginess, and a defiance of social conventions. Rock & roll performers, fans, and subcultures have all embraced leather clothing and accessories.

The leather jackets are one of the most recognizable leather fashion items in rock & roll youth culture. Rock & roll fans have come to rely on leather coats, especially motorcycle jackets. Leather jackets radiated a rugged and stylish vibe, inspired by the rebellious attitude of early rockers and celebrities like Marlon Brando in "The Wild One." They became a representation of individualism and nonconformity. Patches, studs, band logos, and other individualized decorations were often added to leather jackets, enabling users to express their individual sense of style.

Rock & roll performers and fans both loved leather trousers. Stage performances and casual clothing alike benefited from the daring and rock star attitude that leather trousers brought. They became a recognizable representation of rock and roll revolt, encapsulating the spirited and rebellious nature of the genre.

The rock and roll aesthetic required finishing touches like leather belts and boots. Leather boots gave ensembles an air of attitude and edge since they frequently had thick soles and metal accents. Leather belts with metal buckles and studs gave trousers or jackets an additional rock-inspired touch.

Rock & roll performers and fans both loved leather trousers. Stage performances and casual clothing alike benefited from the daring and rock star attitude that leather trousers brought. They became a recognizable representation of rock and roll revolt, encapsulating the spirited and rebellious nature of the genre.

The rock and roll aesthetic required finishing touches like leather belts and boots. Leather boots gave ensembles an air of attitude and edge since they frequently had thick soles and metal accents. Leather belts with metal buckles and studs gave trousers or jackets an additional rock-inspired touch.

A wider variety of designs and finishes became possible during the 20th century because to improvements in leatherworking processes and the accessibility of various types of leather. The general population now has easier access to leather clothing and accessories due to improved production techniques and the growth of ready-to-wear fashion.

In conclusion, leather continued to be a major fabric in 20th-century fashion, frequently being linked to toughness, luxury, and rebellious attitude. Through the years, leather purses, boots, coats, and gloves remained in style while adjusting to shifting fashions and the zeitgeist. The 20th century's fashion scene included lasting and classic leather pieces.

3.1221st Century Fashion

In the twenty-first century, leather jackets are still a common and classic option. Traditional looks like the bomber jacket and biker jacket are still popular, and new versions and interpretations have been developed. For those looking for a fashionable and edgy outerwear choice, leather jackets are frequently made in a range of hues and textures.

Additionally, leather accessories continue to be popular. Leather purses, wallets, belts, and shoes are still in high demand because of their usefulness and fashionable appeal. Leather accessories elevate ensembles with a touch of elegance and refinement thanks to their fine craftsmanship and attention to detail. Additionally, with an increasing focus on transparency and environmentally friendly practices within the fashion business, sustainable and ethically produced leather has attracted attention.

Alternative materials have grown increasingly well-liked as sustainability issues have become more prevalent. A practical and animal-free alternative is faux leather, which is often referred to as vegan leather or synthetic leather. With a vast selection of

designs and finishes that closely mimic real leather, faux leather is frequently used as an alternative to conventional leather. While still enjoying the aesthetic and practical benefits of leather, this trend towards sustainability has pushed fashion designers and customers to investigate alternatives.

Recycled and repurposed leather have also gained popularity recently. These materials entail recycling already-existing leather or using leftover leather to make new clothes, accessories, and shoes. Up cycling and recycling help to make the fashion industry more sustainable by giving used leather a new use.

Additionally, there is rising interest in novel and environmentally friendly leather substitutes made of plant-based materials. Examples include lab-grown or bio fabricated leathers such as Pinatex, which is formed from pineapple fibers, MuSkin, which is made from mushroom fibers. These substitutes provide environmentally responsible and animal-free choices that are in line with the ethical standards of the contemporary fashion sector.

In conclusion, leather still has a place in fashion in the twenty-first century because it is strong, versatile, and ageless. While synthetic leather, repurposed leather, and plant-based leathers are becoming increasingly popular alternatives to conventional leather, the fashion industry is placing more and more focus on environmental and ethical concerns. People may choose chic and ethical solutions that fit their interests and beliefs thanks to the wide variety of leather options available.

IV. CONCLUSION

Finally, it should be noted that the development of leather in the fashion business has been a wonderful process that has spanned centuries and seen a number of major changes in fashion trends, techniques, and designs. Leather has played a significant part in fashion, evolving from a protective material to a sign of luxury, disobedience, and individuality.

Leather has always captured the imagination of fashion aficionados, designers, and subcultures, inspiring them to make it a cornerstone of their outfits. Leather has been used in a variety of products from ancient civilizations to the present day, including coats, trousers, skirts, dresses, accessories and footwear.

The fashion industry has experimented with cutting-edge patterns, textures, and finishes to push the limits of leather. Because of its adaptability and opulent appeal, leather has been pushed to new heights by high-end fashion designers who have included it into their designs.

Leather has become associated with edginess, individualism, and a feeling of adventure because to the birth of legendary subcultures like aviators,

bikers, and rock 'n' roll rebels. Gender distinctions in leather fashion are no longer relevant, giving both sexes the chance to show their individuality in terms of attitude and style.

The usage of leather in the fashion industry has changed recently due to ethical and sustainable issues. The popularity of faux or vegan leather, produced using synthetic or plant-based materials, has provided a cruelty-free substitute that has the same appearance and feel as real leather. To lessen its influence on the environment, the industry is also looking into eco-friendly tanning techniques and the utilization of recycled leather.

Leather has an on-going influence in the fashion business thanks to its classic appeal, toughness, and capacity to adapt to shifting trends. By fusing innovation and heritage, it will continue to enchant both designers and customers. Leather will surely continue to be a valuable and important material as fashion develops, incorporating its illustrious past and opulent attractiveness into the landscape's tapestry.

REFERENCES

- [1] "Fashion from concept to consumer", 4th Edition, Gini Stephan Frings.
- [2] "Leatherwork: A Manual of Techniques", by Geoffrey West.
- [3] "Leather: A Cultural History" by Chris Lavers.
- [4] "The Evolution of Leather Conservation: Past, Present, and Future Perspectives" by L. Baglioni, F. Chelazzi, and R. Giorgi.
- [5] "The Evolution of Leather Processing Technologies: A Review" by M.A. Hossain, M.S. Uddin, and M.A. Gafur