



Particles and potential losses

Within leather making there has always been a loss in value due to contamination arising from the presence of dust and particles. These problems can become apparent after dyeing operations where colour contamination can become obvious.

Effects become increasingly clear during finishing where, at the point of film formation, dust and fibre can become entrapped within the finish.

The way that tanners address these issues in practice is outlined in this paper.

A major problem is created by the shaving operation where a considerable amount of fine particles are generated. Tanners often minimise these problems by good extraction and dust collection techniques as the fibre structure is sheared during the operation. However, a considerable amount of the dust and shavings can still be easily transferred via the skins into the retanning, dyeing and fatliquoring wet processing.

Here, because of the large surface area of these particles, retanning agents and dyestuffs – and especially fatliquors – are readily absorbed. Significant quantities can remain even through washing and draining operations where the contaminated particles remain entrapped by the more open flesh structure. When wet stacking occurs they are then brought into contact with the grain structure where retanning materials and dyestuffs, and in particular fatliquors, can migrate from the particles and cause staining of the grain.

Moreover, these particles can become pressed into the structure and remain throughout samm/setting and wet staking/stretching operations, then transfer onto vacuum drying plates either directly or via the hood, and cause fine grain indentations. These particles may be released from the fibre structure later – say on staking – but the dust still remains problematic for secondary contamination.

This problem is mainly addressed by good extraction equipment during shaving operations, but also in the subsequent wet processing where the processing vessels are fitted with recirculation systems. Here, there are many different systems available where the process floats during recirculation are screened before return back to the processing via the axle of the vessel. As the filtered solids build up they are mechanically removed from the screening arrangement, then drop via disposal chutes to floor level as part-pressed solids for collection and disposal.

Other forms of contamination arise through airborne dust and particles generated by the handling of powder chemicals and dyestuffs. This is mainly avoided by good extraction and entrapment of dust arising from areas where chemicals and especially dyestuffs are weighed, and careful addition of powders into the processing vessel. Also, there is the replacement of powder products by products in the liquid form, often in association with automatic dispensing systems.

Once leathers have been dried there is the effect of electrostatic charge generated by leather making equipment. This is especially a problem on the through-feed vibration staking operation where



Image shows dust and fibres being filter screened from the float during recirculation within the retanning process.



Separated and recovered solids are extracted from the screening arrangement and delivered into waste containers set at floor level.



Pristine conditions within the plant are all part of eliminating dust generation within processing. These can include separate and often enclosed areas for chemical weighing and dispensing.



static electricity is created through friction, contact and induction, and influenced by temperature and humidity. This charge causes dust and fibres released from the structure during the operation to remain in contact with the skin, and then transfer into subsequent finishing operations. In practice this is being addressed by good earthing of machinery and leather, and careful control of the relative humidity. This can include using sprays of water mist as the leather is fed into the machine.

Similarly, where the buffing operation is practised, electrostatic effects have always been a problem in addition to the large amount of dust generated as well as fire hazards. However, state of the art equipment can ensure good earthing, air/moisture control and excellent de-dusting, combined with many forms of effective dust collection systems mainly located outside the premises. In addition, these departments are mainly kept in isolation from the other parts of the factory to minimise any dust transfer into other departments.

Finishing presents the most opportunities for loss in value of the leather. Not only is dust and fibre very visually apparent within glossy finishes, but it can often be detected as a grittiness to the touch. To minimise problems, often finishing departments are physically separated from the rest of the tannery, with the most sensitive areas frequently being isolated within the department. Not only can the air often be filtered in these areas within departments, but double doors – almost airlocks – can be employed. This can be found in sealed areas dedicated to white and high gloss finish applications, where visitors need to wear footwear protective covers to minimise the risk of the introduction of contamination.

More general techniques include very clean in-house working conditions, and often the use of specific plant and machinery limited to selected leather types and colours. In addition, air introduced into drying tunnels is being filtered to avoid any residual airborne particles being blown on to the wet finish as it is being dried.

Other options include the fast growing use of infra-red drying. This is not only effective for drying the finish film – as opposed to drying both the finish and the leather thus causing a loss in area – but the lack of forced air circulation minimises the risks presented by dust.

Other innovation includes covering the otherwise open areas between the machine application of wet film and the drying tunnels to minimise exposure. These enclosures are created from rigid clear plastic sheets mounted directly behind roller coater applications and spraying units. Close inspection or access to the leathers during belt/conveyor transport in these areas is provided by placing inspection doors or hatches in the top horizontal surface of the structure.

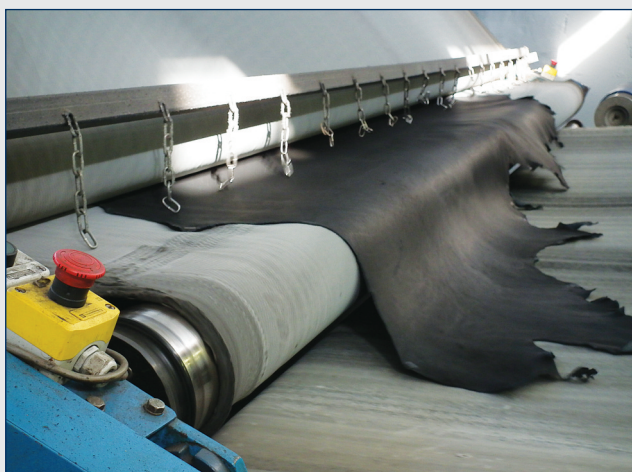
Other techniques are increasingly being used to avoid airborne dust contamination of finishes at the point of application. This can include the use of a framework so that a hard but clear roof can be provided over the machine and work area, but also provides the opportunity for clear side panels and curtaining for full enclosure.

These include the feed and handling areas where finishes are being applied, take off areas for the coated leathers, and storage/standing areas where leather is held between operations. Individual packs of work where leathers are supported on poles set in mobile frames are also being protected using a mixture of hard plastic and soft reinforced curtaining materials.

Similarly, semi-permanent frameworks are being used to isolate machinery such as through-feed vibration staking machines when located within finishing departments where dust and fibres might be generated.



Scales fitted with dust extraction that can be readily moved on rail track to the appropriate dye container is an effective innovation to avoid dust. This is also being applied to weighing areas for other dry chemicals.



The problem of static electricity on through-feed vibration staking is reduced by earthing the leather using drag-chains.



The relative humidity of air is being managed by spraying a mist of water as required into the air within appropriate departments.



Efficient dust extraction, collection and earthing of equipment is essential within de-dusting operations after buffing.



Dust removal is being employed as part of dry splitting operations where very accurate leather substances are essential.



Milling operations are also a source of dust and fibres. In this example the dust collection is external, although the filtered air at controlled temperature and humidity is returned back into the drum.



Even in the best conditions, sometimes dust needs removing at some point, in this case by hand using tacky cloths.



Pristine conditions are being used by leather manufacturers within finishing operations to minimise contamination. This includes control of temperature, relative humidity, and air filtration.



Areas for finishing white leathers, or high gloss leathers, are often isolated within individual finishing departments.



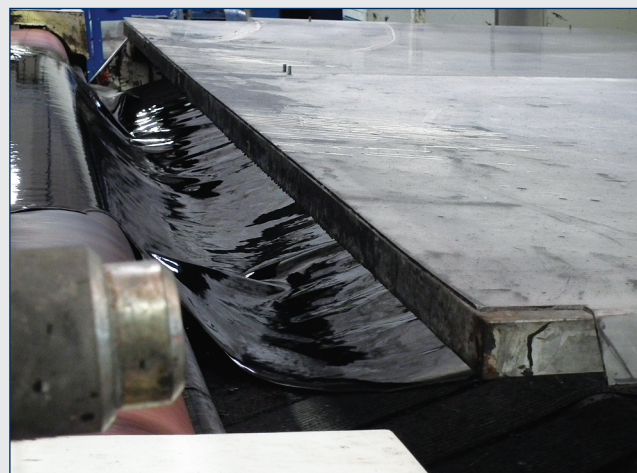
Here, leather placed on poles during finishing and held in this mobile frame is enclosed using hard plastic and curtaining materials to avoid dust associated problems.



Other enclosed areas include take off areas after drying, machinery for stretching/softening within finishing departments, and areas where leather is held between operations.



Feed-area for finish applications are being fitted with overhead cover, and the ability to fit side cover and curtains to enable complete isolation.



The space between roller coating operations and drying tunnels is being enclosed as shown to avoid wet finish contamination. Openings in the horizontal plastic sheeting are fitted with hinged doors for inspection purposes.



Infra-red drying is a fast evolving technology, minimising air movement over wet finish films and hence the risk of dust adhering to the wet finish film.

Legend

Courtesy of tanners participating in the World Leather initiative Tannery of the Year 2009, 2011, 2013 and 2014.

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