



Producing soft leather, consistently

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With a reduced availability of the traditional oils used for fatliquoring, lecithin has become an important raw material for all leathers, particularly ones that need extra softness. Lecithin, a vegetable oil, has been incorporated into fatliquors comparatively recently. It is now difficult to imagine how we could produce the required buttery feel without this product. However, lecithin fatliquors are different to normally used oils, as they need more carefully controlled emulsification.

The theory of fatliquor emulsions

In the 1950s, all leather was firm by today's standards. fatliquors were based on soap and oil, and the leather contained only low quantities of these products. Retanning was hardly used so there was little competition with fixing sites for fats on the fibre, so generally the fat was well exhausted, but often on the surface. Production was also based on small loads, and this permitted considerable individual treatment: this allowed the grain to be cleared of residue fat deposits if required, before finishing.

Today we work with large production loads with little room for individual treatment, but under constant pressure to increase softness, and produce light fluffy leathers.

Achieving these requirements has raised complicated issues. Although tanners offer more fat to achieve softening, it is known that 10% of extra fatliquor does not give us 10% extra softness. And any increase in retannage to achieve these needs reduces the fatliquor exhaustion. Accordingly, both the increases in fatliquor offer and the reduced exhaustion due to retannage has increased the chemical oxygen demand (COD) in the waste water.

Attempts to improve the exhaustion of retanning agents, dyes and fatliquors - such as increasing the formic acid offer at the end of processing - often causes precipitation onto the leather surface. Not only does this produce a heavy-feeling leather, but poor fixation of these products - with attendant poor fastness and aging behaviour - then becomes an issue.

Emulsion variations

There is a strong relationship between the preparation of a fat emulsion and its performance in the leather. Nevertheless, the preparation of emulsions in the tannery has often been neglected and considerable variations can be found, including:

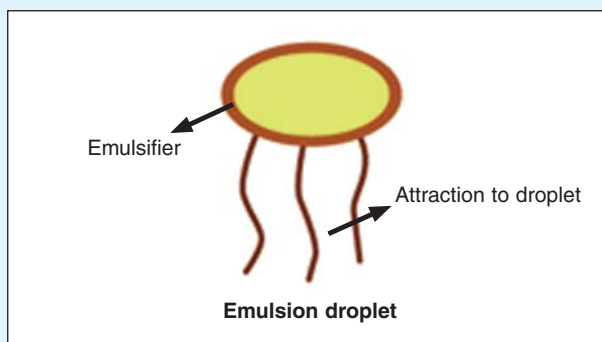
- Mixing of different oils together with little understanding of the reaction with each other.
- The sequence of emulsification.
- The dispersion of oils in the emulsion using various high-speed stirrers - or in some cases sticks.
- The quantity of water being used and its varying hardness and temperature.
- Even the direct use of live steam (*a carry over from the oil & soap days*).

All of these factors affect the emulsion particle size, often resulting in irregular quality, patchy dyeing, uneven break, and looseness.

Emulsion theory

Water alone will not dissolve oils, but surfactants can assist this reaction. Surfactants or similar groups coat a very small droplet of oil with a thin layer of molecules and this enables the whole system to become emulsified. Each separate oil particle is emulsified separately, and they exist in the mixture next to one another. Emulsion particles or droplets are often shown in models, with oil-loving tails and water loving heads as indicated in *Panel 1*.

Panel 1: Conventional model showing emulsification



However, emulsions comprise of individual oil particles, and the sizes of these particles are not all standard. All emulsions are mixtures, containing particles of varying sizes as indicated in *Panel 2*.

Panel 2: The emulsion particle size

