



Back to Basics: A Framework for Leather Manufacture

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Pre-finishing and Finishing

Part 5: Curtain Coating

Overview

The application of a number of finishing products may be carried out using curtain coating machines. Long established for the finishing of wooden surfaces the technique came into leather finishing initially with unsatisfactory results. When it was realised that curtain coaters needed considerable refinement in order to handle leather they were adopted with some significance in the 1960s but are now used less frequently in the industry following the arrival of the widespread rollcoating practice.

Objectives

The main aim is to apply a relatively heavy film of product with precision, repeatability, quickly and avoiding waste. An advantage also is that curtain coating

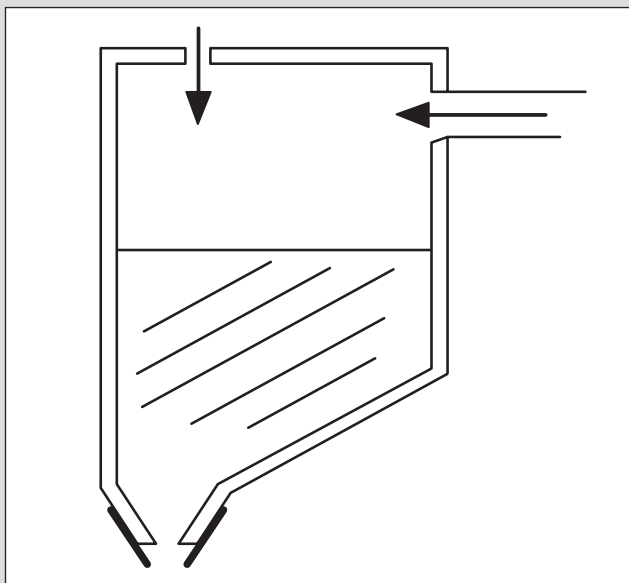
enhances adhesion. The method is particularly suitable for grain impregnations and high gloss products such as for patent leathers and lacquers, but may also be used to apply resins and pigment. Seasoning agents can be applied by curtain coating on the flesh side of leather goods and harness leathers.

The curtain coating process in one pass can create a film approximately equivalent to 4 or 5 spray coats. Although for this reason the leather curtain coating machine is frequently used to deposit a large amount of product per unit area, the several setting facilities make it possible to vary the flow and the rate of deposition. The types of liquid dispenser used incorporate slides to vary the size of the flow port which normally can range between 0.1mm and 0.25mm. The pressure on the liquids in the dispenser can be regulated. The free fall height of the

liquid from flow port to the leather surface may also be adjusted, generally between 100mm and 200mm. Further, the speed of the conveyor carrying the leather past the liquid curtain is variable, i.e. the faster the passage the lighter the deposition. Conveyor speeds on modern coaters are usually infinitely variable in a range between 5m/min and 100m/min. In conjunction with the deposition rate the relationship between product free fall velocity and conveyor speed can be a factor. Optimum application occurs when these two velocities are approximately equal.

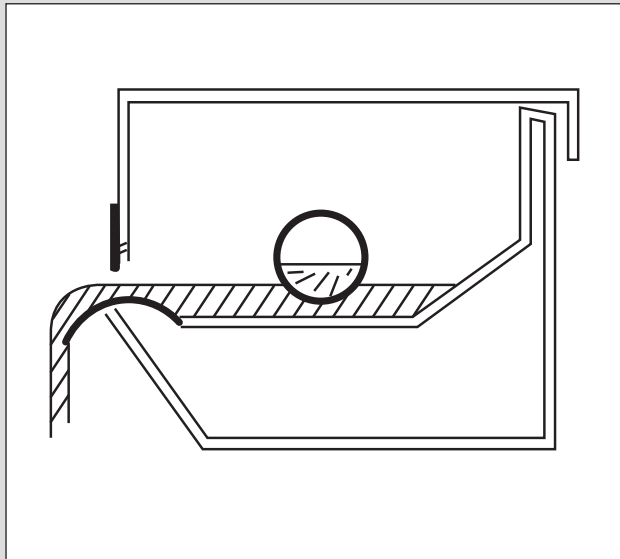
Product characteristics are critical to achieve desired and consistent coating performance. Viscosity is controlled and generally is of the order of 20 seconds Ford Cup 4. Mechanical stability and cohesion of the product solutions are vital to achieve even flow without interruptions. Product

Panel E25 part 5/1 Schematic of the lip pouring head.



Product is pumped into the container at a controlled rate to maintain a constant level. An air connection at the top can provide compressed air at a required pressure to further ensure even flow. The pouring aperture has adjustable plates to vary the flow rate as required.

Panel E25 part 5/2 Schematic of the weir overflow pouring head.



Flow rate is determined by the level controlled by the central feed tube maintaining a constant level in the container. The bold line on the left of the aperture indicates a movable shutter which can also control flow. The weir (bold arc) at bottom of aperture is also adjustable.



formulations take into account avoidance of foaming and the need for good adhesion properties as well as the surface tension of the finish. The temperature of the product needs to be stable and to achieve this it is normally allowed to acquire ambient temperature before beginning coating. The siting of curtain coaters must avoid exposure to drafts or gusts of air as this could distort the curtain thereby upsetting consistent flow. Users are aware that the passage of a person near the machine may create a gust sufficient to interfere with the curtain.

The curtain coating machine

Considerable research and development was necessary to make the curtain coating technology transfer from wood panel coating to leather finishing possible. This resulted in a two conveyor system with the entry one taking the leather piece under and through the product curtain at a speed suitable to produce the required thickness of finish. The separate feed out conveyor speed has to be much slower as it must transport the leather into a drying tunnel giving enough time for the finish to dry. The entry conveyor needs to travel

intermittently as it has to wait for the feed out conveyor to take the leather away before coating the next piece. The transfer operation between the two conveyors is controlled automatically.

The product deposition unit is mounted independently on a support not connected in any way to the conveying structure of the machine. The chief reason for this is to avoid the creation of vibration or shocks such as may emanate from the conveyor system. Vibration would affect the flow curtain causing irregularities in the deposition. Further, the independent mounting arrangement allows the unit to swing or roll out from the machine frame facilitating cleaning, setting up and maintenance. The unit comprises the pouring head with its controlled flow system including filtration together with setting mechanisms and instrumentation. Height setting with gauge is provided for. Product overflow collection with recycling circuit and compressed air connection with gauges are provided. Liquid product tanks with pumps, level sensing, agitators, temperature controls and heating equipment are generally separately floor mounted.

There are two kinds of pouring head in use, the lip type and the weir overflow mechanism. The lip pouring head has a controllable aperture slot which determines flow rate. The product is evenly pumped into the well above the slot and is maintained at a constant head. Normally there is also a compressed air supply with pressure gauge which can be used to stabilise flow rate or vary it.

The weir overflow head can be more consistent in repeatability and can also produce more even flow than the lip system. Here the flow rate is initially determined by a feed tube situated in the well and the pouring aperture is also controlled by an adjustable shutter. The position of a curved weir over which the product flows is adjustable to create the most even curtain.

Curtain coating creates no load upon the environment other than what arises when cleaning the machine. There is no discharge such as is generally found with water-wash spraying machinery and emission to atmosphere is absent. Such fumes or odours from the products used can be disposed of by normal ventilation to protect operators.



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