Economical sanding systems

Unit configurations depend on surface requirements

Environment-friendly types of lacquer are becoming increasingly popular for many different reasons. Modern methods of lacquer application such as drum applicators and 5-axis automatic sprayers meet these requirements. Economical sanding systems are available to prepare surfaces for all types of thin-coat lacquers and surface finishes.

Case examples

The sanding drum is regarded as the main alternative to conventional machines. It is not used for sizing purposes but to adapt the surface of the workpiece to the method of application used by a roller applicator. A positive feature of the sanding drum is its linear removal of material: A very small area of contact with the workpiece results in minimum stress on the sanding belts during the lacquer finishing operation. Very little heat yet relatively high sanding pressure is created over this short machining distance, a fact which prolongs the useful life of a sanding belt far beyond that of a sanding shoe.

Final sanding is often performed by a superfinishing unit equipped with an inner running felt laminate belt designed to generate vibrations in the sanding belt. While felt strips are arranged at an angle to force the sanding belt to wander to one side, the belt control system is set to counteract this movement. Given the right design and machining speed the result is a vibrating sanding belt that can be adjusted in the same way as an eccentric sander. Workpieces are left with a very smooth and even surface, which has a positive impact on both rough and finish lacquer sanding as well as subsequent processing operations.

Rough sanding

A system with five units can be replaced on rough sanding jobs by a sanding machine with the following configuration (see Figure 1) which reduces the number of units by two and saves both investment and operating costs: First a cross belt with 120 grain smoothes the workpiece surface, removes hot-melt glue from the edges, and produces a cross-grain surface ripple in preparation for the follow-up units. Next a sanding drum with K 150 grain, an open cutting angle and higher relative pressure produces the same depth of ripple as with K 120 grain, i. e. one unit (one grain size) can be omitted without worry. And finally, a follow-up superfinishing unit with K 180 grain performs the finish sanding. The result is the same in terms of ripple and characteristics as a surface which has been finish-machined with a standard shoe-type unit. To obtain a cleanly sanded surface under the same premises using K 220 grain for the finish sanding, a cross belt and four sanding shoes would have to be used without omission of any grain sizes. The disadvantages of this option are obvious: First, it needs five units. And second, increases in direct energy consumption (from 22 to 30 kW), extraction volume (approx. 60 m³/min more at 20 m/s), sanding belt costs and setup times all contribute to making the final product more expensive.

Lacquer sanding

A low depth of ripple is a particularly important factor in lacquer sanding because it enables the use of smaller quantities of lacquer or other coating media and results in better surface characteristics. Lacquer application rollers of the familiar rubberized type run in roughly the same way as car tires on a road. If the workpiece surface is deeply rippled, the rubber-coated drum will run irregularly, resulting in a distinct orange skin effect. When lacquer is applied by an automatic spraying machine, the coating is as homogeneous as a film. The lacquer flows to the bottom of the ripples, and even thicker applications retain the ripple pattern. This phenomenon is particularly apparent on wood species with smooth

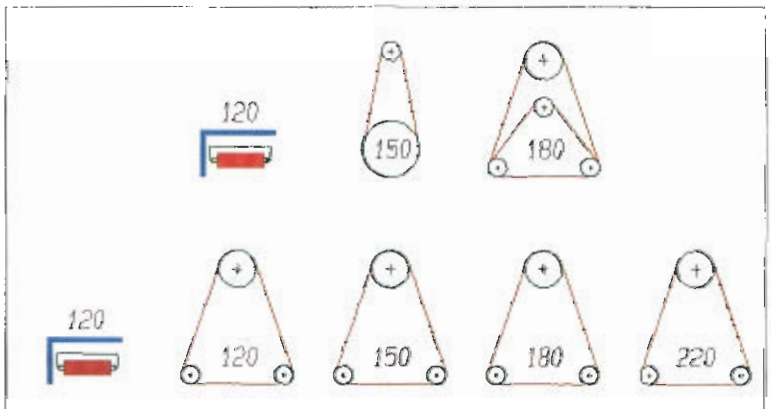

Fig. 1 Rough sanding with a cross belt, a sanding drum and a superfinishing unit (top). Bottom: A five-step arrangement to achieve the same effect using a cross belt and four sanding shoe units

Fig. 3 A machine for intermediate lacquer sanding using a drum and a superfinishing unit on a lacquering line for UV-hardening acrylic lacquers (Drawings and photo: Tagliabue)

surfaces. A small depth of ripple is no less essential, therefore, for high-quality surfaces with thick coatings of mat-satin high-gloss lacquer.

A sanding process for use in this type of production is defined by grain size. Let us assume that a sanding belt grain of K 500 is sufficient for the application (Fig. 2). In this case the first unit will be a sanding drum with K 320 grain. Normally there is no need for a cross belt because its main job, i. e. cleaning and preparing the surface, is made superfluous by the preceding coating of lacquer. A superfinishing unit then performs the finish sanding with grain size K 400. As with the rough sanding, the result is a low depth of ripple. The above mentioned vibration effect and small ripple produce the same sanded finish as when using grain 500 on a sanding shoe unit. Using a conventional machine with shoes would require four units. With no drum unit in first place it would be necessary to use grain 220. Assuming a homogeneous succession of grain sizes, the next steps would be K 320, K 400 and then K 500. In other words, a machine with four units (Fig. 3) would be used in place of the previously described version with two units. Once again two fewer units are needed, so the cost saving is the same as that for the rough sanding operation.

Even if drum units and superfinishing drum units cause errors in production, it is illogical to assume that a shoe-type unit of whatever quality standard is the ideal answer for intermediate sanding operations, particularly where the new UV lacquers are concerned. Eighty of every 100 manufactured doors are sanded by conventional sanding systems differently at their edges than on their main surfaces. This is owed to the high sanding pressure needed to sand UV-hardened lacquers (excessively deep ripple). Further problems arise from sanding the edges with segments that are too wide for the job.

The reduction in investment and operating costs of a complete lacquering line possible with the above described measures adds up to a considerable benefit for the user. On a lacquering line with three sanding machines there would be three fewer sanding units, saving at least 5,500 m^3/h extraction effort per unit. Sanding abrasive consumption would be reduced accordingly. Total savings from the sanding machines alone (including rest, setup, energy and maintenance costs etc.) would thus amount to an estimated DM 60,000 and more on the above described surface finishing line. *Michael Schadt*

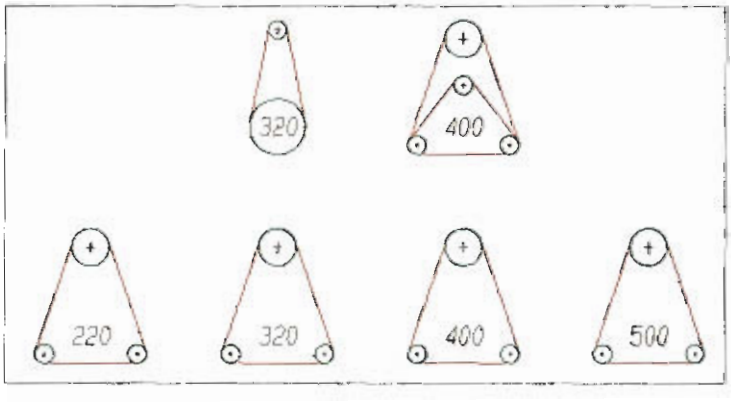

Fig. 2 Lacquer sanding with a sanding drum and a superfinishing unit (top). Bottom: A conventional succession of grain sizes for achieving the same effect with four units

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