Technical Information

No. 31

Abrasives

Wide Belt Sanding in the Wood Working Industry

Faults and Remedies

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General

There are a wide range of sanding operations to be done in the wood working industry. The most important in terms of quantity is surface sanding of panel-shaped workpieces, in various stages of processing such as sizing of raw chipboard, veneer sanding, and lacquer sanding. Despite the wide range of operations and the very considerable differences between them, wide belt sanding has become established as the leading process for surface sanding.

As in all manufacturing activities, it is possible to define typical areas where problems may occur in all kinds of application. This brochure may therefore be useful to remedy such faults in a variety of different operations.

1. Surface faults

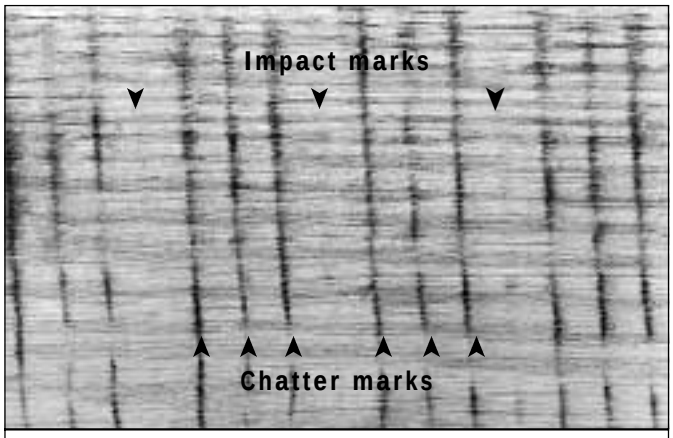
1.2 Chatter marks and impact marks

The term "chatter" is often used in quite a general way to describe all marks on workpiece surfaces that are transverse to the feed direction. However, the following distinction can be made, depending on the cause of the marks:

a) Chatter marks due to contact rolls not running true;

b) Impact marks due to faulty belt joints.

The distance between the marks can be used for simple calculation of the type of trouble (chatter or impact marks).



Sanded oak veneer surface with chatter marks and impact marks

It is advisable to coat the workpiece surface with chalk or charcoal, for easier identification of the marks. For greater accuracy, measure the distance between the first marking and the eleventh marking; one tenth of this distance is then equivalent to the distance between two marks. Then compare this practical value with the theoretical values of marking distances obtained from the calculation formulae given below. If, for example, the measured value l_w is the same as the calculated value l_s, it may be assumed that the cause of the problem is a faulty belt joint.

Calculation of theoretical marking distances (numerical value equations)

Impact marks $$l_s = \frac{l_b \times v_f}{v_c \times 60}$$

Chatter marks $$l_r = \frac{v_f \times d_s \times 3{,}14}{v_c \times 60}$$

or $$l_r = \frac{v_f \times 1000}{n_s}$$

d_s : Contact roll diameter [mm]

l_b : Sanding belt length [mm], for segmented belts also distance between joints

l_r : Calculated spacing between chatter marks (due to contact roll) [mm]

l_s : Calculated spacing between impact marks (due to joints) [mm]

l_w : Distance between marks on workpieces [mm]

v_c : Belt speed [m/s]

v_f : Feed rate [m/min]

n_s : Speed of contact roll [rpm]

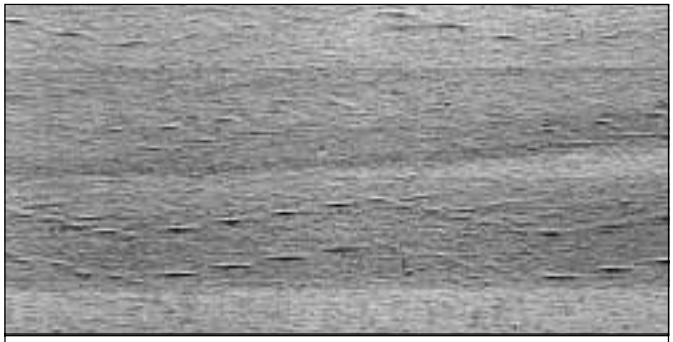
1.2 Longitudinal stripes

Longitudinal stripes are marks on the workpiece surface in the feed direction. There are many possible reasons for this, the most common of which are as follows:

- Longitudinal stripes are often observed in sanding on machines with pressure bar (also known as "sanding shoe"); the cause is often damage to the graphite layers. The best remedy is to check and if necessary grind the graphite layers frequently, or to replace the graphite layers.
- Unequal density of workpiece material can also cause differences in the amount of material removed and thus in belt wear. This applies particularly in sanding chipboard. The only remedy is to work with the most homogeneous material possible.
- If smaller workpieces are always placed in the same track, the sanding belt will be subject to more wear in this track. This uneven wear of the sanding belt will cause longitudinal stripes, which become more and more visible in the sanded surface. This can be avoided by staggered positioning of the workpieces, resulting in even wear of the whole of the sanding belt width.
- If felt is used on the pressure bars, it may be exposed to local burning due to the frictional heat, which will cause hardening. These hardened zones may cause longitudinal stripes during sanding due to their low yield. The only way to remedy this is to replace the felt.

1.3 Needle stripes

Needle stripes are raised, and mostly interrupted, narrow stripes on the workpiece in the feed direction. They run the same way as the oscillation track. They are caused by damage to the abrasive



Sanded beechwood (solid) with needle stripes

grain from mineral or metal particles entrapped in the material. If this happens, the sanding belt must be replaced. As a precaution, all possible measures should be taken to prevent mineral and metal inclusions in the workpieces.

Needle stripes may also be caused by premature contact of pressure bars. In this case, the workpiece edge will run against the sanding belt; this causes undesirable impact-type stress on the sanding belt and may cause grain breakout. This can be prevented by changing the contact moment.

In addition, wider felt can be used on the pressure bar to increase the contact area of the sanding belt and reduce the effective sanding pressure. This can greatly prevent the occurrence of needle stripes.

1.4 Burn tracks

Remains of glue on the wood surface, incomplete condensation of glues in chipboards, resin gall and oil-content or moisture in the wood may cause partial clogging of the sanding belts, often taking the form of peripheral stripes; these areas may then cause stripes to appear. Instead of sanding, these clogged regions of the sanding belt cause friction over the workpiece surface, thus generating burn marks. The sanding belt must then be replaced immediately.

The best preventive measure is to use exclusively workpiece material that has completely hardened glues and woods with low moisture content, and to ensure good removal of the sanding dust. It is recommended to use anti-static sanding belts.

2. Belt running faults

2.1 Belt fracture

This refers to belt fracture transverse to running direction. This should not be confused with belt failure due to creasing. In most cases this leads to joint failure.

The reasons for this may be as follows:

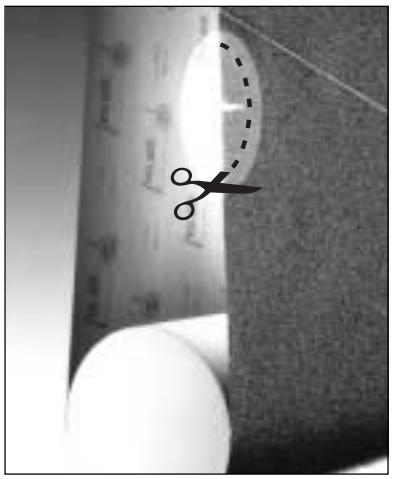
- Excessive belt tension
  (linked with excessive cutting rate)
- Splits in chipboards
- Inadequate joints in sanding belts
- Use of damaged sanding belts
  (wrong handling)

This can only be corrected by preventive measures to eliminate the causes, and by correct machine settings.

2.2 Creasing

In many cases, this fault is wrongly interpreted as belt fracture, as failure of the sanding belt is often the direct cause of creasing. The fragments of the belt should therefore be examined to look for a characteristic crease at an angle of about 20° to the belt direction. The cause is usually that the sanding belt oscillation is set too fast and/ or too jerky. Oscillation fre-quency should not be more than 25 doublestrokes per minute. The belt slide distance should be between 15 and 20 mm, and the change in direction should be jerk-free. A properly set belt reversal is not only better for the sanding belt, but also for the sanding machine, and reduces consumption of compressed air.

2.3 Cracks



Particularly when fitting a paper sanding belt, the belt may be damaged by carelessness, in such a way that there are cracks at the edges. Such cracks may also expand in operation, thus causing the belt to break. Cracks should therefore be cut to a round shape with a pair of scissors or a knife.

If a sanding belt has cracks with a length of more than 15mm, it should no longer be used.

2.4 Belt run-off

This term is used when the sanding belt runs off the rolls to the side (either to the motor side or to the operator side).

This fault may be caused by taper in the sanding belt, i.e. the edge lengths are different. This can be examined by measuring and comparing the edge length. The reason may be wrong storage conditions with the user (see item 3), or faults in manufacture. Mostly belt run-off is due to faults in the sanding machine. A relatively common cause of this fault is failure of the reversal mechanism of oscillation direction or wrong setting of the centre position of the regulating roll.

Wrong setting of the centre position of the regulating roll can be seen by differences in speed of the oscillation movements of the belt, similar to what happens with tapered sanding belts.

Failure in reversal of the oscillation direction is mostly due to the elements or switches which are to detect the lateral position of the sanding belt.

The following are the usual designs and their typical modes of failure:

- Air locks

Due to the high running costs, these detection elements are rarely used today; but they have few faults and if they fail this is almost always due to damage.

- Mechanical stop switch

Wrong positioning of the contact elements may cause the belts to run over them without switching; it is also possible that the contact elements may be damaged by the belt edges if they are in the wrong position. The switches may also stick if they are damaged (bent) or become dirty.

- Photodiodes

Dirt on the photodiodes is a common cause of faults. Frequent cleaning is therefore required. For reflex light barriers, another common fault is mal adjustment of the beam angle, or insufficient sensitivity of the receiver. To correct the fault, check the beam angle or adjust the amplifiers to increase sensitivity.

2.5 Drive roll slipping

On combined sanding heads (contact roll and pressure bar), with powered contact rolls, it is possible for these to slip, as this design means that the wrap-around angle of the sanding belts around the drive roll is too small to ensure reliable drive for the sanding belts. This can often be remedied by increasing belt tension; otherwise, the contact roll infeed may be increased, and the infeed of the pressure bar correspondingly decreased.

3 Special features for paper belts

Sanding belts with paper backing are manufactured under standard climatic conditions, i.e. at a temperature of 20°C and a relative humidity of 65%. If they are stored and used by the consumer at a different temperature, they may become deformed and warped. If the air is too dry, the edges of the sanding belt are warped towards the back, and if the air is too moist they warp towards the abrasive side.

Sanding belts must not be stored directly on the floor, as this causes higher moisture take-up on one side. The dimension changes caused by this result in different edge lengths (see also comments under item 2.4, “taper in sanding belt”).

Another possible fault is waviness of sanding belts due to transport and storage conditions, and this may cause disturbances in belt running.

It is therefore recommended to hang sanding belts as shown in the sketch, for a period of one or two days before use.