MANUAL

Primers

Important information for primer processors

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First class bonding

Jowat Klebstoffe

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Processing considerations for **Jowat®** Primer products

General information

Primers, also called adhesion promoters, are used whenever substrates that are difficult to bond due to their surface properties are to be joined. The purpose of adhesion promoters is to serve as a bridge between the substrate and the adhesive. This facilitates the technical bonding of the substrates despite difficult surface properties.
Primer formulations can be based on water or solvents. The formulations consist of a binding agent (base polymer), filling agents, additives, and either an organic solvent or water. Adhesion promoters primarily achieve their effect through mechanical interlocking and by forming chemical bonds between the primer and the substrate as well as between the primer and the adhesive.

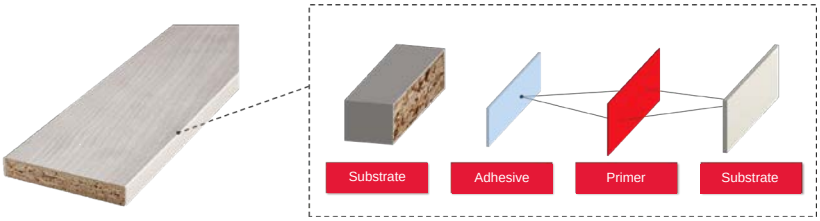


Figure 1 Structure of an adhesive-primer system as used in edgebanding.

It should be observed that different materials require different base polymers and/or different solvent compositions. The adapted primer can be applied to the substrate using anilox, gravure or rubber-coated rollers. In individual cases, the primer can also be applied by spraying.
Usually, the decision to use a primer is taken due to one of the following benefits:

- the possibility to bond different types of materials, which otherwise could not be joined with an adhesive;
- the conserving of a preceding surface pretreatment (corona, flame, etc.);
- improved surface wettability;
- increased surface area, allowing the adhesive to form “anchors” in the subsequent joining process; and therefore
- increased adhesion.

Water-based and solvent-borne primers have different characteristics that must be observed during processing and are highlighted in this manual.

Water-based primers

Water-based primers are physically setting systems. The binding agent is finely dispersed inside small droplets that consist of up to 10,000 macromolecules entangled and intertwined with each other. The boundary layer of the droplets prevents the macromolecules from moving freely in the aqueous phase. When the water evaporates during drying, it allows the molecular chains of the previously separated molecular branches to interlock. After that, the primer film is no longer soluble.
Water-based primers are usually tailored to the customers’ requirements. In general, there are three parameters through which a primer can be adapted:

1. The formulation of a primer influences e.g. the product’s wetting properties and adhesion. It also largely determines the drying process of the primer.
2. Viscosity plays a major role in the application characteristics of the primer. If the viscosity is too low, the primer will run down the substrate. If the viscosity is too high, the slightest evaporation may lead to a thick primer application and to an uneven wetting of the substrate. If the primer is diluted before application, it increases the risk of an insufficient application amount. In many cases, the range of processing viscosity is limited by the application technology used.
3. Primers often contain a UV marker or a dye to facilitate an optical inspection of the coating.

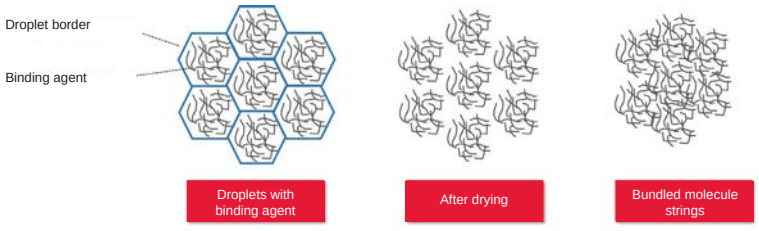


Figure 2 Schematic of the setting process of water-based primers.

Solvent-based primers

Solvent-based primers contain an organic solvent in which the binding agent is dissolved. The silicic acid is dispersed in that polymeric solution. The solvent functions as a transport and processing agent for the binding agent. When the primer is applied, it causes a swelling at the material interface, which allows the solvent to diffuse into the substrate surface. At the same time, the solvent starts to evaporate.

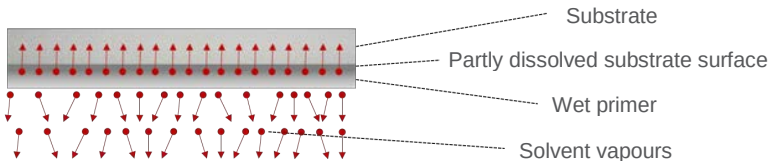


Figure 3 Chemical processes when solvent-based primers are applied.

Solvent-based primers are usually tailored to the customers' requirements. In general, there are three parameters through which a primer can be adapted:

1. The formulation of the solvent influences e.g. the product's wetting properties and adhesion. In addition, it largely determines the drying process of the primer. The choice of solvents may also be restricted by legal requirements in some cases.
2. Viscosity plays a major role in the application characteristics of the primer. If the viscosity is too low, the primer will run down the substrate too quickly. If the viscosity is too high, a slight evaporation may lead to a thick primer coating and an uneven wetting of the substrate. If the primer is diluted before it is applied, it increases the risk of an insufficient application amount. Often, the viscosity range is determined by the application technology used.
3. Many primers contain a UV marker or a dye to facilitate an optical inspection of the coating.

Homogenisation

In general, homogenisation describes the process through which two mutually non-soluble components are made the same throughout, with a uniform consistency.

Figure 4 Before homogenisation – the filling agents settle on the bottom (left). Thorough stirring ensures a uniform distribution of the components (right).

During storage, the different components in the primer will settle on the bottom of the container due to their different specific gravities (sedimentation). To prevent application flaws and ensure a high-quality coating it is therefore of utmost importance to make sure the primer is homogenised before application. In addition, some primers are thixotropic, i.e. the viscosity decreases when exposed to shear movement (e.g. by stirring or pumping), and will only reach the consistency necessary after a certain homogenisation time.

Applying an insufficiently homogenised primer will lead to bonding failures. There are two different failure patterns:

1. If the solvents at the top of the container are applied
   The surface of the primer coating is too “smooth” due to an insufficient concentration of fillers in the primer (see **Figure 5**). Therefore, the adhesive cannot interlock properly with the primer. Adhesion is too low and adhesion failure between the primer and the adhesive is the result.
2. If the deposits at the bottom of the container are applied
   The concentration of fillers is too high and there is insufficient binding agent in the primer coating (see **Figure 6**). Stress then leads to a premature cohesive failure of the primer in the bondline.

When a crosslinking is added (see remarks concerning two-component systems), the correct mixing ratio must be observed and sufficient homogenisation an absolute requirement.
Homogenisation is typically achieved by stirring and should be carried out permanently if possible or at least before processing and application. Intermittent operation is possible after an initial stirring. A turbulent flow during mixing is necessary to ensure a complete homogenisation of the primer also in corners and near container walls. This is often solved by using an eccentric mixer. A turbulent flow is achieved by using a centrally offset mixer. However, this may lead to an insufficient stirring at the opposite end of the stirring unit, which is why a longer stirring time is required compared to a centric mixer. If a centric mixer is used, baffles or a suitable structural design of the stirring unit may provide good results.

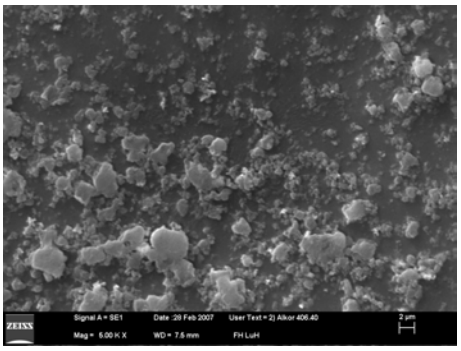


Figure 5 SEM photo of an insufficiently homogenised primer. The silicic acid content in the primer layer is too low.

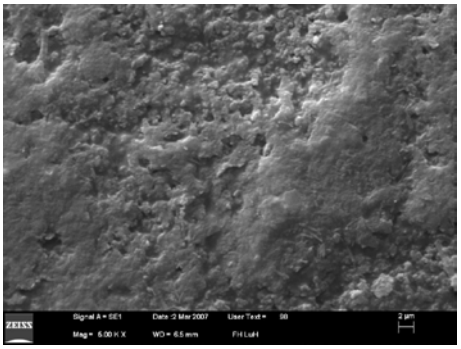


Figure 6 SEM photo of an insufficiently homogenised primer. The silicic acid content in the primer layer is too high due to sedimentation in the primer container.

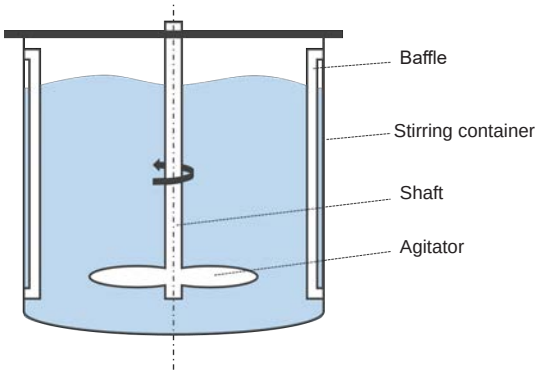


Figure 7 Centric agitator design.

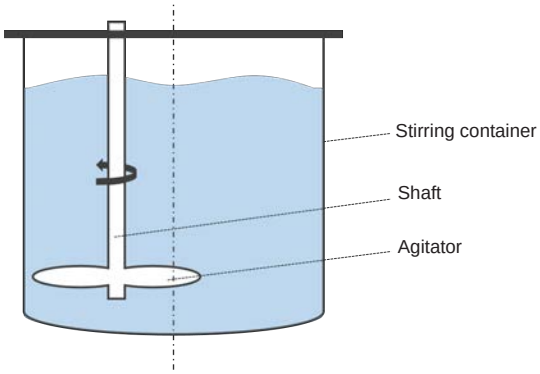


Figure 8 Eccentric agitator design.

In general, the stirring time has to be determined by testing and depends on:

- the stability of the primer
- the viscosity desired
- the size and shape of the container
- the time in storage of the container
- the stirring apparatus as well as the type and size of the agitator blades
- the stirring speed.

Example: A water-based primer is supplied in 1,000 litre containers. Before processing, the primer is homogenised for 15 minutes, using a bucket mixer. After that, the viscosity is measured with a DIN cup. This allows the processor to determine whether the stirring time needs to be increased or reduced.
Manufacturers of mixers supply a range of suitable stirring units and adaptors for different container types.
For hobbocks (metal buckets), it is advisable to use compulsory mixers that are available in manual as well as standard versions. Drums and IBCs can be homogenised using special top entry mixers.

Figure 9 Drum mixer. [1]

Figure 10 Container mixer with bridge. [2]

Observe:
Although the homogenisation of the primer plays a major role in the quality of the coating, excessive stirring and pumping can have a detrimental effect on the binding agent. That problem can be prevented by making sure that only a sufficient amount of primer is mixed that will be processed within a short period of time. The table below provides an overview of different mixing times for several container types based on experience in the field. However, it should only be used as a rule of thumb, as many factors such as speed, blade geometry, etc. play a major role.

Container type	Stirring time [min]
Hobbock (metal bucket)	10 – 15
Drum	10 – 15
IBC	15 – 20

Please do not hesitate to contact us if you need more information to help you find manufacturers of suitable mixers or have further questions.

Wettability and surface pretreatment

A consistent quality of the primer application can only be ensured if the substrates to be coated are clean, dry and free of dust. This is critical to prevent adhesion failure between the primer and the substrate when stress is applied. The foundation of a high-quality primer coating is an even and thin wetting of the substrate surface. It is a prerequisite for sufficient adhesion. Surface wettability is determined by the ratio between the surface tensions of the material to be coated and that of the primer. Generally speaking, the wettability of a liquid on a carrier will be better the higher that ratio is. Therefore, there are two possibilities that can also be used together to improve surface wettability:

1. reduce the surface tension of the primer; or
2. increase the surface tension of the substrate.

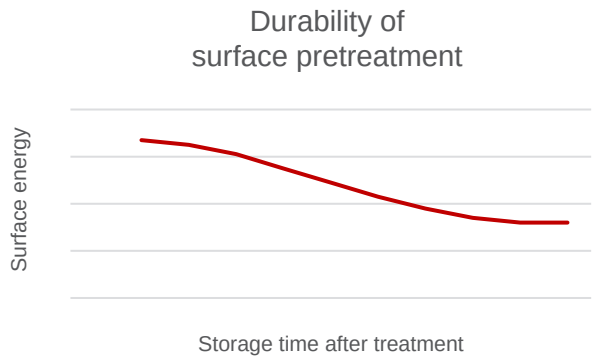


Figure 11: The surface energy continues to decrease after the activation. Therefore, the primer should be applied directly after pre-treatment.

The surface tension of the primer can be reduced with additives in the primer. In this section, however, the main focus should be on how to adapt the free surface tension of the carrier material. A pretreatment of the surface can activate the substrate surface and considerably improve wettability.
Typically used methods are a corona pretreatment or activation by flame. The pretreatment must take place directly before the primer is applied, because the surface energy will decrease again over time as can be seen in **Figure 11**. Unnecessary contact with the surface, e.g. rolls or rails, should be avoided.

Wettability can be quantified by measuring the angle of contact between the liquid-solid interface and the liquid-vapour interface.

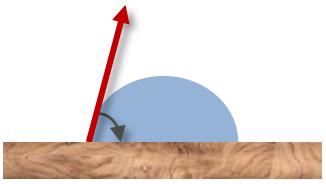


Figure 12: Insufficient wetting – The surface tensions of the liquid is higher than the surface tension of the carrier material.

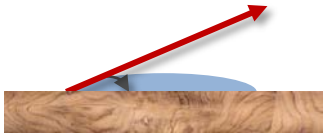


Figure 13: Good wetting – The surface tension of the liquid is lower than the surface tension of the carrier material.

In general, wetting will be better the smaller the contact angle is. Surfaces with a very good wettability have a contact of almost zero. This is referred to as “spreading”.
Another simple method to determine the surface tension of a substrate is to use test inks. An ink with a known surface tension is applied quickly to the substrate. If the ink contracts, the procedure is repeated with the next lower ink until the surface tension of the ink is approximately the same as that of the substrate.

Primer application

If the conditions for a good primer coating are met (see chapters Wettability and surface pretreatment and Homogenisation), it is time to ensure an optimum application of the primer. Usually, the primer is applied by a roller. In individual cases, water-based systems may be applied by spraying. The primer must be applied in a thin, even and continuous layer. Depending on the adhesive system used later, the following application amounts for primers can be used as a guideline:

Table 1 Guideline values for the application amount of primers.

Downline adhesive system	Water-based dry $[\frac{g}{m^2}]$	Water-based wet* $[\frac{g}{m^2}]$	Solvent-based dry $[\frac{g}{m^2}]$	Solvent-based wet* $[\frac{g}{m^2}]$
Dispersion adhesives	2 - 4	6 - 12	2 - 4	13 – 26
Hot melt adhesives	5 - 10	15 - 30	5 - 10	33 – 66

* Based on the following solids contents: water-based 32 %; solvent-based 15 %.

In any circumstances, the application amount must be high enough. Otherwise, it will lead to flawed bonding. If the application amount is too low, it will lead to insufficiently interlocked filling agents (silicic acid) in the polymeric solution. In addition, there may also be uncoated areas. Each uncoated spot will later contribute to a weakening of the adhesive bond.

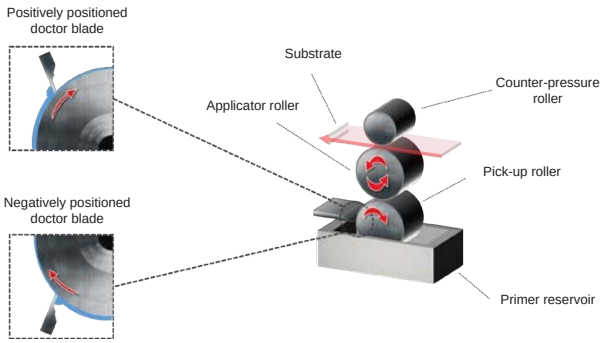
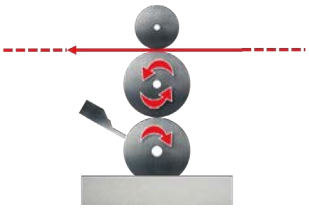
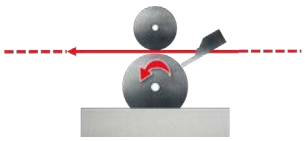
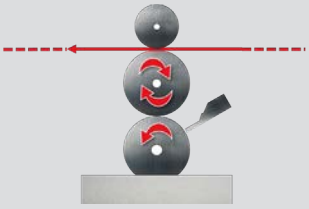


Figure 14 Schematic of the design of a roller applicator system - with indirect forward roller application. The doctor blade can be positioned negatively or positively to the rotating direction.

The primer is often applied indirectly, i.e. a pick-up roll transfers the primer from the pan to the applicator roller before it is finally applied to the substrate.
A doctor blade removes excess primer and ensures a constant and even application. In direct application methods, the applicator roller also functions as a pick-up roller. Doctor blades can be arranged in positive or negative direction of the roller rotation, each design with its own advantages and disadvantages. The positively positioned doctor blade has a reduced risk of silicic acid accumulation over time. However, it increases wear on the pick-up roller. Negatively positioned doctor blades usually wear out sooner compared to doctor blades in a positive position. Despite of the benefits of a doctor blade in terms of primer metering, blade-free systems are also used in the field.
The rotating direction of the applicator roller also plays an important role in the quality of the primer application. Depending on the requirements, there are several advantages and disadvantages, shown in **Table 2**.

Table 2 Advantages and disadvantages of roller application systems and application direction.

Application direction	Indirect	Direct
Forward		
	Quick adaption to the profile width possible.	Reduced costs compared to the direct method because a pick-up roller is not needed.
	Coating up to the edge.	Small evaporation area and therefore a low increase in viscosity over time.
	Metering can be adapted through the choice of anilox roller.	Good metering.
	“Fishbone” application.	Can only be used for flat profiles.
	Only limited adaptability to the profile shape due to hardness of the roller.	
	Big evaporation surface.	
Reverse		
	Primer distributed evenly.	No pick-up roller.
	Sharp coating edges.	Very even application.

Application direction	Indirect	Direct
	Increased roller wear.	Little experience in the field yet.
	Needs primer with good gliding characteristics.	Ceramics rollers are strictly necessary.
		Only for absolutely flat surfaces.

Methods and primer metering

The primer is usually metered by a doctor blade and the chosen gravure roller. It is also possible to use adaptable metering rollers (see **Figure 15**), usually consisting of a smooth rubber roller (EPDM) or steel roller with a knurled surface. By changing the size of the nip between the pick-up roller and the metering roller, processors can adapt the application amount. Pick-up and metering rollers are designed as a counterpart to each other, i.e. one roller has a smooth and the other one a structured surface.

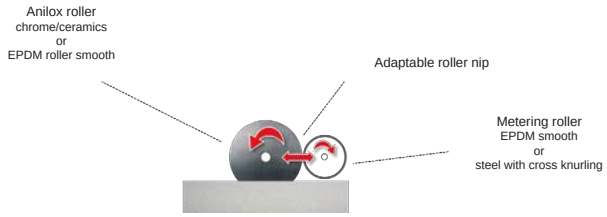


Figure 15 Primer metering with metering roller.

Application systems with an adaptable nip can be a good choice for applications that require a very precise metering (see **Figure 16**). The adaptable nip width between the pick-up roller and the applicator roller allows a very precise setting of the application amount. The primer should have a medium viscosity. Forward and reverse can be integrated in this process.

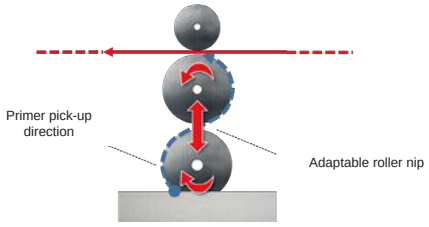


Figure 16 Schematic design of a roller applicator with adjustable roller nip.

It must be ensured that fillers are not crushed by high shear forces in the roller nip during processing. This method also has certain limitations regarding the coating thickness. If a very thin coating is required, roller application systems with adaptable nip should be avoided.

Methods to prevent solvent evaporation

The evaporation of a large amount of solvents during processing can lead to an undesired increase in viscosity. Therefore, any open surfaces of the primer reservoir should be as small as possible. The width of the applicator roller should be only minimally bigger than the substrate to be coated. A smaller diameter of the roller will also reduce the amount of solvent evaporation. A smaller diameter is therefore more favourable, but it should also not be too small because increased rotational forces due to smaller diameters lead to splattering and an uneven primer application.

Drying considerations

The term “drying” comprises all methods that lead to a solidification of the primer film. This process is of particular importance because materials that are rolled before completely dry may block. This means, the substrate will stick to itself and may be very difficult or impossible to unroll. In the worst case, the solvents may penetrate into the top and decorative layers, with a detrimental effect on appearance and quality. In addition, incomplete drying can compromise the primer surface. The polymers and silicic acid used will then form a virtually closed film that makes the physical bonding of the hotmelt adhesive difficult. This can lead to an adhesion failure in the bondline.
In general, the primer is dried through physical methods. The ideal drying conditions must be determined by testing in each individual case and depend on six factors:

- application amount
- temperature of the materials
- drying temperature
- air speed
- feed speed
- solvents used.

Water-based and solvent-based systems require different drying methods due to their differing characteristics.

Drying time

Solvents in the primer film should evaporate as fast as possible. The longer they are allowed to act, the more will they diffuse into the substrate. Subsequently they are very difficult to remove and can have a negative impact on the characteristics. Water-based primers usually require a longer drying time.

Drying temperature

Higher temperatures will require a shorter drying distance. It should be observed that evaporation has a cooling effect that slows down the drying. Therefore, drying should always be carried out above room temperature. Temperatures that are too high (primer temperature > 60 °C) may lead to foaming in the primer, which will result in a low cohesion in the primer and a premature failure of the subsequent adhesive bonding. In addition, temperatures that are too high may also soften the binding agent and form a film on the surface. If the substrate runs through a pulling device prior to rolling, it smoothens the surface. If that happens, the adhesive can no longer interlock sufficiently with the primer layer. The result will be a premature adhesion failure.
Water-based systems generally require higher drying temperatures or longer drying times compared to solvent-based products.

Drying air

To prevent the air directly around the substrate from becoming saturated with solvents, the volumetric flow rate of the air should be as high as possible. Furthermore, the direction of the air flow should be against the machine running direction. Ideally, the air has been dried previously. Turbulent flows are preferable to directed flows. Air containing solvents has to be extracted and cleaned, e.g. by thermal oxidising. Water-based systems usually do not require such an extraction.

Uniformity of the coating

An unevenly applied primer coating will also result in an uneven drying. In the case of fishbone application patterns it has to be ensured that the entire primer is completely dry to prevent an inferior quality of the subsequent bonding.

Drying methods

Air drying

Air drying is the easiest drying method. Solvents with high boiling points have a very slow evaporation rate and therefore require very long drying zones. In addition, the substrate will absorb the solvent due to the long dwell time, which may have a detrimental effect on top and decorative layers and may possibly also have a negative impact on the substrate characteristics. Apart from that, solvent-based primers require an air extraction system. The procedure is not suitable for water-based primers. Due to those aspects, this drying method is not recommended.

Convection drying

In this method, the primer is dried by blowing a turbulent, heated air flow over the primer. The degree of turbulence will influence the result, and higher turbulence can generally improve the drying. Usually, the heated air is blown onto the substrate using slot nozzles or round nozzles. The heated air increases the temperature of the primer and allows the solvents and water to evaporate. Several nozzles may be installed in a series for a more uniform drying. Air containing solvents is subsequently extracted.

Infrared (IR) drying

This method involves infrared radiators to heat the coating. The radiation is partly absorbed by the primer and excites vibrational modes in the molecules. The molecule movement creates heat that is used to evaporate the solvents and water in the primer. This method is more effective and provides a more uniform drying compared to convection drying because the entire primer film is heated simultaneously and not from top to bottom. IR drying is often used in combination with a nozzle drying channel, where the primer is heated by infrared and the moisture is removed by the circulating but not heated air.

Considerations for 2-component systems

Coating PP and PET substrates in particular requires the addition of a crosslinking agent. Depending on the system used, 3 to 5 % of crosslinker are added to the primer during homogenisation. In addition, surfaces have to be pretreated (plasma, corona, flame, etc.) to add the hydroxyl groups necessary for the hardening process. Ideally, crosslinker containers should be processed directly and entirely after opening. If this is not possible, the container must be sealed hermetically to prevent the crosslinking agent from reacting with air moisture. The crosslinking agent should be added slowly during stirring to ensure that the product is sufficiently mixed. After that, the hardening process begins, i.e. the chemical reaction already starts in the primer reservoir and in the container. This leads to an irreversible increase in viscosity until the primer reaches its final strength after 24 to 48 hours. Therefore, only as much material should be mixed as will be processed. As a guideline, all mixed material should have been processed after 1.5 hours. Both time frames may be different in the field due to changing temperature and humidity conditions.
Although homogenisation is of fundamental importance, excessive stirring or pumping will reduce pot life and is therefore to be avoided. The primer is also very sensitive until it has reached its final strength. Downline operations, for instance cutting, should therefore be carried out only when completely dry and after appropriate crosslinking time. Non-crosslinked, warm primer is tacky and substrates are therefore to be cooled (e.g. in a cooling zone) before rolling to prevent blocking.

Quality evaluation

In general, the quality of a primer coating cannot be evaluated immediately. This can only be done after the actual adhesive bonding. However, several methods can provide an indication of problems in the primer coating process already.

Uniformity

Many primers contain UV markers or may be dyed in some cases, to help with an optical evaluation. This allows a verification of the primer structure in the coating under UV light.

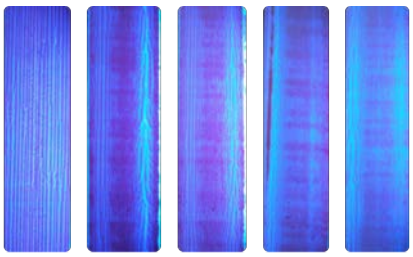


Figure 17 Example of a bad primer coating. The application on all samples is uneven. There are clearly visible parts with too much as well as with virtually no primer.

The primer coating should be as even and homogeneous as possible. In some cases, a fishbone structure cannot be avoided due to the application technology used. Special attention must be paid to a proper drying in those cases, because areas with a thicker primer layer need more time for drying (see also the information about drying). An evaluation with UV light does not allow any conclusions about the prior homogenisation of the primer.

Standard tests

A reliable assessment of the quality of a primer coating is only possible after test bonding. The bonded specimens are then exposed to different stresses and the results in those tests then allow a conclusion regarding the quality of the primer coating. However, it should be observed that the entire compound consisting of substrate, primer and adhesive must be tested and analysed. The specimens for testing are bonded using established adhesive systems based on EVA, PO and PUR. The exact choice of adhesive and tests depends on the requirements of the customer and the intended purpose of the product. For more information regarding possible tests, please contact us.

Best-before date

The applicable best-before dates are indicated on the container label of the primer. Water-based systems can be homogenised to an unlimited extent without any detrimental effect on quality. The frequent opening and closing of containers (e.g. for filling) leads to an evaporation of solvent-based systems, which can lead to unintended changes in viscosity. It is therefore recommended to process the material as quickly as possible after the container has been opened.
Dry primer layers on substrates are generally not affected by time, provided that the coating is not exposed to incorrect use, detrimental environmental influences or other parameters. The processor is therefore responsible for ensuring that coated substrates are stored correctly under consideration of the prevailing ambient conditions.

Cleaning

Water-based primers can be cleaned with warm or cold water. The water may be mixed with a small amount of flushing agent or isopropanol for easier cleaning. Steel rollers may additionally be cleaned using a soft plastic brush. The use of NMP/NEP or MEK cleaning agents or solvents can be an alternative for dry primer residues and solvent-based primers. Another possibility is the cleaning of steel rollers using **Jowat®** Cleaner 930.60 in a heated bath for 2 hours at 130 °C with continuous circulation.
Please make sure to also coordinate cleaning methods with the machine supplier.

Handling, safety and disposal considerations

Transport, storage, containers

Primers should be stored hermetically closed, cool and dry. The best-before date on the container label and the information in the safety data sheet of the product used must be observed. Record the date the containers are opened in your documents. Water-based primers are frost-sensitive, which may require a thermally controlled transport and corresponding storage conditions during winter.
Solvent-based systems are classified as hazardous materials in many countries, which may impose additional requirements for transport and storage. In many cases, this also depends on the amount of primer to be transported/stored. In some cases, additional explosion prevention measures may be necessary. Each individual case is different and a generalised statement about what measures are necessary is not possible.
Please make sure to carefully check the regulations applicable in your country.
A wide range of different containers facilitate convenient handling, secure storage and a safe transport. Primers are typically supplied in metal buckets (hobbock), ribbed metal drums with bung closure, or in IBSs, depending on the quantity needed and the application. Please contact us if you need further information for choosing a suitable container.

Figure 18 Left to right: Hobbock, ribbed metal drum and IBC.

Occupational safety measures

Jowat primers contain organic solvents that evaporate at room temperature already. Appropriate ventilation and extraction systems are generally needed. This is also necessary for a sufficient drying. In addition, explosion prevention measures are to be taken when solvent-based primers are processed.
Please read and observe the information in the corresponding safety data sheet for the product processed.

Environment protection measures

When solvent-based primers are processed, the air used for drying is to be extracted and cleaned by thermal oxidising.
Please read and observe the information in the corresponding safety data sheet for the product processed.

Conformities

Many applications in the industry require different conformities, e.g. IOS-MAT.
Our Environmental Management Department can provide a written confirmation of conformity for all Jowat® primers. If necessary, please contact our sales representatives.

Disposal of rest quantities and packaging materials

Observe the information in the safety data sheet for the corresponding product when disposing of primer remnants and packaging.

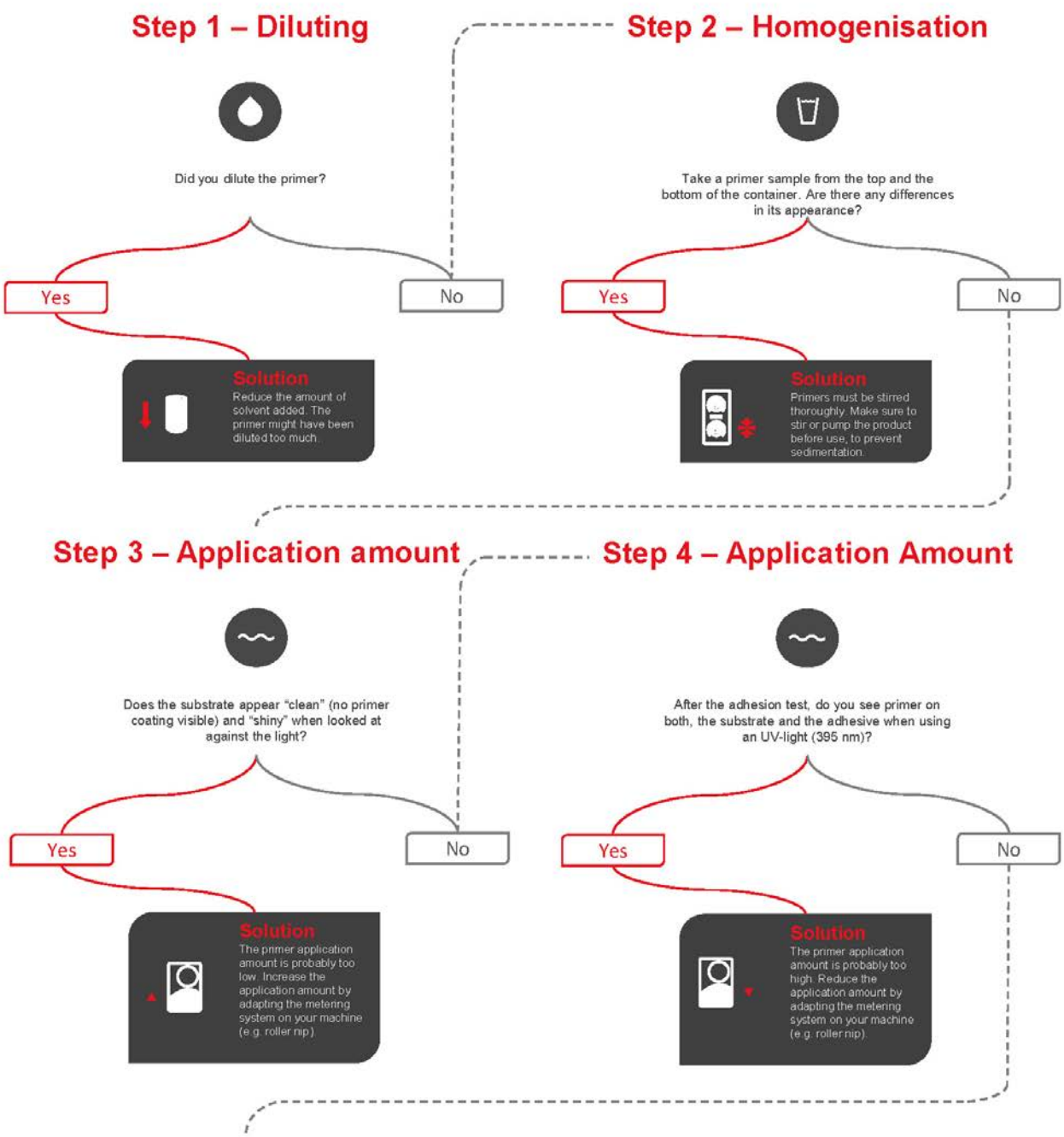
Troubleshooting

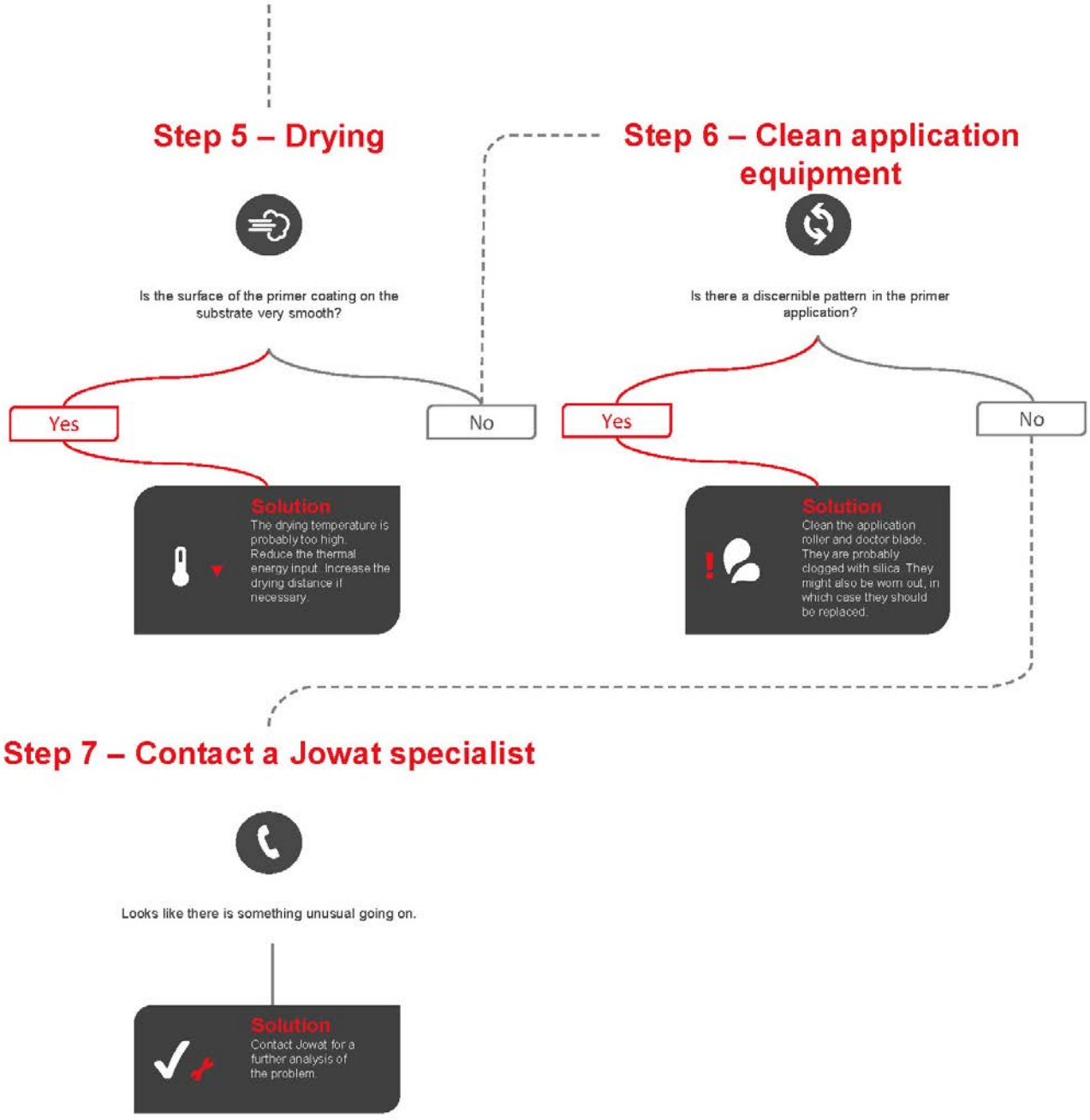
Problem	Possible causes	Corrective actions
• Uneven application	• Roller worn out • Doctor blade worn out • Silicic acid build-up at the doctor blade • Rollers run in forward direction • Viscosity too high due to evaporation of solvent • Uneven pressing	• Replace roller • Replace doctor blade • clean doctor blade • If possible, run rollers in reverse direction • See methods to prevent solvent evaporation • Correct pressing • If necessary, replace rollers or roller bearings
• Application too thick / thin	• Roller nip too narrow / wide	• Adapt roller nip between applicator roller and pick-up roller • Adapt nip between roller and metering roller • Readjust doctor blade • Use a different roller
• Foaming in the primer layer	• Drying temperature too high	• Reduce drying temperature, increase drying distance
• Primer layer extremely smooth – insufficient adhesion to the adhesive	• Drying temperature too high	• Reduce drying temperature, increase drying distance
• Substrate blocking when rolled	• Primer not dried completely	• Increase drying distance • Increase air volume
• Delamination of downline bonded parts after storage in heat over time	• Primer and adhesive might be incompatible with each other	• Check primer – adhesive system
• Adhesion failure between adhesive and substrate • Under UV light (395 nm): primer visible on the adhesive and the substrates	• Cohesion failure in the primer	• Check primer application – reduce application amount if necessary • Check homogenisation

Problem	Possible causes	Corrective actions
• Adhesion failure between substrate and adhesive • Low peel strength and heat resistance of downline bonded parts • Substrate looks “smooth” and “shiny” when viewed against the light	• Primer application too thin • Primer diluted too much • Primer not homogenised sufficiently • Deficient edgebanding	• Increase primer application amount • Do not dilute the primer • Improve homogenisation procedure • Check edgebanding – application amount, temperature, pressing, etc.
• Adhesion failure between primer and adhesive • Low peel strength and heat resistance of downline bonded parts • Spotty primer coating • Substrate visible clearly through the primer	• Primer diluted too much • Primer not homogenised sufficiently • Gravure roller clogged	• Clean rollers more frequently • Check position of doctor blade • Do not dilute the primer • Improve homogenisation procedure

Do you notice low peel strengths?

Follow the instructions below




Step 5 – Drying
Is the surface of the primer coating on the substrate very smooth?
Yes
No
Solution
The drying temperature is probably too high. Reduce the thermal energy input. Increase the drying distance if necessary.
Step 6 – Clean application equipment
Is there a discernible pattern in the primer application?
Yes
No
Solution
Clean the application roller and doctor blade. They are probably clogged with silica. They might also be worn out, in which case they should be replaced.
Step 7 – Contact a Jowat specialist
Looks like there is something unusual going on.
Solution
Contact Jowat for a further analysis of the problem.

Is the decor layer on the edgeband or foil slightly dissolved?

This problem usually affects only ABS substrates. It occurs when the styrene is dissolved by the solvents in the primer.

Follow the instructions below

Step 1 – Winding

Reduce the winding tension.
Has this improved the result?

Yes

Solution
Reduce the winding tension. Tight winding promotes the penetration of solvents into the top layer of the substrate. If this improves the result but does not entirely fix the problem, try the following steps as well.

No

Step 2 – Drying

Increase the drying distance or drying power.
Has this improved the result?

Yes

Solution
The substrates might have been winded before the primer was completely dry. Increasing the drying power helps fix the problem.

No

Step 3 – Protective foil

Do you have the possibility to wind the substrates with a protective foil?

Yes

Solution
If nothing else helps, there is still the option to wind the substrates together with a protective film that functions as a barrier between the primer coating and the top layer.

No

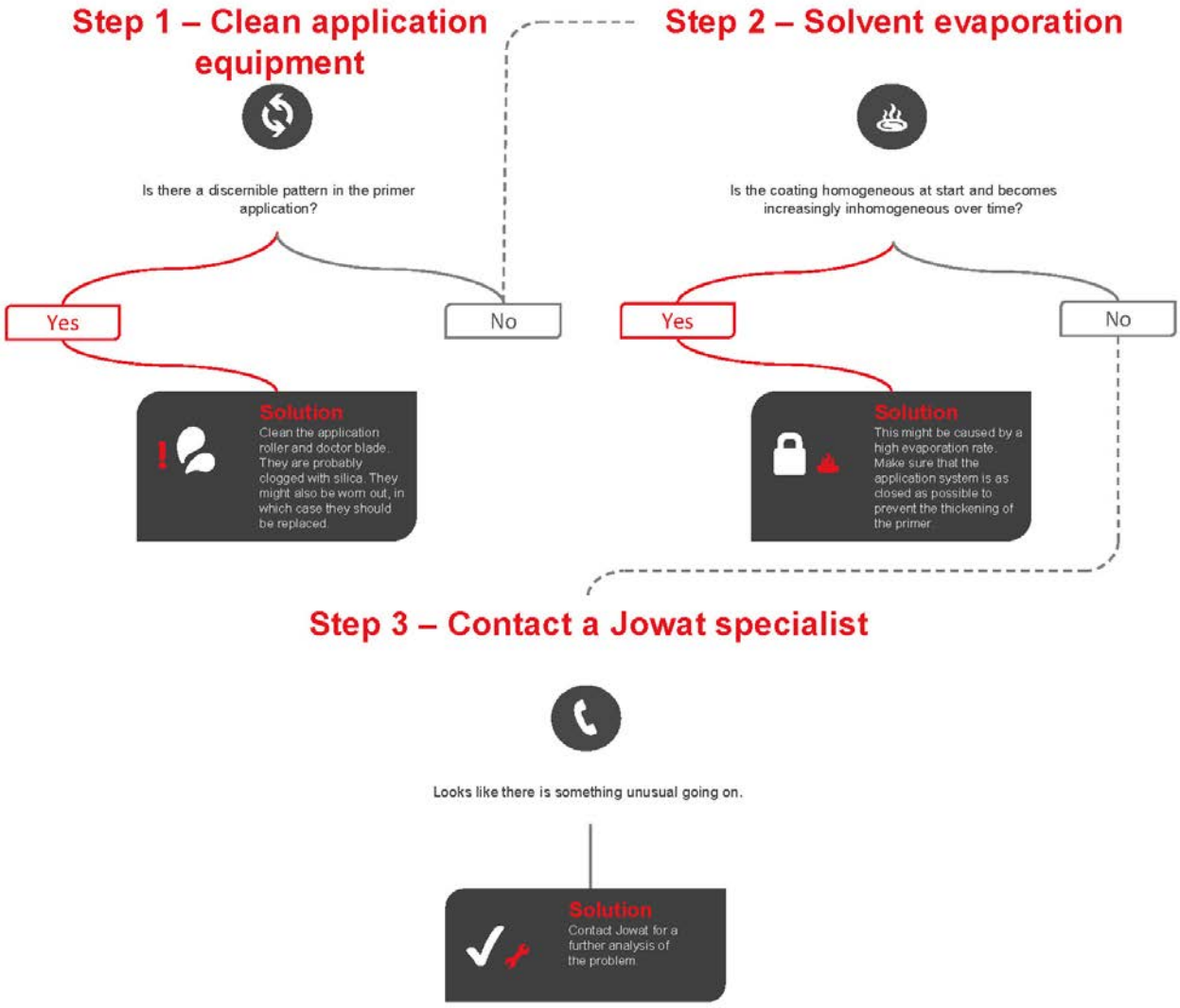
Step 4 – Contact a Jowat specialist

Looks like there is something unusual going on.

Solution
Contact Jowat for a further analysis of the problem.

Is the primer application uneven?

Follow the instructions below



FAQ

For how long can primed substrates be stored after coating?

Without knowing the ambient conditions to which the primer is exposed, it is not possible to say for how long the substrates may be stored before the coating deteriorates. Please contact your edgeband manufacturer for more information.

Can I dilute the primer to reduce its viscosity?

Primers should not be mixed with solvents or other substances due to the unpredictable influence on the product's behaviour, on quality and on safety aspects. All Jowat® primers are generally ready for use.

How can I clean my applicator unit after the primer coating?

Please observe the information in the cleaning section.

The primer coating looks different than usually.

This can have many different causes. See the troubleshooting table above. Our colleagues from the technical departments will also be pleased to provide further assistance if necessary.

The best-before period has elapsed. What should I do?

If the primer has been stored in ambient conditions according to the information in the technical data sheet, it is possible to extend the best-before period after a thorough inspection.

Adhesion failure of edgebands coated with primer.

This can have many different causes. See the troubleshooting table above. Our colleagues from the technical departments will also be pleased to provide further assistance if necessary.

Gravure – prior or after primer coating?

If the gravure is applied after the primer coating, the pressing may lead to a compression of the primer. A sufficient interlocking between adhesive and primer may no longer be possible. The bonding might not achieve the necessary strength.

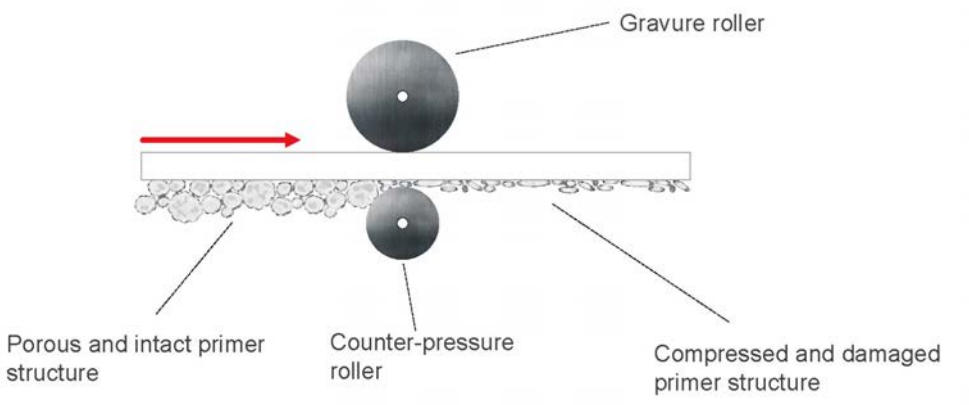


Figure 19 Consequences of engraving after primer coating.

The edgeband formulation has been changed – things to consider.

Primers are generally tested and approved for a specific edgeband. Changes to the edgeband formulation can have major effects on the behaviour of the primer. Whether the primer system still meets the quality requirements must be verified in each individual case. Spreading may also be affected because often the solvents in the primer prepare the substrate surface for the coating. Our colleagues from our technical departments will be pleased to assist you further in case of a formulation change.

Changing from a solvent-based to a water-based system – things to consider.

A change to water-based systems usually also requires modifications to the application technology. Different rollers may be necessary. Engraved rollers (crosshatched instead of cells) provide good characteristics for that purpose. Their surface pattern is intended to prevent primer from drying on the roller. Consequently, the roller would have a smaller diameter. The crosshatched pattern prevents the build-up of silicic acid in the grooves. A longer drying zone is necessary to facilitate a gentle drying and to prevent damage to the polymers due to temperatures that are too high. Please also observe that solvent-based systems generally have a better tolerance for small variations and deviations in the primer coating process. Conversely, water-based primers are more sensitive to such deviations. Special attention should therefore be paid to reproducible process conditions.

What feed speeds are possible?

Feed speeds from 2 to 60 m/min are widely used in the field. The actual speed depends on the edgeband thickness and the extrusion capacity. Off-line processes allow higher speeds because constant framework conditions and process parameters are easier to maintain.

Primer coating – off-line or in-line?

The primer coating can take place in- as well as off-line. In-line procedures require less investments due to no additional costs for machinery. Offline procedures generally facilitate higher feed speeds and constant process conditions. Which method is used therefore depends on speed and quality requirements as well as on the budget.

References

[1] F. Geppert, “Geppert-Mixing,” 24 06 2019. [Online]. Available: http://www.geppert-mixing.de/cre/. [Accessed 24 06 2019].

[2] F. Geppert, „Geppert-Mixing,“ 24 06 2019. [Online]. Available: http://www.geppert-mixing.de/fr/. [Zugriff am 24 06 2019].