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Official media of the
British Printing Industries
Federation Labels Group



Linerless material

Applications, components and where special attention is required

Wolfgang Aufmuth

The use of linerless labels has increased steadily during recent years. The variety of applications is continuously developing and the growth potential for these labels is huge.

Labels are an integral part of our everyday life. They are used for carrying advertising and information. Most of the self-adhesive labels on the market are made from traditional self-adhesive laminate where the release liner is created by first applying a thin layer of silicone to a special paper or plastic foil. An adhesive is then applied to the release liner before the label material – also paper or plastic foil – is laminated immediately afterwards. Uncoated or coated papers are normally used, as are functional papers such as thermal papers.

Self-adhesive labels

The manufactured jumbo rolls (width up to 2 metres) are then cut into narrower rolls before being processed further on printing and die-cutting machines. In many cases, a multi-coloured print image is added, inline die-cutting of the label is carried out, the matrix is removed and the roll is then cut again into narrower single rolls. The finished label can then be detached from the release liner – either mechanically using a high

speed dispensing unit or by hand – and then applied to the corresponding product container.

Labels produced using conventional methods have the advantage that a variety of different label formats can be produced and high production speeds can be achieved nowadays – e.g. self-adhesive laminate can be manufactured at speeds of 1,000 m/min (3280 fpm) and more.

Sustainability

A major disadvantage is the non-recyclable material waste. This relates in particular to the matrix that accumulates during label production and is usually disposed of along with the release liner. All in all, the proportion of waste that cannot be recycled – or can only be recycled with great difficulty – is in the region of 50% or more.

The perfect solution would be to produce labels which do not have to be die-cut and do not need a liner. A satisfactory answer has been around for years in niche applications. Many years ago, meat or cheese purchased at the deli coun-

ter was packed in plastic bags and the receipt attached to the bag using a stapler. After this method of sealing bags was no longer allowed, an alternative was needed. The solution came in the form of a technology that was developed in England in the 1980s for labelling tins of beans, which was then optimized and implemented accordingly and now allows labels of different lengths to be used at the point of sale to seal bags and carry information.

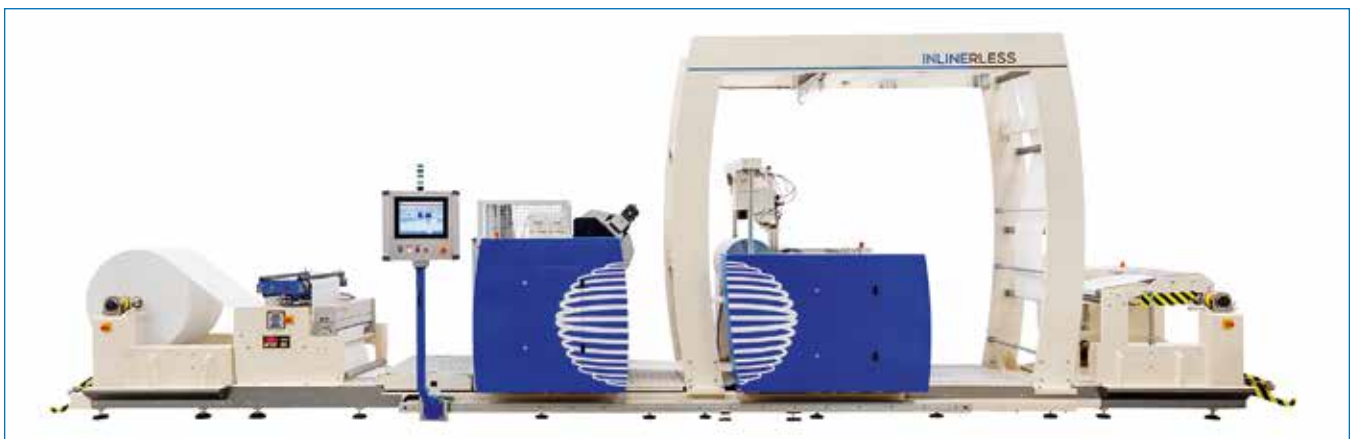
Strictly speaking, this is more of a tape solution than a label solution as the product has the same structure as a roll of adhesive tape. A carrier is siliconized on the surface and coated with adhesive on the reverse side. This construction means no release liner is necessary.

“As this method of printing different information is just like a label, the terms linerless materials and linerless labels have become commonplace.”

While the liner of an adhesive tape is often made of plastic, the label solution usually uses paper. As different information has to be printed on the paper at the point of sale and printing on the silicone surface is not possible, thermal paper has to be used. Printing the information is then carried out via conventional direct thermal printing. Once the information is printed, the thermal paper tape can be torn off at a serrated edge and fixed in place.

As this method of printing different information is just like a la-

Production lines for linerless materials production such as the inlinerless system by Maan



Source: Maan

bel (but one that doesn't use a release liner), the terms linerless materials and linerless labels have become commonplace.

In addition to the material savings, this label system also has other advantages:

- 50 to 60% more labels per roll
- Less storage space required for the same number of labels
- Fewer roll changes
- Variable label length and flexible print format
- No matrix waste
- No release liner waste
- No storage space required for release liner waste
- No transport and disposal costs for release liner and matrix waste
- Saves resources
- Environmentally friendly
- Up to 30% reduction in material costs¹
- Up to 15% savings in total costs¹

What components are required for producing a linerless material?

■ First, a suitable thermal paper is required. The thermal paper must allow good anchorage of the adhesive to the reverse side is possible. At the same time, it must also be impermeable so that no part of the adhesive can penetrate through the paper into the thermal layer and render the printed information illegible. The surface must be such that good anchorage of the silicone is guaranteed without the silicone being absorbed into the surface and neutralising the release effect. As a rule, papers with a topcoat and back barrier fulfil these requirements very well.

■ The silicones used are usually UV-curing. The correct viscosity is important. When the viscosity is too low, the silicone can penetrate the surface of the paper and can then no longer be cured sufficiently. There is a particularly high risk of this when using papers with a porous structure and without a topcoat.

Another important factor is selecting the right adhesive. Aqueous adhesives penetrate the paper structure and then have to be dried. The paper warps during drying and renders the label roll unusable. This rules out dispersion adhesives and

solvent-based adhesives, thus leaving us with 100% systems like traditional rubber based hot melts and radiation curable hot melts.

The right adhesive

Traditional hot melts are easier to apply – simply melt, coat, wind and you're done. It is important to also select the right product when using hot melts as the adhesive has to meet several different requirements:

- It must be possible to detach it from the silicone layer

Linerless labels – Advantages in short

This type of label has a range of advantages:

- Material savings
- 50 to 60% more labels per roll
- Less storage space required for the same number of labels
- Fewer roll changes
- Variable label length and flexible print format
- No matrix or release liner waste and thus, no storage space required or no transport and disposal costs for release liner and matrix waste
- Saves resources
- Reduction in material costs up to 30%¹

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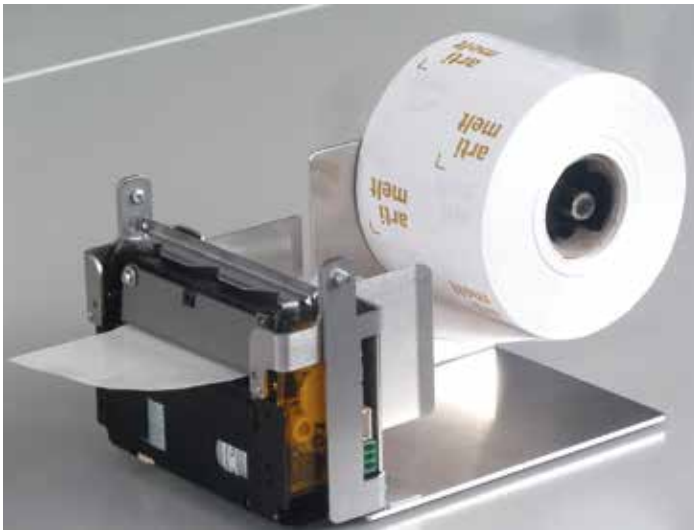
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Source: artimelt AG

- It must not contaminate the rollers of the label printing system
- It must not contaminate the label cutting device
- It must ensure secure adhesion of the label on the corresponding product

These linerless rolls are manufactured on specially designed systems, such as those from Maan Engineering. The system is equipped with a Corona station for increasing the surface tension of the thermal paper (resulting in improved adhesion of the silicone), a silicone coating machine with nitrogen inertisation and a UV curing unit, plus a slot die with a rotating bar for applying the adhesive to the roll. Immediately after coating, the coated mother roll (with a maximum width of 530 mm (20.86")) can be cut to the final roll width and length using an inline cutting device.

A range of products such as offered by the company artimelt AG are suitable for the production of linerless rolls. However, as previ-

ously mentioned, how the rolls perform during the printing and cutting process is of even greater importance. In addition to tearing off the printed labels by hand using a serrated edge, mechanical cutting and labelling is becoming increasingly widespread.

In order to minimize downtimes, the linerless material must not contaminate the rollers inside the printer or the cutting knife. Otherwise, the linerless material can clog the printer or stick to the knife edge. The printer rollers are thus made from special adhesive-repellent materials. On the cutting knives, systems are occasionally used that prevent the adhesive from sticking to the knife thanks to the regular application of silicone oils or special oils. Such systems are a feasible solution in logistics, for example.

However, if the application involves foodstuffs, the use of silicone and oily substances is subject to greater scrutiny or has to be ruled out entirely. An adhesive is

thus required that causes minimal contamination of the cutting knife from the outset.

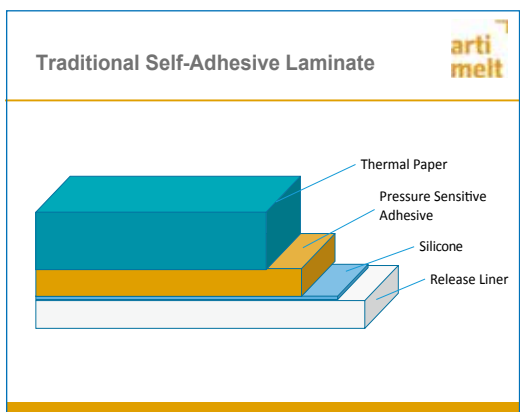
The linerless label market

The number of areas in which linerless labels can be used has increased constantly in recent years. According to an AWA survey, 40% of the global self-adhesive label market is already currently covered by linerless labels. In absolute terms, this corresponds to around 930 million m² of self-adhesive material¹.

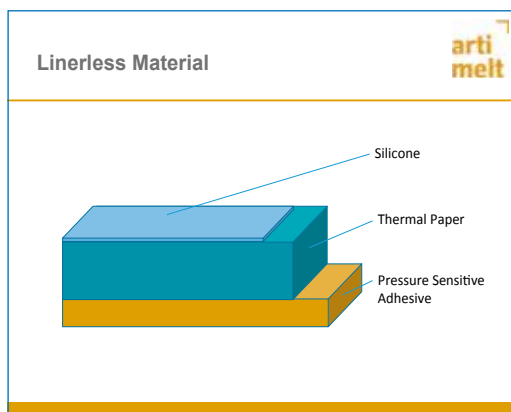
What started off as a simple sealing system for plastic bags containing meat and cheese purchased at the deli counter is now being used in other areas of the foodstuffs industry. For example, the British company Ravenwood has developed wrap-around labels for use on food trays. In order to be able to produce labels in the required quality, a complete system for manufacturing these labels was also developed at the same time.

Left: GeBE test bench GPT-4673-Linerless

Right: Just another example for a linerless application



Source: artimelt AG



Source: artimelt AG

Left: The structure of tradition self-adhesive labels

Right: The structure of linerless materials



Source: artimelt AG

There have also been initial attempts made using transparent foil material that is pre-printed in colour which can be used in the cosmetics and beverage segments.

However, the greatest potential is in the logistics sector. In online retailing – an area that has grown sharply in recent years and continues to do so – the share of delivered parcels has increased dramatically. All of these parcels contain the address of the recipient, usually on a self-adhesive label. Traditional labels – with all of their associated advantages and disadvantages – are used in this application at pres-

ent. If linerless labels were to be used, this could lead to a huge reduction in the amount of release liner waste. This could also lead to savings for the online retailer, who would then no longer have to store, transport and dispose of the release liner waste.

Summary

To sum up, linerless labels are currently a cost-effective and environmentally friendly alternative to traditional labels. While the area of application is currently limited, it is absolutely sufficient for labels with

What components are required for producing a linerless material?

Firstly, a suitable thermal paper is required which must offer good anchorage of the adhesive to the reverse side of the material. At the same time, it must also be impermeable so that no part of the adhesive can penetrate through the paper into the thermal layer and render the printed information illegible. The surface must be such that good anchorage of the silicone is guaranteed without the silicone being absorbed into the surface and eliminating the release effect. As a rule, papers with a topcoat and back barrier fulfil these requirements very well.

The silicones used are usually UV-curing. The correct viscosity is important because when the viscosity is too low, the silicone can penetrate the surface of the paper and then no longer be cured sufficiently. There is a particularly high risk of this when using papers with a porous structure and without a topcoat.

short-term, informative content – such as labels used in logistics. The selected components must be of the very highest quality in order to avoid nasty surprises during the printing and cutting process.

The potential for growth is immense, and anyone investing in this technology today will be well set up for the future.

| *Linerless roll*

References

^[01] AWA AWAreness Report
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