Coffee capsules made of plastic
An ingenious high-tech product with growth potential

In 2014, every German consumed 162 liters of coffee on average. Meanwhile, coffee from a capsule has become cult. The pre-portioned small, colored capsules allow to brew a single cup of coffee with an always good, fresh aroma since the coffee inside the capsule is protected from air.
Customers enjoy this advantage: While sales of roasted coffee and coffee pads are declining for years, the capsule business is booming more than before. Especially after the patent of market leader Nespresso was declared void early in 2015 the way was cleared for me-too products and ever new capsule varieties. It can be assumed that also tea, cacao and softdrinks will increasingly be available in capsules in the future. Producers who want to stay competitive in this strongly growing market should pay attention to some important influencing factors. After all, the simple-looking small capsule is a true high-tech product, especially when made of plastic.

**Up to nine layers for perfect aroma protection**

A superior quality film of up to nine layers reliably preserves the aroma inside the capsule. An EVOH layer ensures the durability of the coffee powder whereas a PE top layer allows the lid film to be laminated upon after the coffee has been filled in. Other layers are used to ensure the adhesion between the different polymer layers. They also permit the refeeding of edge trims and web scrap produced in the thermoforming process and the addition of diverse color batches.

**Low tolerances of individual layers for high efficiency**

Due to the high product requirements, it is necessary to use high-quality and hence relatively costly raw materials in the production of capsules. Therefore, it is indispensable for producers to lay stress on minimum tolerances of the individual layers if they want to achieve high quality beside high efficiency. The best solution for this task is offered by the coextrusion feed blocks of the specially designed Reicofeed 2.1 model type: The technology enables the adjustment of all individual layers and, in contrast to other feedblock systems, also the core layer which in the case of coffee capsules is normally made of the very expensive and sensitive EVOH raw material. A further pluspoint of Reicofeed 2.1 is the possibility to adjust the layer thicknesses during running production which makes costly machine downtimes superfluous.

**Ideal applications**

- PET film < 150 µm for display packaging and blister
- Barrier lid film for food packaging
- Lamination film in a thickness range from 30 to 60 µm
Highest surface quality through precise polishing

The polishing quality of the web is a decisive factor in the downstream thermoforming process of a multilayer film. A particularly reliable and efficient solution for this are the new MIREX-MT polishing stacks of Reifenhäuser Cast Sheet Coating since they allow to adjust the polishing nip more precisely by a factor of 10 and, in contrast to conventional polishing stacks, nip adjustment can be effected fully automatically even during running production. Thus, the intended film quality can be achieved within the shortest possible time after a production start or change which reduces rejects of expensive raw materials to a minimum.

Clean room conditions fulfil strict hygiene requirements

The new polishing stacks of the MT product range offer a further advantage in the production of coffee capsules: Because hydraulic systems are dispensed with in the Reifenhäuser polishing stacks and mechatronic nip adjustment systems are used instead, clean room conditions can be met. This may be essential for the production of films for the food industry.

Positive growth in the future

Coffee capsules are a very sophisticated high-end product. Philip Neumann, sales director at Reifenhäuser Cast Sheet Coating, is convinced that it makes sense to enter this market just because of this reason: “The expansion of beverage capsules is an ongoing trend worldwide and the development is far from complete. We expect that the requirements will still become more complex in the future. Therefore, we have already prepared line concepts for films of 11 to 13 layers. I consider it a clear competitive edge for our customers in this strongly growing market that not everyone is able to produce these films.”

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New lamination station launched
Reproducibility and higher production reliability for PET/PE film structures

Times in which minced meat had to be processed on the day of production are gone. Today, minced meat bought in a supermarket can be stored in the fridge for up to eight days. This is made possible by Modified Atmosphere Packaging (MAP) - a hi-tech product which is able to prevent or slow down physical, chemical, enzymatic and microbial deterioration processes of fresh and minimally processed food.

It’s all a matter of bonding
Crucial for the function of this packaging is the reliable bonding of tray and lid film. It has to prevent modified atmosphere from escaping the pack and ambient air from getting into the pack. Due to the fact that trays are increasingly produced from PET, a sealant has to be applied on the tray to ensure safe bonding between tray and lid. For cost saving reasons, the current trend is away from adhesive bonding towards in-line lamination of PE film in the PET extrusion line.

Problems in the past
Following this trend, different processes have established themselves in the market. But none was able so far to combine the high demands for quality lamination with the high demands for production reliability and operating safety. Poor accessibility and safety risks in the operation of the line, in addition to film elongation and web break as well as insufficient adhesion led to production problems time and again (see info box “Advantages and disadvantages of different processes”).

Heat roll lamination: the Reifenhäuser solution
Reifenhäuser Cast Sheet Coating has developed, in collaboration with a European film producer, an innovative laminating station that eliminates the negative effects of previous processes. The so-called heat roll lamination uses a heated roll that transfers heat into the PE film from the rear side. The highlight here is that a defined roll temperature can be adjusted and thus optimally adapted to the respective production parameters. The activated film is then applied on the PET web in the haul-off unit of the extrusion line.

Production stability
Mark Borutta, sales manager at Reifenhäuser Cast Sheet Coating, says: “Customers who work with established processes have often told us that their processing window was relatively small. PE films would often break and adhesion was insufficient since there was no possibility to influence the thermal input. Therefore, we have developed a solution that
allows the customers to exactly determine the input of heat being the decisive process parameter for a higher flexibility and stability in the production.”

Operating safety
A special focus of the developing engineers was on the operating safety which is often given too little attention. Mr Borutta explains: “With our new lamination station, no one has to feed the film into the polishing nip while the machine is running, or has to introduce the film web below the rotating rolls of the polishing stack and find the correct point of contact in this inaccessible area. Now the operation is easy, but above all it is safe.”

Compatibility
The new laminating station is already successfully being used by customers. It is available for all new lines, but can also be retrofitted to all existing MIREX lines and to many lines of other manufacturers.

Test now
You want to see for yourself the advantages of heat roll lamination in field tests? Make an appointment in our Technology Centre.

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Advantages and disadvantages of different processes

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<tr>
<th>Process</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>Lamination using adhesives</td>
<td>- Excellent adhesion of layers</td>
<td>- High production costs</td>
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<td></td>
<td>- Broad processing window</td>
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<tr>
<td>Lamination in the polishing nip</td>
<td>- Excellent adhesion of layers</td>
<td>- Low operating safety: the PE film has to be fed into the nip while the machine is running</td>
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<td>- Low investment costs</td>
<td>- Low process safety: wrinkles and elongation of the film due to high thermal stress, therefore high risk of web break</td>
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<td>Lamination on the rear side of the middle polishing roll</td>
<td>- Good adhesion of layers</td>
<td>- Poor accessibility</td>
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<td></td>
<td>- High operating safety</td>
<td>- Strongly limited processing window</td>
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<td></td>
<td>- Low investment costs</td>
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<tr>
<td>Lamination using infrared heaters</td>
<td>- No introduction of film into the polishing stack</td>
<td>- The thermal input cannot be controlled, therefore risk of elongation, wrinkles and web break</td>
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<td></td>
<td>- Relatively cost-effective</td>
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<tr>
<td>Reifenhäuser solution: Heat roll lamination</td>
<td>- Good adhesion of layers</td>
<td>- Higher investment costs</td>
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<td></td>
<td>- Precise adjustment of roll temperature</td>
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<td>- No neck-in or wrinkles thanks to controlled,</td>
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<td>constant web tension</td>
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<td></td>
<td>- High operating safety</td>
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<td></td>
<td>- Very good accessibility</td>
<td></td>
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<td></td>
<td>- Reproducible process parameters</td>
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“Good service is fast, reliable and transparent”, says Markus Schroeder, head of service at Reifenhäuser Cast Sheet Coating. “When I start a service request, I want to be updated regularly about the current status. This happens to me when I take my car to a garage, and so it does when our customers place an order, for example, for a spare part.”

Exactly this transparency is offered by the new Service Portal of Reifenhäuser Cast Sheet Coating: Customers now have the opportunity to access on their own all information about a current request or order via a web portal, irrespective of the time of day and availability of service staff. This includes delivery dates, shipping information and tracking. But the portal still goes one step further. Coupled to Reifenhäuser’s EDP system, new Service Portal of Reifenhäuser Cast Sheet Coating...
the portal is supplied with up-to-date data in real time. All information placed by a Reifenhäuser employee is directly available to our customers. Entering the material number, they can immediately obtain information on the availability of spare parts and start a request with a few clicks directly via the portal. The system also allows to retrieve the documentations for all machines manufactured since 2000.

However, according to Mr Schroeder, the portal does not replace the traditional communication channels phone and email. He explains: “The portal is a useful addition to the existing communication media. It makes our customers a bit more independent of us and can speed up service as a whole. Of course, our customers can still contact us directly – if they want also via the service portal. For us, good service means personal advice and trusting cooperation. The different channels now available complement each other in an ideal way.”

Register now
The service portal can be used free of charge by all customers of Reifenhäuser Cast Sheet Coating. Register now under https://portal.reifenhauser.com/rqs and get your personal login data.

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Your benefits:
- Checking spare parts availability
- Tracking service requests
- Tracking deliveries
- Initiating service requests
- Viewing line documentations
Two countries at a time can benefit now from an enhanced onsite support for cast film lines, sheet lines, extrusion coating lines and blown film lines: In April 2015 Reifenhäuser opened new sales and service offices in Sumirago, Italy, and Ho Chi Minh City, Vietnam. With this step Reifenhäuser strengthens the commercial and technical onsite customer service and meets the increasing investment needs in both countries.

Daniele Cerizzi, an Italian native, is the managing director of the new office in Italy. In the past years, he worked in Sales at Reifenhäuser Cast Sheet Coating after holding various positions in the plastics extrusion industry. The office in Vietnam is headed up by Ms. Uyen Le who has been working for many years in the plastics extrusion industry. Vietnam and Italy are now the eighth and ninth regional sales and service offices around the world, following Chile, China, India, Manila, Russia, Singapore and USA.

New Reifenhäuser offices opened in Italy and Vietnam

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Amazing Facts
Would you have guessed that?

>13% savings in raw material can be obtained with 0.15 millimeter thick film produced on a MIREX-MT polishing stack using X-Crossing.

70 kilometers of a 25 micrometer thick film can be wound on a single reel of 1.200 mm diameter and an outer core diameter of 180 millimeter.