

# Fitness Program for New Markets

**Film Stretching Technology.** Film manufacturers who are producing 3-layer film on older lines have noticed that they can no longer compete with new, high-per-



formance BOPP lines. A qualified line modification to 5- or 7-layer technology provides for the possibility of producing new products and entering new high-margin markets with a reasonably modest investment.

## UWE THÖNNISS

Since 2008, more than 120 new BOPP lines with more than 4 million t production capacity have been sold. The additional capacity will be available on the market by mid-2015. Depending on how many lines are taken out of service by then, a nominal capacity of almost 10 million t/a could be installed worldwide. The price for standard BOPP film in Europe has dropped by 25 % since 2008. These films are produced today on highly productive lines with an output of more than 6 t per hour, a line width of up to 10.4 m and production speeds in excess of 500 m/min. Therefore, the share of fixed costs per kilogram of produced film decreases enormously. Older BOPP lines using 3-layer technology with an output performance which does not match the state of the art can no longer compete with these high-performance

lines since their fixed costs are only insignificantly lower. Before stopping the line completely or even scrapping it, the possibility of modification to 5- or even 7-layer film production should be investigated (Fig. 1). Film producers will discover completely new possibilities for the use of their production lines.

### High-margin Markets for Specialty Film

5- and 7-layer films are produced for high-quality and high-margin applications, including white, voided and metal-

lized films for food packaging, synthetic paper for business cards and high-barrier film for packaging with aroma protection (Title figure). By using intermediate layers with special functions, which consist for instance of ethylene vinyl alcohol copolymer (EVOH), these films achieve good to excellent barrier properties against oxygen (OTR) and water vapor (WVTR). Special outer layers with high surface energy enable exceptionally tight metallization providing uniform protection. Further advantages of 5-layer films are improved optical, transparent, gloss and opaque properties.

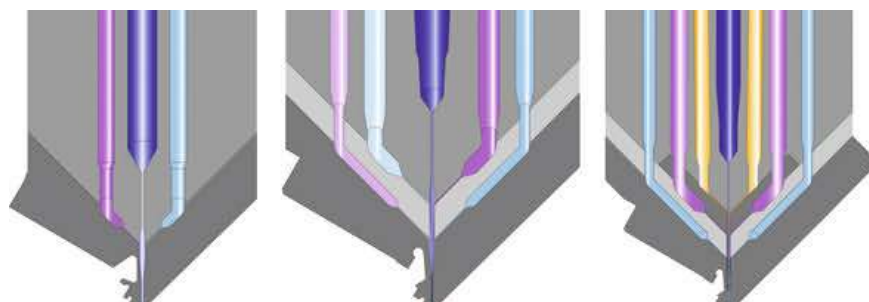


Fig. 1. Comparison of various dies (3-, 5- and 7-layer film)

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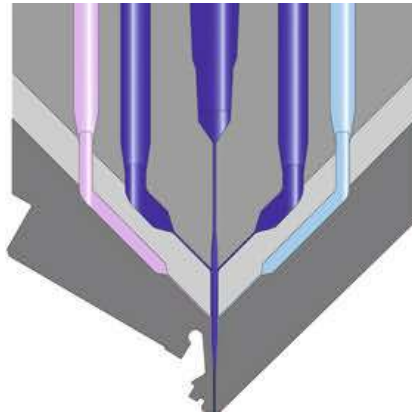
There are also cost advantages since expensive additives are mainly applied in the thinner intermediate layers and in smaller quantities. As a result of the reduced use, less condensate is produced, especially in the transverse direction orientation unit (TDO), so that maintenance of this line component is reduced too.

A new development in the market is BOPP ultra-high-barrier (UHB) film. These 5-layer films have outstanding barrier properties as a result of the subsequent refinement with metallization. BOPP UHB films are therefore very suitable as a replacement for applications in which aluminum foil has been used in the past, such as the packaging of instant soup. Additionally, BOPP UHB-film is also a highly sustainable alternative as regards environmental protection: it reduces the carbon footprint by approximately 75 % in comparison with aluminum foil.

All specialty films mentioned above serve highly profitable and rapidly growing markets which are covered by only a small number of manufacturers. In these markets in particular it is ideal to enter them with relatively small volumes and manageable investment costs. The upgrade of an older 3-layer line with a non-state-of-the-art output to proven 5- or 7-layer technology is very suitable for this strategy. Furthermore, it is recommended that the process control system should also be modernized for a significant improvement in the ease of operation, as well as cost reduction through faster product changes, higher stability and intensive analysis of the operating data.

**Flexibility is the Magic Word**

The modification increases the operational flexibility of a BOPP line: a stretching line upgraded to 5 or 7 layers can still



**Fig. 2. Example for the production of 3-layer film with a 5-layer die**

produce 1- or 3-layer film, which means the existing product range is expanded to include high-margin applications (Fig. 2). All film requirements can be fulfilled depending on the market situation. In order to increase the flexibility of the entire stretching line, it is also possible to equip the main extrusion with an energy-efficient twin-screw extruder. In combination with an intelligent control system, this results in reduced waste of material during product changes or line stops for filter change or maintenance. The vacuum dome for degassing permits production without granulate drying. This leads to further energy savings as well as an expansion of the raw material spectrum. What is more, the twin-screw method is the most quality-stable and secure production method for voided film.

**Technical Requirements**

Certain technical requirements must be fulfilled for the production of 5- or 7-layer film. The investment for the line modification is about 10 % of the initial investment cost depending on the configuration of the existing BOPP line. The financial risk is therefore low. The up-

grade consists principally of: additional co-extruders (for intermediate layers; for 7-layer upgrades there will be accordingly more) with raw material supply, dosing units, filters and melt pipes, a 5- or if necessary a 7-layer manifold die including the die frame modifications and the new adapter block for the connection of the changed melt pipes, as well as the electrical equipment, the drives and the software modifications (Fig. 3).

If a new twin screw extruder is to replace an existing single screw or a cascade extruder, the existing volumetric dosing must be replaced by a gravimetric dosing unit. Moreover, fundamental modifications in the main extruder control system will be necessary.

In general, the total line output can be increased by a 5- or 7-layer upgrade, if the other line components still have thermal reserves. That is the reason why the consultation for a capital expenditure decision of this nature also includes a design inspection of the other line components and recommendations as to how to overcome any bottlenecks thereby identified in the most economical way. Aside from the increased margin quality, the increased line output will contribute to a fast amortization.

**Markets on the Move**

Brückner Servtec in Siegsdorf, Germany, started modifying BOPP lines from 3 to 5 or 7 layers ten years ago. In the past three years in particular, upgrade projects have been carried out in Europe and Asia. At present, the first 5-layer upgrade is being carried out for a Chinese customer, because film producers there have also recognized that the production of specialties is an appropriate alternative to the tremendously increased production capacity of the so-called commodity films. Additional inquiries have been received.

Finally, increasing consumer demand for high-quality appearance and functionality in flexible packaging, labels, surface coating etc. continues to drive the development of and the demand for specialty films. In film production creativity is needed when raw material savings, utilization of a higher recycling quota and energy reduction are at stake. Brückner's multi-layer technology provides a convincing answer to this challenge. ■

**THE AUTHOR**

DIPL.-ING. UWE THÖNNISS, born 1959, is Managing Director at Brückner Servtec GmbH, Siegsdorf, Germany.



**Fig. 3. Brückner film casting unit**