EVOLUTION Technology
for 7- and 9-Layer Blown Film

Our Solutions - Your Success
EVOLUTION Technology for 7- and 9-Layer Blown Film

Our Solutions - Your Success is a synonym for our enthusiasm, experience and technical leadership which has been proven with the EVOLUTION generation of blown film systems. Barrier film suppliers with EVOLUTION systems are now recognized by their customers as reliable high quality flexible barrier film packaging specialists. Continuous research and development together with the experience gained jointly with our customers has enabled Reifenhäuser Kiefel Extrusion to help our customers become successful players in the global barrier film packaging industry.

Over the past few years the flexible packaging industry has experienced dramatic changes. End users have increasingly demanded multilayer barrier films with unique properties, functionality and added value. Flexible multilayer barrier films are today an integral part of our daily life, something we often do not realize.

Reifenhäuser Kiefel Extrusion heard the message from the world markets and launched the modular EVOLUTION generation of blown film systems. These systems enable film producers today to grow existing markets, find new markets, and meet the changing demands of the global flexible packaging industry. Let us introduce you to the world of EVOLUTION technology for the production of economic, high quality multilayer barrier films consisting of 7 or 9 layers.

Why 7 or 9 layer?
Protection of food, medical or other sensitive goods against penetration of oxygen, or other ambient influences.
The required application properties can be achieved by combining different polymers.

PE or PP or Surlyn (Ionomers):
- No natural adhesion to polar polymers such as PA, CoPA, EVOH, etc
- Good water vapor barrier (PP or PE)
- Good sealing properties (mLLDPE blends, LLDPE or Surlyn)
- High mechanical strength (puncture resistance)
- Carrier layers (PE or PP)
- Moderate O₂ barrier in dry environment*
- High thermal stability for pasteurization (PE) / sterilization (PP)**

EVOH (Ethylene Vinyl Alcohol):
- Good odor barrier
- Limited use for sterilization
- High O₂ barrier in dry environment*
- Insufficient WVTR

PA or CoPA:
- Good odor barrier
- Very good thermoforming properties
- Good pasteurization properties
- High mechanical strength (puncture resistance)
- Carrier layers (PE or PP)
- Moderate O₂ barrier in dry environment*
- Insufficient WVTR

* = Barrier properties dependent on moisture level
** = Pasteurization: 82 - 85 °C Sterilization: 121 - 125 °C
**EVOLUTION Extruders**

Highest flexibility and widest output range with our Ultra Range of extruders, i.e. depending on the application requirements, extruders are selected based on the polymers to be processed, and all are equipped with a unique screw design.

A wide variety of polymers and blends, such as LDPE, LLDPE, Metallocene, EVA, Ionomers, MDPE, HDPE, PP, Adhesives, Copolyamide, PA6, blends of Polyamide, EVOH, COC, PETG, PS, K-Resin, etc. can be processed, enabling a wide range of layer thicknesses and ratios while ensuring perfect homogenization.

**30 L/D Ultra Range Extruders**

- High specific screw output with short residence time and low melt temperature which avoids melt degradation and thus improves film quality
- Universal screw geometry designed for low melt temperatures, perfect homogeneity at all output rates
- Special heating-cooling combination on grooved feed section allowing the widest range of polymers to be processed

The direct drive system along with the slim frame design allows for compact installation without sacrificing operator requirements.

**EVOLUTION Ultra Range Die Heads**

The Reifenhäuser Kiefel Extrusion philosophy from the beginning has been to manufacture all key components in-house using state-of-the-art CAD/CAM design in conjunction with CNC tooling machines. The selection of the proper type of steel, along with stress relieving steps are a further important quality factor. The mirror appearance of each die head part is achieved by superlative surface coating and experienced polishing department.

All EVOLUTION Ultra Range die heads are manufactured and designed to achieve the requirements for continuous successful production of barrier blown films. Key characteristics are:

- very compact design, short melt flow channels
- highest flexibility for resin and output ranges
- superior individual layer thickness
- very broad processing window for different film structures
- no dead zones, low residence times
- perfect self cleaning, short purging times
- low pressure drop
The take-off unit is an important intermediate station in the blown film process. Its task is the wrinkle-free collapsing of tubular film into a double layflat film, without scratching sensitive film surfaces but still ensuring perfect flatness. As multilayer barrier films are often very stiff (as a result of the total film thickness and the selected polymers such as PP, COC, CoPA and EVOH), the take-off must be constructed in a very robust design.

All EVOLUTION take-off units fulfil the above requirements and, in conjunction with a number of special features, set the market standard.

All EVOLUTION extrusion systems are known for the highest flexibility and the widest output ranges. Our die heads support this philosophy. The ultimate challenge with barrier films is to run thin individual layers while ensuring perfect individual layer thickness tolerances.

The binary pre-distributor division principle in conjunction with either axial spiral mandrels or plate design dies results in a short residence time and homogeneous temperature profile. This allows our customers to run layers with expensive polymers as thin as possible whilst maintaining barrier properties.

Unique and exclusively available from Reifenhäuser Kiefel Extrusion are brush rolls, which are mounted on the collapsing frame, and side guide rolls. The diagonal brush rolls, which are fitted in front of the nip rolls, ensure perfectly flat film. Homogeneous cooling of the film over the entire layflat width and compensation of the relative different speeds of the film as it travels up the rotating collapsing frames are two further key advantages of these “hairy companions” The microporous slats which are installed just prior to the nip rolls and the microporous air turning bar system finally ensure that a wrinkle- and scratch-free film will be delivered to the winder.
EVOLUTION Winders
Clean edges, perfect roll geometry, constant winding tension from the first to the last meter, overlap free splices, etc., these are the roll criteria which barrier film suppliers have to meet in their daily business. This is especially true for films which are rigid, have an asymmetric structure or have a tacky inside layer. These requirements put the highest possible demands on all film winders. All winder types offered by Reifenhäuser Kiefel Extrusion are designed to meet the above criteria regardless of whether it is a contact winder or a center/surface/gap winder.

Unique features such as constant lay-on pressure, reverse winding, flap-free web splicing, vacuum contact drum, tapeless splicing, different devices for web cooling and web slitting, special driven spreader rollers, semi- or automatic shaft handling systems, etc. enable us to achieve these requirements.

EVOLUTION Automation
The key to economic and consistent high quality production of multilayer barrier films are automated machine control systems, which simplify work for operators. The EVOLUTION automation system enables operators to easily enter control functions resulting in a considerable reduction of start-up and change-over waste. Due to the diversity of barrier film formulations, each extruder can have different temperature settings as well as blends with up to seven components per layer. It is therefore necessary that the automation system assists the operator and that the accuracy and the adjustment speed of the system from the start to the end of an order is fast, easy, and reliable.

The system is characterized by the following factors:

- Central operation and control of the entire blown film system from a single operator-friendly intuitive 24” touch screen panel which includes: raw material supply, gravimetric dosing, temperature settings, screw speed, throughput of extruders and die, blower settings, profile control, width control, winder settings, etc. in a smartphone like presentation.
AUTOMATION & APPLICATIONS

Possible applications
Whether films with low, middle or high barrier properties are required, the Reifenhäuser Kiefel Extrusion production program will enable you to meet these requirements.

Films which require even more precise thickness tolerances are possible due to the high resolution measurement technology and the ingenious control algorithms of our various profile control systems. This also creates perfect roll geometry, simplifies and enhances further processing steps.

Recipe memory for exact repeat orders
Online service diagnostics
Detailed reporting for quality and order control
Data export capability to Excel, Access, SQL, etc
Job change assistant to minimize polymer loss and speed up changeover
Integration of treaters and other optional equipment
Easy handling, operation and maintenance
Modular design - enables us to easily enhance the system at any time

Typical 9-layer film structures