Simultaneous Orientation lines
GAP, Tailor extrusion film line manufactured, specialized in exclusive and dedicated extrusion film lines for: double bubble and three air trapped bubble for simultaneous no contact biaxial film orientation system, designed for LLDPE, EVOH, PA, PP, PLA, PET multilayer structure.

Ideal to produce biaxially oriented heat - shrinkable and heat-set barrier films.

High Speed Extrusion coating & lamination system a dedicated technique, combination of converting and extrusion process where different material are laminated by extrusion. High speed solution over 500 mt/1’ and fast work change for multipurpose production.

Gap develop new barrier oriented shrink film on its new R&D department where simultaneox are continuously in operation.

GAP offer the customer its 360° experience in the heat-shrinkable barrier bag and film production.

This know how start from the manufacturing of multilayer double bubble Simultaneox line, nowadays enlarge with a new dedicated multilayer three air trapped bubble production line, in his factory, which can offer multilayer barrier shrink bags and film.

GAP develop continuously new concept of barrier, with his resource team. These product are extruded and converted with a new sophisticated simultaneox oriented double bubble line, with 9 layer technology, using the last technical innovation.
Bubble Orientation

- Uniformity and balance characteristics in MD and TD.
- Flexibility in the film thickness.
- Application range of material is wider (heat set – shrink – partial shrink)
- Simultaneous orientation easy to get a very transparent barrier film
- Film heating one time only no need to reheat for second orientation avoiding defect in crystallization.
ADVANTAGES OF SIMULTANEOUS ORIENTATION

- Contactless orientation no need any clips which damage the material and require large trimming.
- Trimmless process, huge saving cost in the productivity, costly barrier film can not be recycle.
- Bandless with 360° continuox winder rotation especially in important thickness.
- Increase planarity of the film.
- Simultaneous stretching yields better mechanical properties over sequential tensile and modulus.
- Orientation improves barrier properties the thickness of the laminated film can be reduced with no effect on the barrier economical advantage.
- Laminated printed film for lids can be replaced by simultaneously oriented barrier film with printable layer.
- Coated film may replaced by oriented film for microwave heating.
- Orientation and heat treatment increases gas barrier properties at high humidity conditions.
- Fewer converting steps is an advantage towards laminating and coating Better layers distribution control HELP TO REDUCE FILM THICKNESS ON THE FINAL PRODUCT AND SAVING IN RAW MATERIAL.
## Double-bubble process

<table>
<thead>
<tr>
<th>Type</th>
<th>Application</th>
<th>Width</th>
<th>Thickness</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double bubble POF</td>
<td>Shrink LLDPE POF BOPE</td>
<td>2.500 - 4.000</td>
<td>9-25</td>
<td>Up to 600</td>
</tr>
<tr>
<td>Double Bubble CROSSLINK</td>
<td>Shrink LLDPE crosslink film</td>
<td>2.500 - 4.000</td>
<td>7-15</td>
<td>Up to 600</td>
</tr>
<tr>
<td>Double bubble BARRIER SHRINK FILM</td>
<td>Multilayer barrier shrink film</td>
<td>1.600-2.500</td>
<td>15-25</td>
<td>Up to 400</td>
</tr>
<tr>
<td>Double bubble with annealing in line</td>
<td>Heat set oriented barrier film BOF</td>
<td>1.300-3.000</td>
<td>20-40</td>
<td>Up to 700</td>
</tr>
<tr>
<td>Double bubble with annealing in line</td>
<td>BOPA, BOPLA</td>
<td>1.300-3.200</td>
<td>12-25</td>
<td>Up to 700</td>
</tr>
<tr>
<td>Multy-Bubble line</td>
<td>Oriented Shrink barrier bags</td>
<td>200-900</td>
<td>40-110</td>
<td>Up to 150</td>
</tr>
<tr>
<td>Multy-Bubble line</td>
<td>Oriented Shrink barrier film</td>
<td>900-2000</td>
<td>15-25</td>
<td>Up to 500</td>
</tr>
</tbody>
</table>
Double bubble

Crosslinked pof or Microlayer up to 27 layers
The orientation line works by the so-called “double-bubble process”, i.e. the polymers are extruded through a circular die and immediately waterquenched to form a thick primary tube which is then re-heated up to a suitable temperature and blown to form the main bubble of thin film. The non-contact simultaneous orientation is achieve thanks to the air inflated during the start up phase. This air allows the transversal orientation while the machine direction orientation is taken simultaneously thanks to the speed different between the stretching nip roll and the tower nip roll. The bubble is cooled by air and then flattened; after the trimming of the edge, the two webs obtained rolled up in two reels. By annealing the product obtained on the biorientation equipment, it is possible to obtain heat set film such us: BOPP, BOPA, BOPET and special products. POF the annealing can be placed in line or off line. Partial annealing can also be integrated in the orientation.

<table>
<thead>
<tr>
<th>Shrink film</th>
<th>Low force</th>
<th>Antifog</th>
<th>Crosslinked</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is a very versatile film suitable for a wide range of applications. It’s shine, optics and durability. Excellent gloss, clarity, sheen. Best in class for cost and productivity. Durability as high performance overwrap film. High shrink ratio, heavy-duty packaging.</td>
<td>For application that require a low force shrinkage as for example for magazine. This film offer a high transparency and protection to the magazine. Best in Sheen and gloss. Rugged puncture resistance and durability.</td>
<td>A new antifog shrink film with improved hermetic seals for reliable pack integrity. This film offers a unique anti-fog agent that prevents film fogging up under cold storage conditions. This makes it ideal choice for packaged cold foods, fruit and vegetable.</td>
<td>Multilayer heat shrinkable film for wrapping application, this is an high performance multilayer film engineered for automatic packaging machine. It makes a clear choice for over-wrapping. Excellent sealing strength, puncture resistance, hot slip property. Possibility to Stretch/shrink for Poultry application</td>
</tr>
</tbody>
</table>

**INNOVATION** Microlayer heat shrinkable film up to 27 layer

Film with a large number of layers having uniform bi-axial orientation achieved in one step.

Having a larger number of and/or thinner layers than prior annular structures improve: barrier, layer uniformity, strength, toughness, tear resistance puncture resistance
Solution up to

- COEXTRUSION up to 27 layer
- FILM THICKNESS from 7 micron
- FILM WIDTH up to 4000 mm
- OUTPUT up to 1000 kg/h
<table>
<thead>
<tr>
<th>Shrink bags</th>
<th>Lidding film</th>
<th>Barrier shrink film</th>
<th>Flow vac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum shrink bags are the perfect packaging for many perishable food products, such as sub primal meat, smoked and processed meats, poultry, fish and cheese.</td>
<td>Top lid film with reduced shrink characteristic on both direction which provide to the tray a “drum effect” ideal to pack fresh meat and products with tray and MAP.</td>
<td>Barrier heat shrinkable film which wrap with its retraction the products or tray. It’s perfectly adhere to the no barrier tray ideal to wrap fresh meat, cheese, processed meat by tray and MAP.</td>
<td>Barrier shrink film ideal for flow-vac. Wraps perfectly the product thanks to its retraction, ideal to wrap fresh meat, cheese, processed meat.</td>
</tr>
</tbody>
</table>

**INNOVATION** Microlayer heat shrinkable **film up to 27 layer**

Film with a large number of layers having uniform bi-axial orientation achieved in one step.

Having a larger number of and/or thinner layers than prior annular structures improve: barrier, layer uniformity, strength, toughness, tear resistance puncture resistance

**Multibubble Line 3B**
The orientation line works by the so-called “Double bubble process”, i.e. the polymers are extruded through a circular die and immediately water-quenched to form a thick primary tube which is then re-heated up to a suitable temperature and blown to form the main bubble of thin film. The non-contact simultaneous orientation is achieved thanks to the air inflated during the start up phase. This air allows the transversal orientation while the machine direction orientation is taken simultaneously thanks to the speed difference between the stretching nip roll and the tower nip roll. The bubble is cooled by air and then flattened. The third bubble is annealed by ovens with ceramic infra-red heater. The final product can be wind in tube or fat film.
Large Oriented Barrier Multilayer Film Up To 4,000 mm
The orientation line works by the so-called “double-bubble process”, i.e. the polymers are extruded through a circular die and immediately water-quenched to form a thick primary tube which is then re-heated up to a suitable temperature and blown to form the main bubble of thin film.

The non-contact simultaneous orientation is achieve thanks to the air inflated during the start up phase. This air allows the transversal orientation while the machine direction orientation is taken simultaneously thanks to the speed different between the stretching nip roll and the tower nip roll.

The bubble is cooled by air and then flattened. The film pass though an annealing ovens to reduce the retraction of the film.

<table>
<thead>
<tr>
<th>Barrier film</th>
<th>Lidding film</th>
<th>Barrier annealed film</th>
<th>BOPA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multilayer barrier and recyclable film.</strong> Good replacement of barrier laminated or metalized product.</td>
<td><strong>Top lid film with reduced shrink characteristic on both direction which provide to the tray a “drum effect” ideal to pack fresh meat and products with tray and MAP.</strong></td>
<td><strong>Special simultaneous oriented barrier film including PP, EVOH, PA PET etc Thin gauge barrier heat set film. Lamination purpose, lidding etc.</strong></td>
<td><strong>Lamination product for Lithium Battery package To be use as lamination material together with Aluminium and CPP.</strong></td>
</tr>
</tbody>
</table>

**INNOVATION** Microlayer heat shrinkable film up to 27 layer

Film with a large number of layers having uniform bi-axial orientation achieved in one step.

Having a larger number of and/or thinner layers than prior annular structures improve: barrier, layer uniformity, strength, toughness, tear resistance puncture resistance

**NEW**

**High Barrier Oriented Recyclable materials**

The orientation line works by the so-called “double-bubble process”, i.e. the polymers are extruded through a circular die and immediately water-quenched to form a thick primary tube which is then re-heated up to a suitable temperature and blown to form the main bubble of thin film.

The non-contact simultaneous orientation is achieve thanks to the air inflated during the start up phase. This air allows the transversal orientation while the machine direction orientation is taken simultaneously thanks to the speed different between the stretching nip roll and the tower nip roll.

The bubble is cooled by air and then flattened. The film pass though an annealing ovens to reduce the retraction of the film.
New Microlayer configuration up to 27 layers

Water quench Extrusion Line
The molten resin is extruded in a tubular form through the die. In the path between the die and the pulling rolls, the tube is inflated until it tangencies the sizing ring which defines the width of the film that is being produced.

Right after it, the film goes out of the die passing through an Air Ring, then suffering a pre-cooling and then the film passes through a sizing ring immersed in cool water.

The cool water provides a thermo shock on the film because of the cold temperature, making the film to acquire brightness and high transparency that are the characteristics of the product. Afterwards the film passes through the pulling rolls, through a drier to eliminate the damp, then it passes by the device of lateral slitting (cutting) of the film and finally the roll is wound in the double winder.
Advantages of Annular Microlayered Film Structures
Annular profiles that are cost-effective for various applications with at least one of:

} Improved barrier
} Improved layer uniformity
} Improved strength
} Improved toughness
} Improved tear resistance
} Improved puncture resistance

A new era for microlayer technology
We Can Implemente Your Process With Microlayer Die

Advantages of Annular Microlayered Film Structures

} Film with a large number of layers having uniform bi-axial orientation achieved in one step
} Having a larger number of and/or thinner layers than prior annular structures
} Produce blown film in which the circumference of the structure avoids a conventional welding or overlapping area where structure properties will be undesirably or adversely affected

<table>
<thead>
<tr>
<th>SEQUENCE OF LAYERS</th>
<th>1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-26-27</th>
</tr>
</thead>
</table>