



Reifenhäuser

BLOWN FILM PLAMEX

The Extrusioners



Aqua Cool Extrusion Lines

Semicrystalline thermoplastics, like polypropylene, polyethylene and polyamide are preferred materials in the packaging industry. These materials change at the glass transition temperature into a partial crystalline structure, where spherulites are created, which spoil the transparency by refraction of light. In order to prevent this phenomenon the melt must be cooled as fast as possible.

An instantly chilled partial crystalline plastic, e.g. Polyamide, stays amorphous. The film remains highly transparent due to the lack of makrospherulite build up. Side effects of the procedure include: high gloss, extreme puncture and tear resistance and excellent thermo-formability rising from its amorphous structure.



Technical Realisation

Due to the use of water and the effects of gravity on it, the extrusion has been designed in a downward vertical direction. The air-cooling ring, with the possibility of automatic thickness tolerance regulation by segmented air flow if requested, serves mainly as a stabilizer for a defined blow-up ratio. After the desired tubular diameter is reached, the film immediately enters the cooling chamber where it is shock cooled by water rather than the traditional frost line approach and fast crystallization. It is the expertise of Reifenhäuser Blown Film Plamex to optimize this process with efficient water exchange, achieving a turbulence free procedure removing maximum heat in a minimum amount of time with remarkable optical properties. An installed vacuum settles the shape of the bubble and allows the film to leave the cooling chamber almost dry. Approximately 10Kcal/cm circumference can be extracted (PA6, 500kg/h, ΔT 190, dlf. 800mm, 100 μm).

With respect to achieving a desired stiffness of the film or influencing its curling effects, we highly recommend the integration of Reifenhäuser Blown Film Plamex SSP (Solid State Post crystallization) aggregate, which is positioned after the reversing haul-off. With this system, the amorphous film is pulled over a couple of defined tempered rolls, adjusting the film according to desired specifications. No adverse effects on transparency and thermoformability occur during SSP as the growth of makrospherulites no longer occurs by the time this process begins. On request this system can also be used for MDO (Machine Direction Orientation). Downstream, the film runs into our well-established Reifenhäuser Blown Film Plamex Multiwin one-station or two-station winding systems.

Major Applications

- When the highest requirements are demanded for transparency, gloss, puncture and tear resistance as well as thermoformability for the lowest investment and material cost.
- When highest throughputs along with paramount film properties are required.

- When downstream mono or biaxial orientation takes place due to the vitality of an amorphous structure as a precondition for good orientation (e.g. thin lid films).
- For medical films with a high demand for transparency, puncture and tear resistance and high seal strength (e.g. bags for liquids made from Polypropylene modified with Elastomers).

Advantages of Aqua Cooled Extrusion (ACE)

- Immense cost savings due to the use of standard polymers instead of more expensive copolymers (e.g. standard PA6 types instead of slower crystallization C-types)
- Excellent optical properties (gloss, transparency)
- A balanced orientation in machine and transversal direction (MD = TD)
- Highest possible throughputs, due to the relief of cooling limits imposed on more traditional extrusion methods
- Edge trims unnecessary. There is also the possibility to produce tubular films (e.g. pouches without wide welding, heavy duty bags)
- Smaller space requirement with respect to air-cooled blown film lines especially in height. Thus lowering building and steel-work investments.
- Return on investment measurably better than that of cast and conventional blown film lines.

