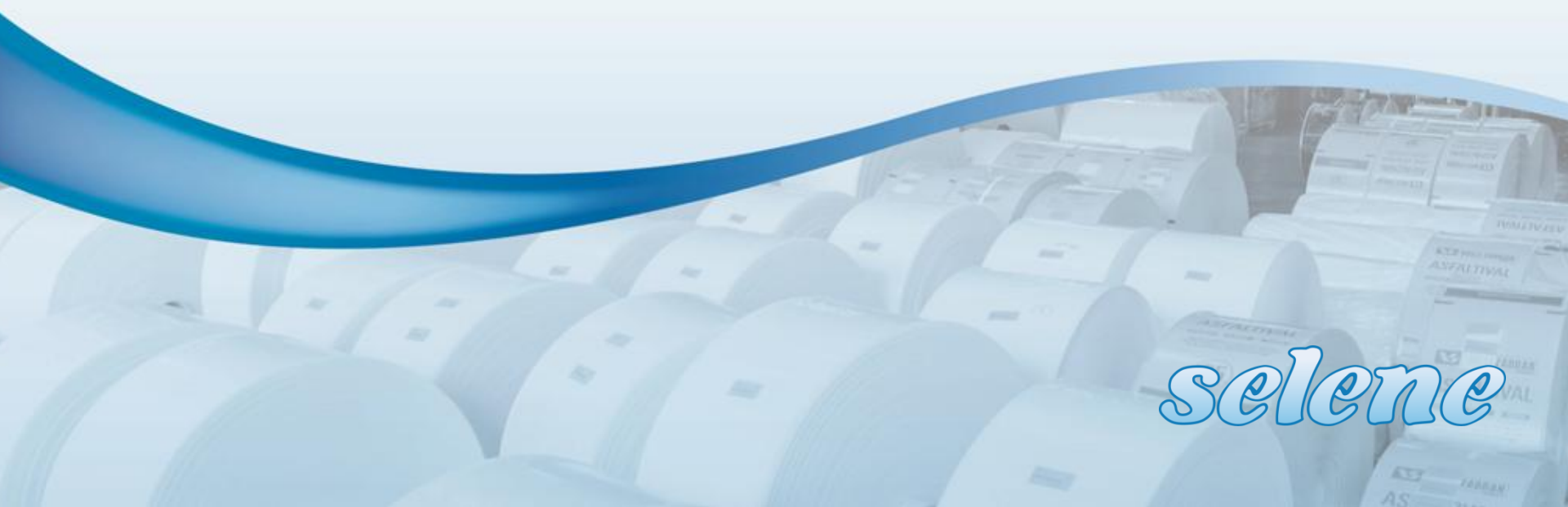


Machine Direction Orientation - MDO



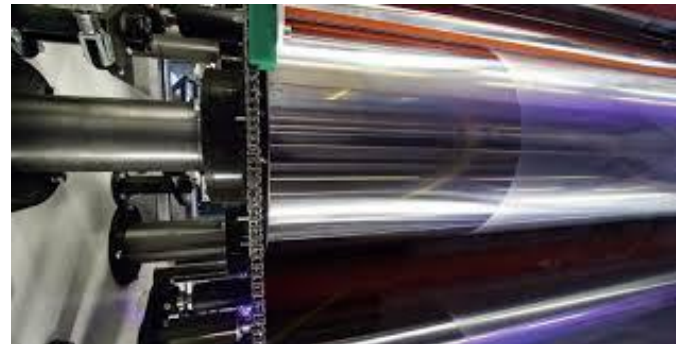
selene

General Information

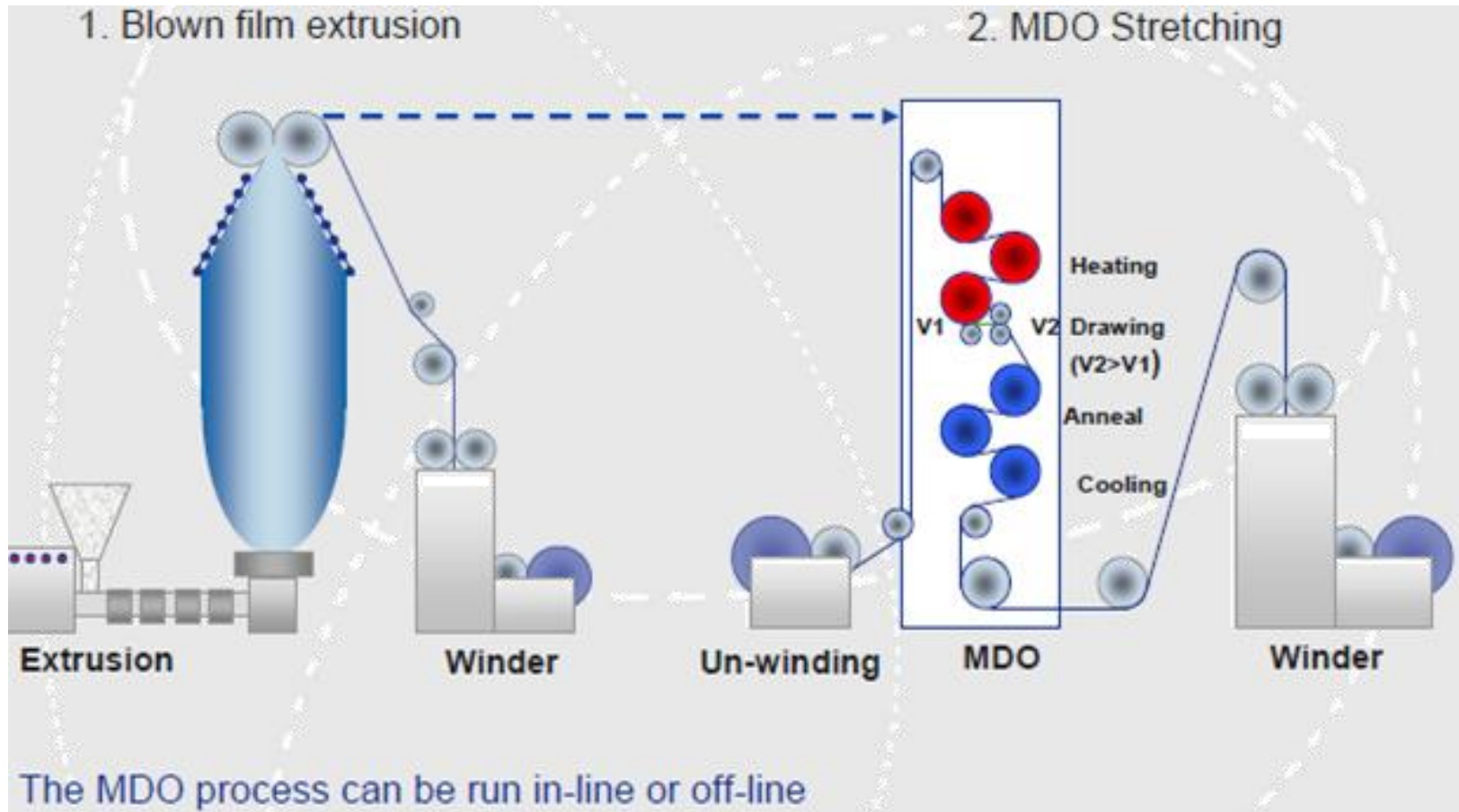
What is it

MDO is an equipment used to modify and improve film properties.

Efficiency of the whole process was enhanced by recent development of the device, being the reduction of the edge trim up to 50%, that provides at the same time better film behaviour.



MDO full integrated in blown film production process



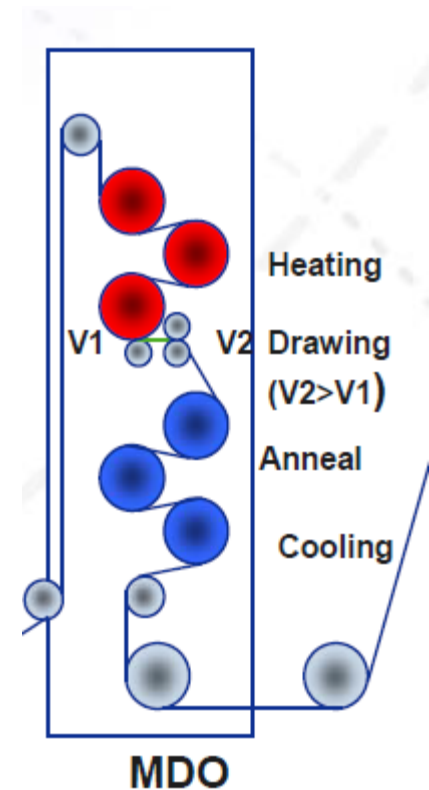
Equipment

Phases

The equipment consists in a set of rolls, moved by separated controlled engines with special designed nip rolls, that grants a better film passage. Different phases have different temperatures. Rolls are usually between 8 and 12 in number.

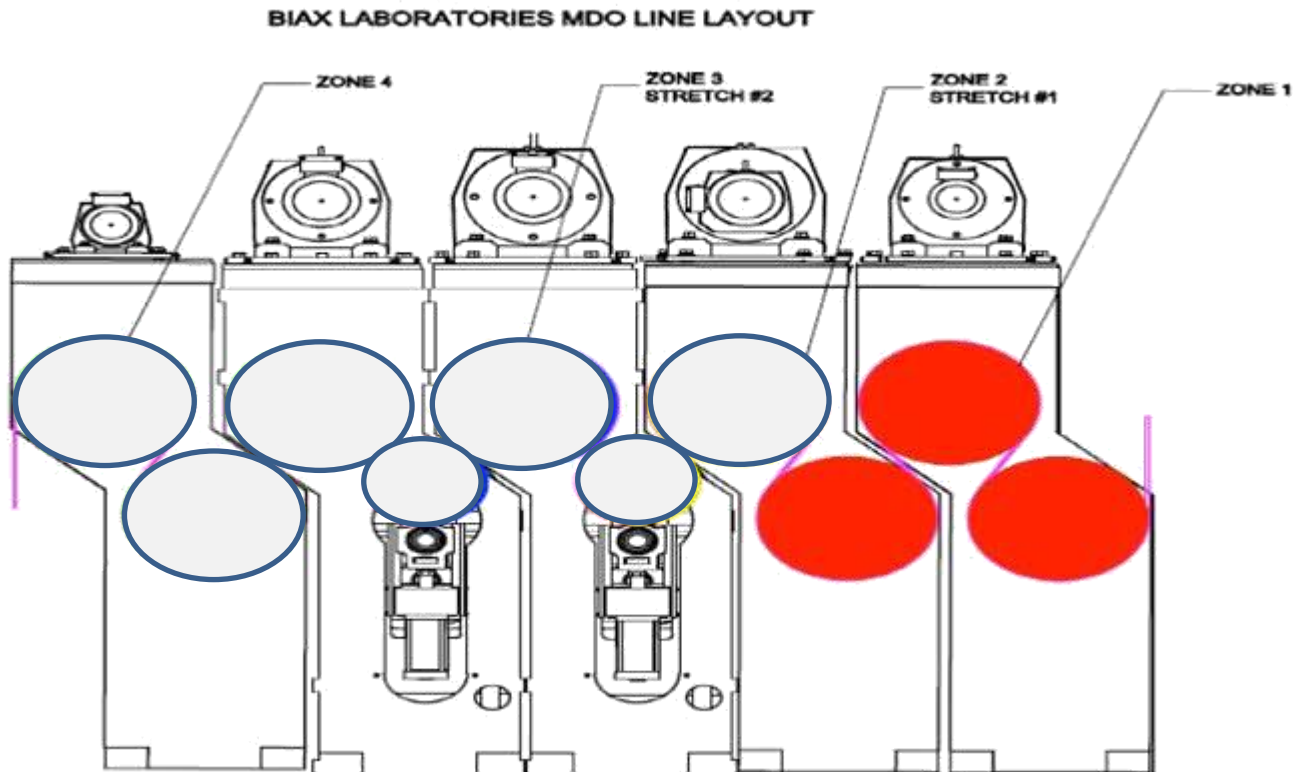
We have four process phases:

- ✓ Heating
- ✓ Drawing
- ✓ Annealing
- ✓ Cooling



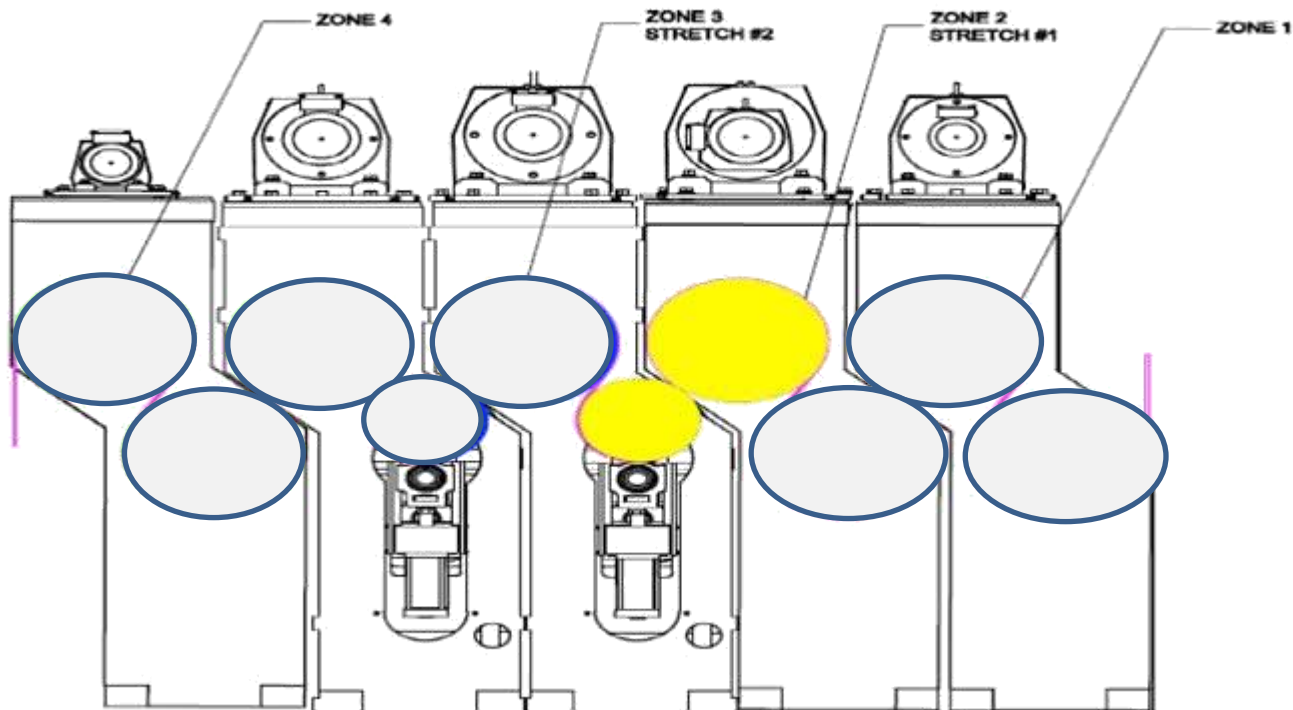
Heating

In this phase, checking the absence of folds, the temperature of the film is increased up to the point of MD orientation and conveyed to the next rolls.



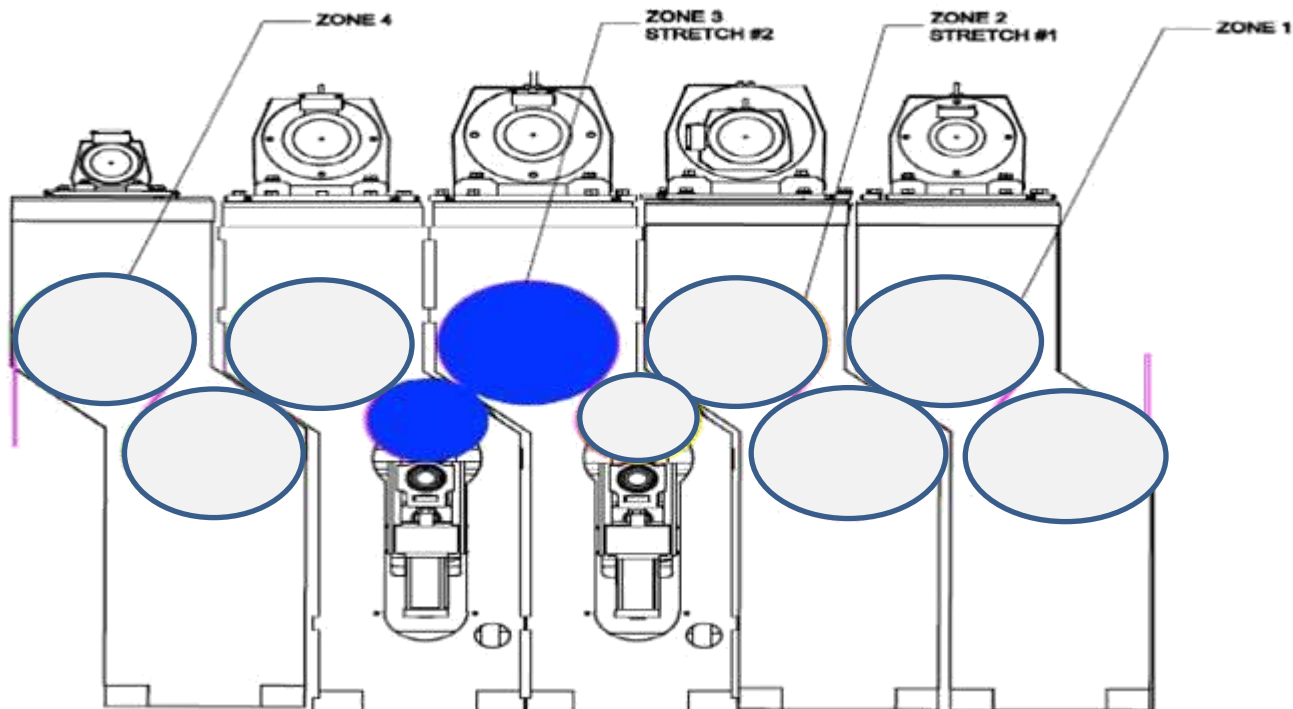
Drawing

The film is orientated, leveled and stretched by a series of rolls with narrow passages. In this section the film can be stretched up to 10 times. These rolls are managed at higher speed compared to the first phase.



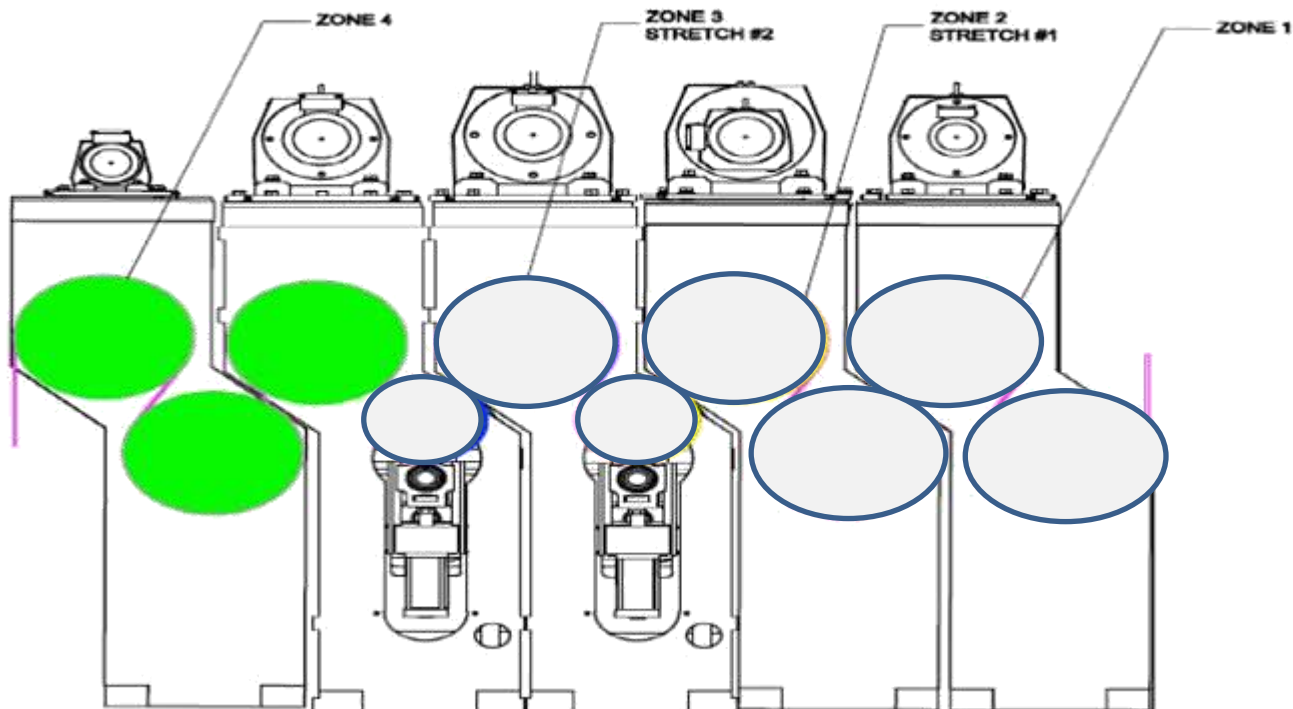
Annealing

Film is annealed and tensioned. Heating fixes the film properties obtained in the previous phase in order also to control the reaction for a possible future exposure to heat, such as sealing.



Cooling

In this section the film is cooled and brought to room temperature before the rewinding and next processing. MDO equipment has concluded.



Benefits

Film Properties Improvement

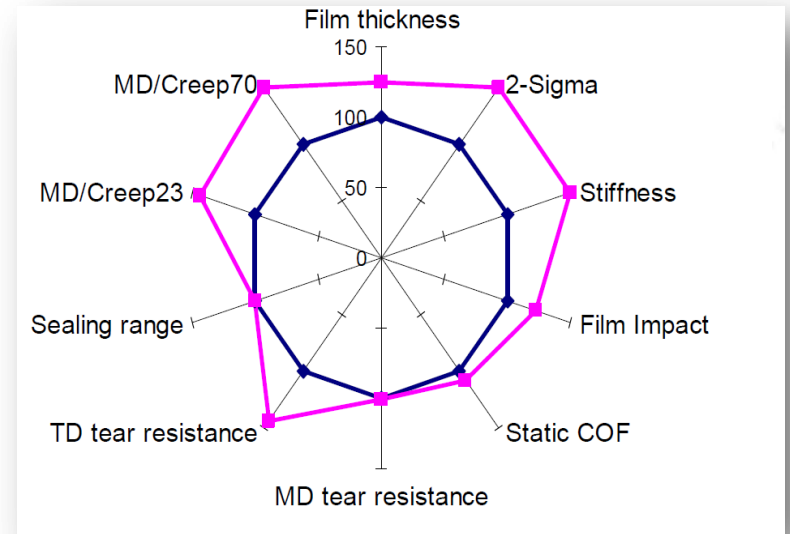
Through MDO processing film properties are enhanced.

Improved Properties

- ✓ Optical
- ✓ Elastic modulus
- ✓ Tensile strength and puncture resistance
- ✓ Barrier
- ✓ Breathability
- ✓ Mechanical

Benefits

- ✓ Cheaper solution
- ✓ Accurate process and high quality result
- ✓ Improved printability



Costs Reduction

Using MDO it is possible to reduce production costs, working on three aspects:

- ✓ Source reduction
 - Film thickness reduction
 - Bag weight reduction
- ✓ Reduced material usage
- ✓ Processes merging: it is possible to enter the phases of lamination and coating, eliminating:
 - Intermediate phases
 - Time taken for production
 - Waste and scraps
 - Logistics and packaging materials



Possible Applications



Bags



Compression packaging



Lamination film



Label film