Today's packaging sector uses multilayer films made from increasingly complex materials and resins. The majority of production generally takes place in three-layer coextrusion systems; however, since the end of 2007, the Italian mechanical engineering company Macchi has increased the number of coextrusion lines for manufacturing barrier films for flexible packaging with more than three layers, and is today manufacturing systems to produce films with seven to nine layers. The main

**More Layers, Less Resin**

When it comes to sustainable and resource-friendly production, the Italian mechanical engineering company Macchi relies on a multilayer process for manufacturing film packaging, which saves valuable resin.
reasons behind this strategy, aside from the improved technical and applicative characteristics of the films, are ecological sustainability and a more conscious use of resources.

An effort that pays for itself
The decision to migrate from systems producing three to five layers to systems producing seven to nine layers was based on the need to both reduce consumption of expensive barrier-effect resins and reduce the number of connecting layers to a minimum. Today it is possible to produce layers of EVOH (ethylene vinyl alcohol) with a thickness of only 5 μm or even 3 μm, for example. In addition, coextruded films in which the “barriers” are divided into different layers have a higher resistance to low temperatures and also show better thermoformability.

The implementation of these multilayer systems requires detailed know-how and the ability to ensure absolutely precise thresholds with regard to film thickness. This is because even the smallest variation in dimensions can result in a product that is both nonconforming and not cost-effective or marketable. An additional challenge of this technology in terms of quality is that the thickness of each individual film layer cannot be controlled by a dedicated controller. Factors crucial for excellent film quality are an optimum coextrusion head as well as having absolutely constant speed, pressure, and melt flow. These factors are guaranteed by Siemens torque motors. This is precisely where Macchi has achieved its competitive edge, and where its success as a company lies.

New torque motors guarantee quality
In its new extrusion lines, Macchi relies on a new generation of torque motors from Siemens, which stand out for the following advantages: they enable screws to be extracted from the rear of the extruder via hollow shafts to facilitate maintenance, and the motors achieve operating currents that are up to 30 percent lower than their predecessors, thereby reducing output and dimensions while retaining the same torque.

In processes with nine layers, where absolute precision in the thicknesses of the different layers is a fundamental quality criterion, the use of direct drive technology offers a clear benefit: thanks to the torque motor’s high level of precision in terms of torque and speed, the pressure of the melt flow can be controlled accurately, thereby ensuring that the finished product has ideal features.

Reducing the torque also affects the output of the motors used, as well as the size of the switchboards and wire diameter. With all these features, the platform requires less space, the machine is quieter, and consumption is reduced.

Protection for winders and stretching machines
As belts, belt pulleys, and reduction gears are no longer required thanks to the direct drive technology in the torque motors, strain on the winding systems and stretching machines in the Macchi systems during operation is also reduced.

The Bo Plus winder is regarded as one of the most efficient film winders on the market today. This machine can be configured in various ways depending on the type of film being manufactured. The stretching machines are available in different widths and have technological and design features that make them suitable for use in difficult conditions. The use of torque motors eliminates mechanical play, maintaining the torque at the exact level required and enabling precision and speed dynamics to be regulated accurately. The result is a high-quality product that satisfies all customer demands with regard to uniformity and tear strength.

The Sinamics S120 – a flexible converter system
With its new extrusion line, Macchi is using not only torque motors but also a modern drive concept developed by Siemens. Thanks to its versatility, the modular Sinamics S120 converter range is ideal for controlling a wide variety of applications – from extruders right through to complex multiaxis applications such as the Bo Plus winder line. The Sinamics converter for winders consists of a common supply module, which is coupled with several powerful modules in order to save space in the switchboard. In addition, all systems are connected to Profibus, allowing the quick and constant transfer of information between the control unit and the drive. Macchi uses the specialist software WinAC Servo Light throughout the entire line; this software was specially developed by the center of excellence in Milan for controlling stretching machines and winders. A special tool for teleservices allows all devices in the network to be accessed for diagnostic purposes in the event of a fault. “Engineered by Macchi – Powered by Siemens” – with this successful strategy, the Italian mechanical engineering company is optimally equipped to face the ever-growing challenges of the future.