For more than 20 years, Colomer Italy has been relying on the technology of Romaco Unipac for filling hair dye into tubes. On a tube filling line of this machinery supplier, the manufacturer processes 388 colour shades of a high-quality hair dye product for both European and extra-European markets. The system with an integrated cartoner from Romaco Promatic achieves an output of up to 100 tubes per minute.

A finished tube after 12 stations

Colomer Italy packages hair dye at 60 – 100 tubes per minute

The high-quality Colomer hair dye products for professional applications are solely filled into aluminium tubes.

People have been changing their appearance by dying their hair since ancient times. In the early modern times this was done with henna, indigo or with lead combs dipped in vinegar; at the end of the 19th century, the first chemical hair dye products appeared on the market. An estimated 40 percent of all women in industrialized countries dye their hair. In their Italian facility in Bologna the Barcelona based Colomer Group produces hair dye in more than 520 different shades of colour. The development of hair care and dye products is one of the core competences of this organization, founded by the Catalan barber José Colomer in 1934. Worldwide, this cosmetics specialist employs more than 2,200 workers in five production facilities in Europe, North and Central America, and in several international sales offices.

The Italian facility Intercosmo (former name of Colomer Italy), with 170 employees, has been part of the Colomer Group since 2000. Here the manufacturer produces most of their hair dye products for the European and extra-European markets. The high-quality products in the upper price range are mainly intended for professional applications in areas such as fashion and hair styling. In the company-owned R & D centre in Barcelona, a team of chemists, biologists and pharmacists is continuously working on improving the ingredient formulas. In addition to aspects of hair care and health, the laboratory work focuses on the productivity and intensity of the products.

Prototype takes off

The entire development and manufacturing process reflects the high-quality requirement of the company for its product lines. The exclusive dyeing agents, for example, are solely filled into aluminium tubes. This type of primary packaging should ensure that no undesired oxidation, which would damage the product, leaks after the tubes are opened. Colomer Italy produces a total of approximately 17 million tubes per year. For this, the organization has four different filling lines at its disposal - amongst

others, a Unipac stand-alone tube filler and a complete tube filling line including a Romaco cartoner.
Since the early eighties, Colomer Italy has been relying on the technology of this supplier. When the company planned the installation of a new tube filling line five years ago, they already had many years of experience with the machinery manufacturer's technology. "When selecting the new machine concept, I relied on our production mechanics, most of whom felt very positive about the Unipac technology, " Manfredo Malpensa, Production Manager at Colomer Italy, explains his decision. "Even the fact that the tube filling machine and the cartoner were prototypes was no obstacle for us. An investment that we never regretted." The line has been in operation in Italy without interruption since September 2005. The machines were produced in Rastignano, near Bologna where Romaco's brands Macofar, Promatic and Unipac are based.
The tube filling line runs for five weekdays in a two-shift operation; two employees per shift supervise the process. The first test runs and validation batches were done with the professional hair dyeing agent "Revlonissimo". The composition is enriched with nanoparticles and liquid crystals, providing even and permanent hair coloration as well as high effects of care. Due to the high demand, the packaging line is working to capacity with the filling of the dyeing agent.

Easy adjustments to different tube formats.

On the Unipac U 20100 the tubes run through twelve stations in a clockwise movement.

Safe processes are a must

The 388 different colour tones of the series are filled into aluminium tubes with a volume of 50, 60, 70 and 100 millilitres. Depending on tube size, the system reaches outputs of 60 to 100 tubes per minute. Every week, Colomer Italy produces an average of 14 different batches on the line. The required changing of product and packaging material is said to be carried out by the machine operating staff without great effort. "From our point of view, everything is coming together in this project," says Malpensa. "In short: a successful line concept for a successful product."
The hair dye is transported from the portable stock directly via a pipe to the reception container of the tube-filling machine Unipac U 20100. From there, the product is sucked into the dosing chamber of the dosing pump. A piston presses the measured product amount through a hose into the dosing nozzle, which dips vertically into the open tube, filling it in one single upward move. The dimensions of the nozzles as well as the coating of the dosing pump can be adapted to the physical and chemical properties of the product. The tube filler processes liquid and semi-solid solutions of varying density and in a wide viscosity range. In addition, the use of servo drives enables fully reproducible processes with regard to fill amount and filling speed.
The tubes to be filled arrive from the tube magazine horizontally in an elevator that transports them to the machine. They are taken from there by a vacuum assisted tilt system that turns the tubes by 90 degrees, inserting them vertically into the tube holders. In these transport receptacles, the tubes run through 12 stations of the filling process in a clockwise movement. First, the tubes are oriented in their bushes (in order to respect the position of the graphic design during the closing operations) and immediately cleaned with air pressure. Then filling takes place: in the case of hair dye, bisulfite is added to the tube. The chemical ensures a stable combination of the hair colour and is added just before the closing stations. In several steps, the tails of the tubes are mechanically pressed and folded.
After sealing, all tubes are marked with a laser engraving, which provides information on the colour tone and contains the necessary product batch specifications. Before being transferred to the cartoner, the finished tubes go through one more control station, which checks that all of them are tightly shut. 'Faulty' tubes are rejected before reaching

Photos: Romaco

Tube feeding into the transport stations.

the conveyor belt of the cartoner. This special monitoring is implemented to comply with the strict process control. "Particularly for highly priced cosmetics, we are especially concerned with checking and safeguarding the entire production process two or three times over", Malpensa points out. "With Romaco's system concept, we can realize our high end requirements for product safety and quality, as well as for packaging."

Cartoning made to measure

The transfer of the filled tubes to the cartoner Promatic PC 4200 takes place via a robot transfer station. The servo driven pick & place system is equipped with suction heads, which pick up the tubes, transfers them to the transport chain of the cartoner and places them into the right bucket chain.

The continuous horizontal cartoner packages the hair dye products, including user manual, into folding cartons. After closing the cartons and applying the required coding, the products are moved out of the machine. Before that, they pass a last safety barrier, which only releases the boxes if all control systems have reported the appropriate signal. Several sensors monitor the process. If an error is reported, the operator panel immediately localizes the fault, so that the cause can be cleared promptly.

The cartoner was developed strictly in accordance with the guidelines of Good Manufacturing Practices (GMP). Its consistent balcony construction means that packaging components cannot get jammed inside the machine. Due to its lightweight construction, the entire front cartoning area does not require any reenforcement. Plastic-sheathed tooth belts with mounted retaining fingers replaced all chains and mechanical gears. This is why the kinetic energy of the moved machine body, even in high-performance operation, is so low that the cartoner can be stopped quickly at any time. This not only increases product safety but also work safety. In addition, four brushless drives ensure accurate, vibration free and clean processes.

Thanks to the integration of low-noise Venturi nozzles instead of vacuum pumps, noise emission for the operating staff is said to be drastically lowered. A vacuum is needed to manage the package inserts and to open the folding cartons. With the aid of vacuum suction cups, an active servo driven movement pulls the packages apart. This friction-free procedure conserves the material and enables reliable handling of different packaging sizes and types. With a packaging speed of up to 230 packages per minute, the cartoner is said to be in the upper performance range. In order to exploit the potential of the system optimally, Colomer plans to soon integrate a second tube-filling machine in the line. ■)

Vasco Mazzotti (Product Manager Romaco Unipac), Marco Mandrioli (Product Manager Romaco Promatic).

The strict balcony design of the machine enables safe production processes.