



Dual-chamber tube packaging



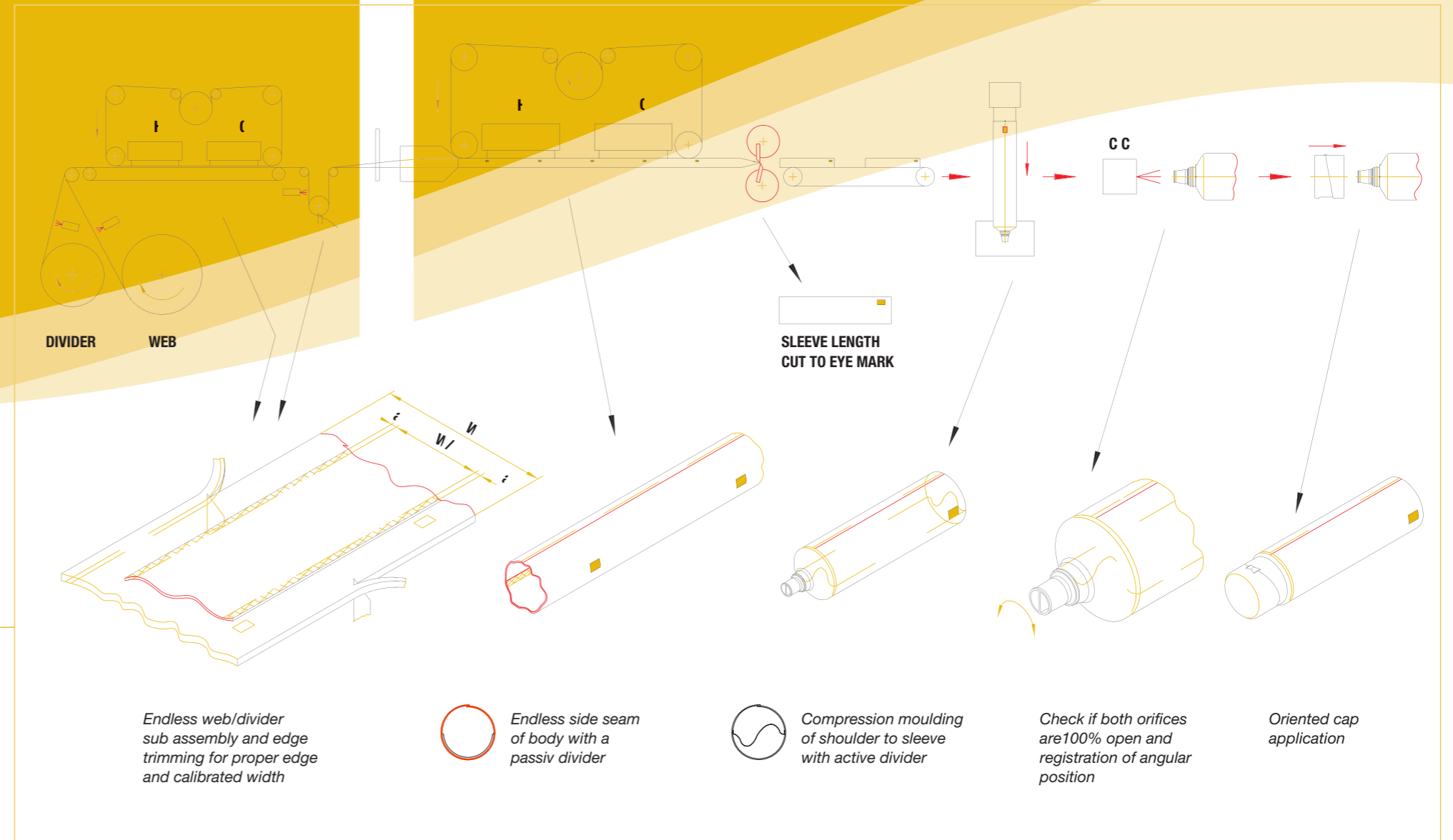
Dual-chamber tube packaging is not exactly new. Indeed, developers have been working on the idea for more than 30 years, and a number of possible solutions have been patented. Nevertheless, surprisingly few solutions are commercial today as most of the inventors were presented with difficulties similar to those faced by Aisa at the beginning of the project:

Four difficulties presented themselves in realizing a viable dual tube solution:

- > Denial of access to protected solutions because of intellectual property rights.
- > The required functionality of a dual-compartment tube in terms of product requirement (product claims are based on equal dispensing capability).
- > Total cost of packaging compared with alternative packages such as pumps.
- > Cost of integrating the production process into an automated line to achieve high speeds and efficiencies.

Three categories of tubes capable of storing two reacting products can be distinguished:

- > Tube-in-tube, in which a tube of smaller diameter is assembled into a larger one.
- > Side-by-side, in which two tubes are positioned alongside each other and, for example, share one cap assembly.
- > Divider tube, in which a third structure or film creates a division within a single-chamber tube in order to separate the two reactants.



Endless web/divider sub assembly and edge trimming for proper edge and calibrated width

Endless side seam of body with a passiv divider

Compression moulding of shoulder to sleeve with active divider

Check if both orifices are 100% open and registration of angular position

Oriented cap application

The advantage of Aisa's divider tube is twofold:

First, in terms of packaging cost/complexity: the tube comprises a standard laminate body with a thin multilayer divider film welded onto the tube body inner walls and moulded onto the tube shoulder, with separate orifices for each cavity.

Second, in terms of dispensing characteristics: since the thin divider film has only minimal influence on the pressure distribution during squeezing, nearly equal pressure applied to each components results in the highest dosing accuracy of all the dual-chamber tube packaging type alternatives.

According to our information this dual-chamber tube is the only commercial divider tube capable of storing two reactant products completely separately, and delivering them in equal doses when squeezed.

KLT DT Divider tube technology process, step-by-step:

In the first step the divider film (typically a 5-layer PE/EVOH/PE film) is welded onto the printed laminate.

In the second stage the laminate assembly with the divider film is formed into a tubular shape, and welded to create a side seam. During this operation the divider remains in its original position.

At the end of the body-maker section the tube is cut to length using a print mark registration. The tube sleeves are then transferred to the heading machine section.

At this stage the divider inside the tube bodies is placed in position by several mechanical devices.

With the tube body and divider in the desired position and loaded onto the mandrels, a PE tube shoulder is compression-moulded and welded into place. The two half-moon shaped orifices are also formed during this operation.

Finally, the tube is inspected for any mould defects, and capped with a flip-top cap and oriented towards the print. The dual chamber tube is now ready for the tube filling machine.

Tubes in diameters ranging from 30mm to 50mm and in different commercial lengths can be produced on the line. Oval section shapes are also possible.

To summarize, the Aisa divider tube is unique in three ways:

- > **The tube production method.**
- > **The ability to store two reacting products separate from each other in a single tube.**
- > **The ability to dispensing its contents in equal amounts.**

For the consumer the only apparent difference is, as it should be, the evident superiority of a product made of two reactants when compared with a single-component product.

Aisa's divider tube technology has been protected by several international patents which cover manufacturing process and production machines.