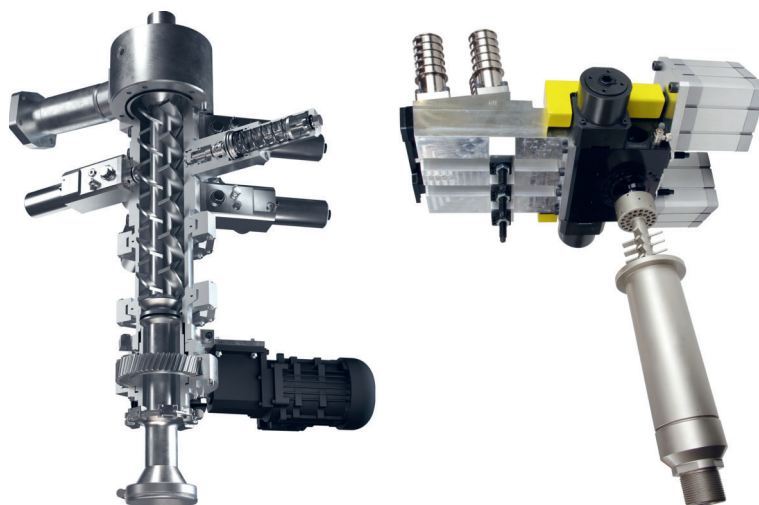


### Low-pressure mixing heads

The standard low-pressure mixing heads are agitator mixing heads. Polyol and isocyanate are supplied via input injectors located at the opposite sides of the mixing chamber. The rotation of the stirrer provides the mixing [Fig. 5.7]. Its rotational speed ranges from 1,000 to 20,000 rpm. The stirrers exist in different forms and shapes, such as spikes, paddles, screws, or propellers. These mixing heads can handle highly viscous and filled components. The required cleaning of the mixing chamber after each shot is a disadvantage of this mixer type.



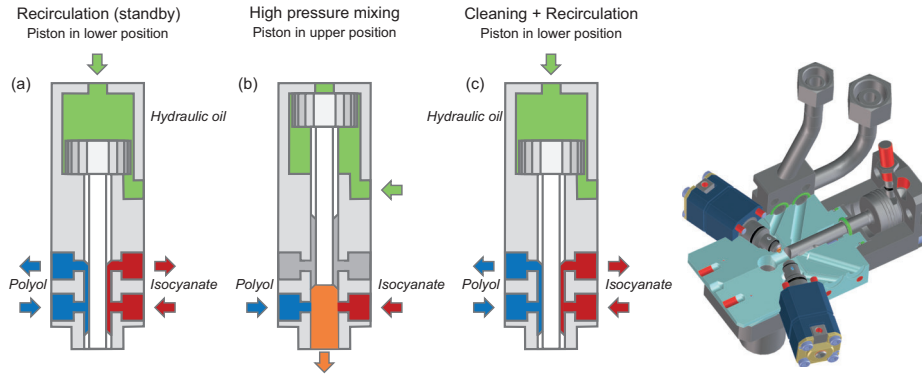
**Fig. 5.7:** Examples of agitator mixing heads (left: with the kind permission of Hennecke GmbH; right: with the kind permission of Cannon S.p.A.).

### High-pressure mixing heads

High-pressure mixing heads are self-cleaning. Several high-pressure mixers exist, but all work according to the same principle. Fig. 5.8 illustrates an example of a linear mixing head.

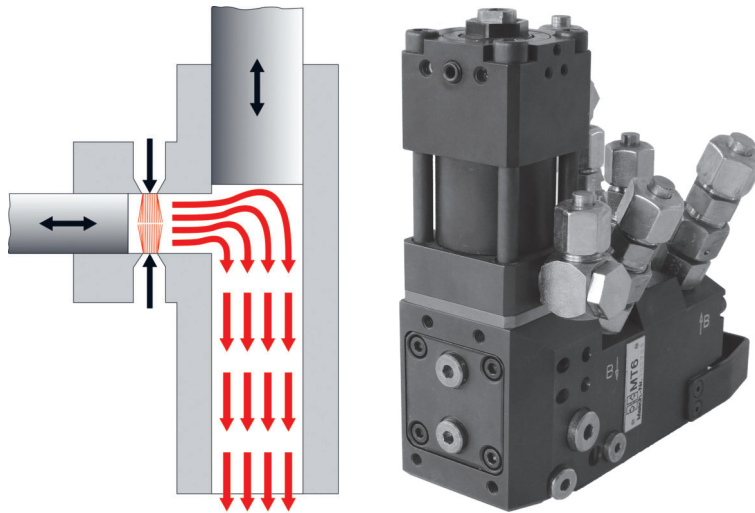
The hydrolytically driven control piston separates the isocyanate from the polyol and switches the mixing head between recirculating and mixing. When the control piston is in position (a), the isocyanate (red) and polyol (blue) are recirculated via the longitudinal grooves in the piston. After lifting the piston (b), the components are injected into the mixing chamber under high pressure and mixed. The control piston is pushed down to stop the shot and, at the same time, closes and cleans the mixing chamber (c).

The injection speed of the components into the mixing chamber through the small orifices is high, reaching up to 150 m/s, and the flow is turbulent. The turbulent flow ensures good mixing; however, for a proper laydown of the reactive liquid in the



**Fig. 5.8:** Linear high-pressure mixing head: (a) recirculation; (b) mixing; (c) cleaning (with the kind permission of Hennecke GmbH).

mold or on the conveyor belt, the reactive liquid ideally needs to leave the nozzle as a laminar flow. For this, the flow rate must be reduced significantly, to below 3 m/s. This can be accomplished, for instance, with an L-shaped outlet at right angles between the orifice of the mixing chamber and the outlet pipe [Fig. 5.9]. This geometry establishes laminar flow by perpendicular deflection and increased outlet pipe diameter.



**Fig. 5.9:** L-shaped mixing head (with the kind permission of Hennecke GmbH).