fluitec
mixing + reaction solutions

Fluitec Georg AG Seuzachstrasse CH-8413 Neftenbach
Tel: +41 52 305 00 40 Fax: +41 52 305 00 44
info@fluitec.ch www.fluitec.ch

Fluitec Documentation No. 11.155 Rev. 1

Novel Melt Mixer CSE-X/4-09 for the Improvement of

Extrusion Processes

Melt pumps and melt mixers are well established and integrated in extrusion processes. Installed between the extruder and the tool they are complementing each other in a perfect way. Reduced pulsations and improved thermic homogeneity are leading to a significantly higher quality of the melt and much higher contouring accuracy of the final products. The new Fluitec® melt mixer has the lowest pressure drop these days, at a short length of only 4D. The rigid construction allows the processing of polymers of high viscosities at high throughput rates.

Introduction

Static mixers in combination with gear pumps are used for decades for the homogenisation of polymer melts. In order to fulfil the increasing requirements of high-tech plastic products, it is essential to focus on a perfect and homogeneous structure already in the melt of the polymer.
These demands can be met by applying the latest technology of Fluitec® melt mixers. As a matter of fact, however, only the melt pump is able to compensate the pressure peaks caused by the extruder in an efficient way. Thus it is recommended to use the combination of both technologies, the gear pump and the static mixing elements, to improve an extrusion process significantly. An up-to-date extrusion process can be arranged as shown below:

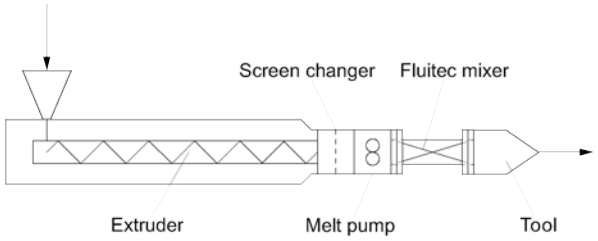


Fig. 1 Sketch of an extrusion plant

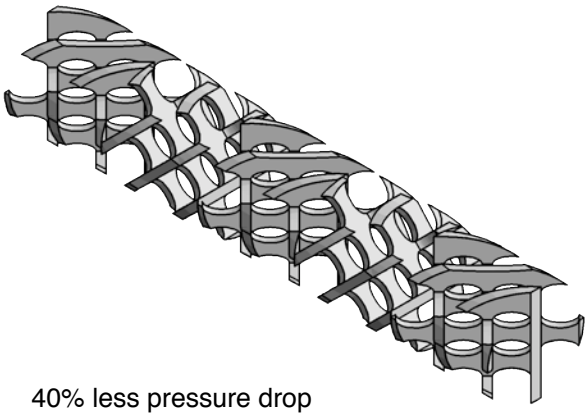
Advantages by using the Fluitec® melt mixer:
- homogeneous temperature profile
- homogeneous viscosity profile
- improved staining quality and performance
- reduced costs for dye of up to 25%

Advantages of the melt pump:
- elimination of pressure peaks generated by the extruder
- constant flow of polymer melt
- possibility of decreased melt temperature

The homogeneous melt, the constant flow rate and the possibility for a reduced melt temperature are leading to the following advantages:

of the extruded product:
- higher contouring accuracy
- improved quality of surface
- improved quality of mixtures of different polymers or regranulates
- products which are free of striaes
- improved mechanical properties due to reduced thermal and mechanical stress
- homogeneous and uniform cell structure of foamed products

of the process:
- increased throughput-rate
- significantly extended field of applications
- optimisations of processes are reproducible
- reduced wear out of extruder
- reduced costs for energy
- reduced costs for maintenance
- possibility of increased use of regranulates



40% less pressure drop
at same mixing efficiency

Fig. 2 Fluitec® CSE-X/4-09 melt mixer

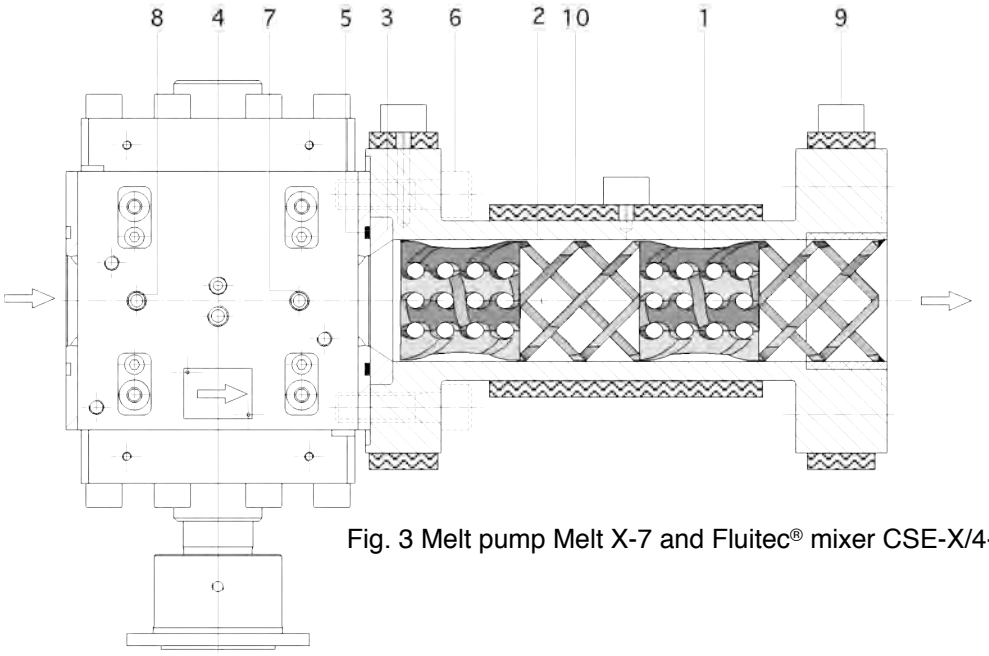


Fig. 3 Melt pump Melt X-7 and Fluitec® mixer CSE-X/4-09

Fluitec® melt mixer

Fig. 4 shows the results of a CFD-calculation and cross sectional views of frozen probes. The very high mixing performance is visibly. Strains are clearly present at the inlet, while after a length of only 2D the mixture at the outlet is already well mixed. This unique performance at the short mixing length required allows an uncompromising improvement of almost any existing production plant at affordable expenses.

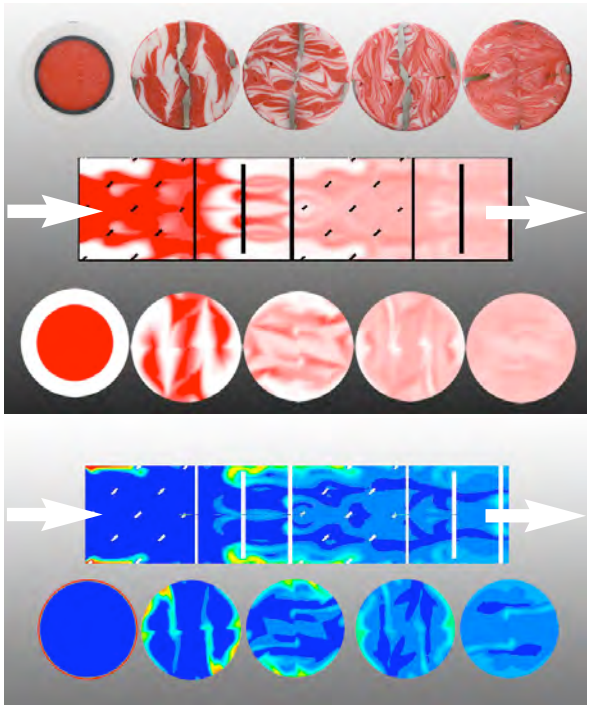


Fig. 4 Mixing performance of the Fluitec® melt mixer without wall effect.

A system as shown in Fig. 3, consisting of a melt pump and a melt mixer, can be used for throughput rates of up to 5'000 kg h^{-1} and a viscosity of 2'000 Pas to 50'000 Pas.

Legend of Fig. 3

1. Fluitec® melt mixer
2. Mixer housing
3. Middle-flange
4. Eprotec Melt pump
5. Spiroflex-sealing
6. Hexagonal bolts
7. Fittings for pressure probe
8. Fittings for temperature probe
9. Heating band for flanges
10. Heating band for housing

Easy handling

All Fluitec® melt mixers are basically free of any maintenance. However, the melt mixer is easily disassembled if required, due to the smart integrated extractor device. Thermal cleaning in an oven is achieved by max. 450°C.

Fig. 5 Melt mixer with housing

The compact and rigid construction allows operating pressures of up to 500 bar and pressure drops of 100 bar.