



Thermoplastic Elastomers. Effective compounding with highest dispersion and maximum throughput rates.

➤➤ Individual solutions for maximum productivity. With our long-term experience and comprehensive know-how we design every process step of a compounding plant according to the used cross-linking agent and the base material. Hence processing thermoplastic elastomers allows to profit out of highest throughput rates.

Thermoplastic elastomers TPE are characterized by their elastic usage and thermoplastic processing properties. Based on the chemical-morphological structure, they are divided into TPE-S, TPE-O, TPE-E, TPE-A and TPE-V. Different methods are applied for the compounding of thermoplastic elastomers such

as pelletizing or direct extrusion in film or sheet. Numerous ZSK twin screw extruders of Coperion are worldwide successfully in operation for the processing of thermoplastic elastomers in a very wide range of forms and recipes.

01 | ZS-B TWIN SCREW SIDE FEEDER (MOBILE)

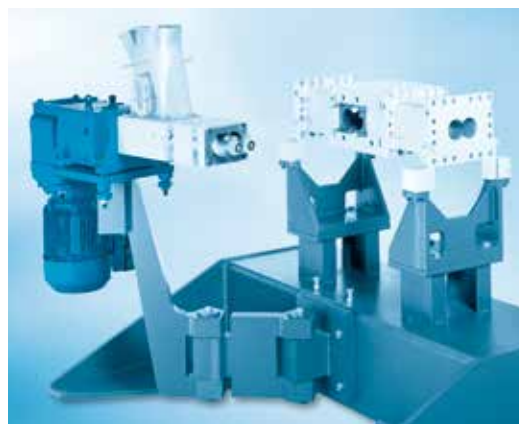
02 | ZS-B TWIN SCREW SIDE FEEDER (SWIVELLABLE)

03 | ZS-EG SIDE DEVOLATILIZATION UNIT

>01

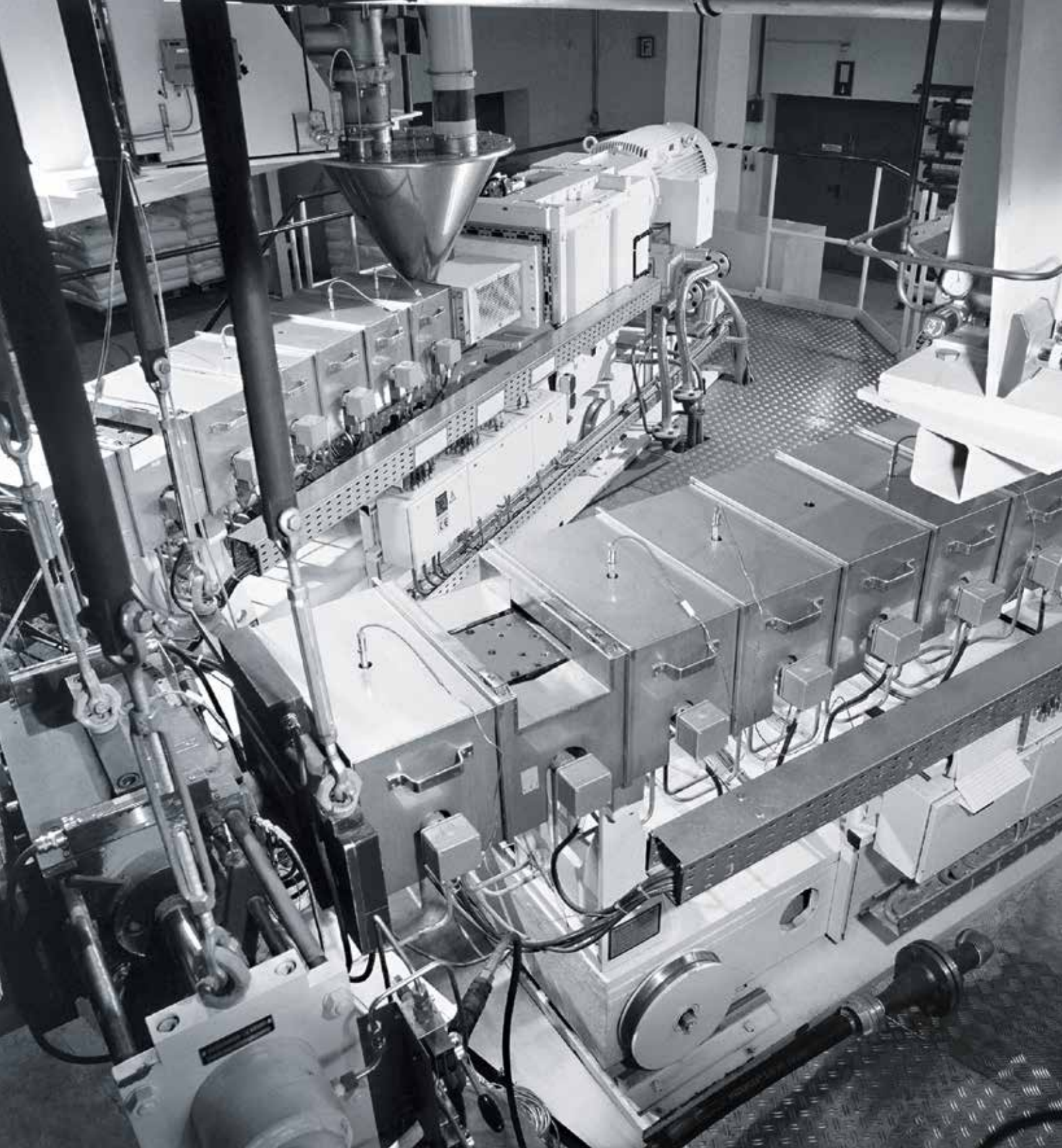


>02



>03





>TPE-O DIRECT EXTRUSION FILM PLANT

› TPE

TPE refers to elastomer alloys which consist of different quantities of thermoplastics and elastomers.

Typical process steps for the production of TPE

- › Gravimetric feeding of all recipe ingredients as a dry pre-mix
- › Alternatively: Separate gravimetric feeding of the individual components
- › Addition of softener along the process section by an injection nozzle
- › Alternatively: Feeding of mineral fillers or a portion of the thermoplastics into the process section via the ZS-B twin screw side feeder

- › Plasticizing, alloying, homogenization, mixing and dispersing
- › Degassing of volatile components by a vacuum dome or via the ZS-EG twin screw side devolatilization unit
- › Optional: Gear pump
- › Optional: Screen pack changer
- › Underwater pelletizer

Recipe ingredients

- › Elastomer: SBS, SEBS, SEPS, etc.
- › Thermoplastic: PS, PP, PE, PA, PPE etc.
- › Softener
- › Mineral fillers

› TPE-V

Thermoplastic elastomers with a cross-linking rubber component are specified as TPE-V. The cross-linking and dispersing of the EPDM as well as the addition of larger quantities of softener require twin screw extruders with a process section length at an average of $L/D = 56$. Each process section is designed individually according to the used cross-linking agent and the base material.

Typical process steps for the production of TPE-V in a single-step process

- › Gravimetric feeding of ground, powdered and conveyed EPDM into the feed barrel
- › Gravimetric feeding of additives, fillers and thermoplastics into the feed barrel
- › Gravimetric feeding of the softener at one or more points along the process section

- › Plasticizing, dispersing, cross-linking, mixing, phase reversal
- › Degassing of volatile components, preferably by a ZS-EG side devolatilization unit
- › Pressure build-up by gear pump for highly viscous melts
- › Screen pack changer
- › Underwater pelletizer

Recipe ingredients

- › PP
- › EPDM
- › Softener
- › Fillers
- › Additives, pigments
- › Cross-linking agent, accelerator, activators
- › Reclaim

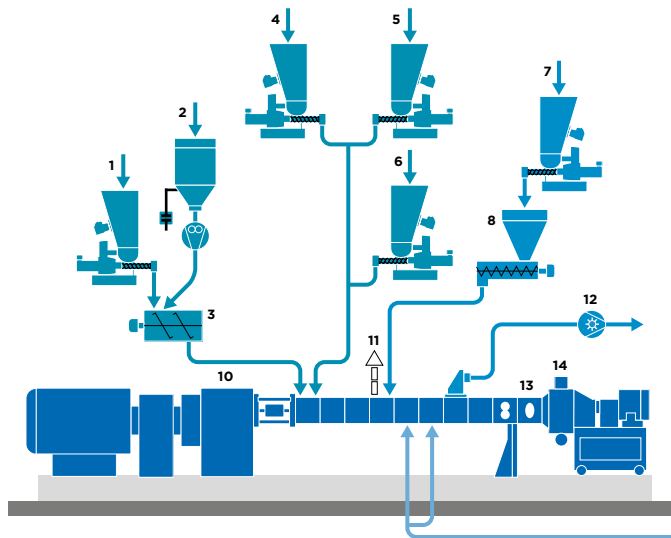
› DIRECT EXTRUSION OF TPE-O FILM

Decorative film which is used for vehicle interiors for instance, can be produced with ZSK twin screw extruders in a single-step process. The intermediate pelletizing typical for plastics and other products is omitted in this in-line compounding. This considerably reduces the investment and running costs as well as the energy requirement of the production process. The example on the right shows the production of a multilayered film of TPE-O on two twin screw extruders: One ZSK processes the base layer and the other the decorative layer. Discharge takes place through a melt filter, a gear pump and an adapter to the co-channel nozzle in which the layers are merged, followed by the transfer onto a three roll finishing calendar.

Plant data by example of two ZSK 70 Mc¹⁸

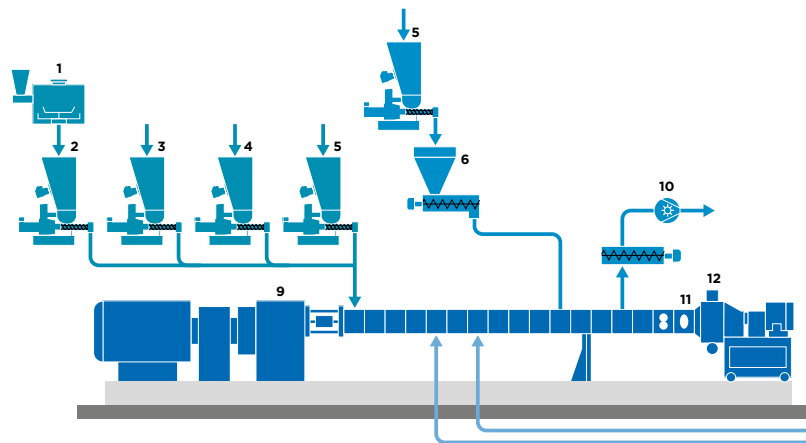
Machine data		
Screw diameter	mm	70
Number of barrel sections		8
Screw length		32 D
Operating data		
Screw speed	rpm	400
Troughput rate	kg/h	up to 700
Melt temperature	°C	230
Melt pressure	bar	up to 100
Plant data		
Sheet width	mm	up to 1,700
Sheet thickness (total)	mm	0.5 to 1.8
Take-off speed	m/min	bis 20

➤ TYPICAL PLANT STRUCTURE FOR THE PRODUCTION OF TPE



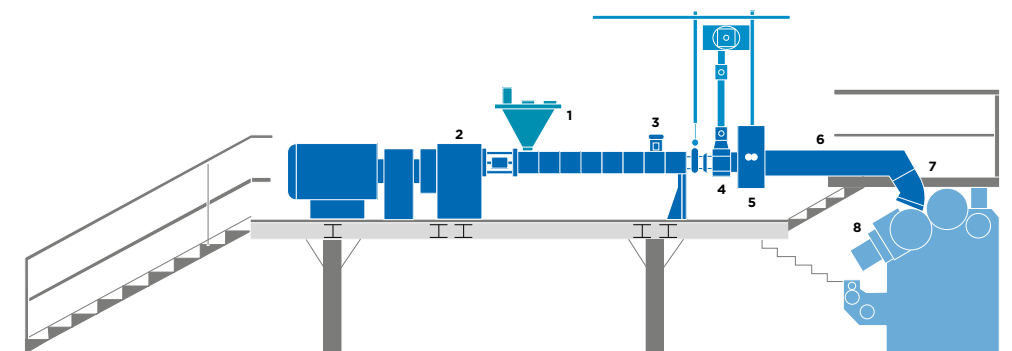
- 1 Elastomers
- 2 Softener
- 3 Continuous mixer
- 4 Thermoplastics
- 5 Fillers
- 6 Additives
- 7 Fillers or thermoplastics
- 8 Twin screw side feeder ZS-B
- 9 Alternatively: Softener
- 10 ZSK twin screw extruder
- 11 Atmospheric venting
- 12 Vacuum degassing
- 13 Screen pack changer
- 14 Underwater pelletizer

➤ TYPICAL PLANT STRUCTURE FOR THE PRODUCTION OF TPE-V IN A SINGLE-STEP PROCESS



- 1 Rubber mill
- 2 EPDM ground product
- 3 PP
- 4 Fillers
- 5 Additives
- 6 ZS-B twin screw side feeder
- 7 Softener, cross-linking agent
- 8 Alternatively: Softener
- 9 ZSK twin screw extruder
- 10 Vacuum degassing via ZS-EG
- 11 Screen pack changer
- 12 Underwater pelletizer

➤ TYPICAL PLANT STRUCTURE FOR THE PRODUCTION OF TPE-O FILM



- 1 Feed hopper for taking up several components from the gravimetric feeder
- 2 ZSK twin screw extruder
- 3 Devolatilization port
- 4 Melt filter
- 5 Gear pump
- 6 Adapter
- 7 Co-channel nozzle with merger of base and decorative layers as well as a nozzle lip with heat expansion bolt for thickness adjustment
- 8 Three roll finishing calender

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