



PROCESS
FLOW DIAGRAM
TECHNICAL DATA
PROCESS IMAGING
FEATURES

Toner.Compounding.

> ECONOMICAL COMPOUNDING OF TONER WITH
THE ZSK TWIN-SCREW COMPOUNDER. <

Compounding of toner.

The toner formulation, consisting of resins, pigments, and additives, is processed in a blender to produce a premix. It may contain fines that must be reprocessed.

This premix is fed continuously to the twin-screw compounder (ZSK) via a metering device. The premix is added to the feed barrel (barrel no. 1) via a chute.

The co-rotating, closely intermeshing screws of the ZSK twin-screw compounder convey and then compress the product in order to melt or plasticize it with the kneading elements in the plastification zone (barrels 2-3). During and after the plastification process, the individual components of the formulation are dispersed, mixed, and homogenized. To help in this task the screw rpm of the ZSK twin-screw compounder is adjustable. The throughput depends on the product

quality, the feed behavior of the product, and the drive capacity of the ZSK twin-screw compounder. Another important criterion is the amount of fines to be processed and their grain structure. The throughput has to be matched to the corresponding values.

Barrel no. 4 has a vent port whose function is designed specifically for the processing of fines. The vent in barrel no. 7 is used depending on the formulation. It is possible to close the barrel or to devolatilize at atmospheric pressure or under vacuum.

The compounded melt is discharged vertically downwards at atmospheric pressure, through a die in the last barrel. The product is cooled and pre-pelletized in a cooling device as preparation for the subsequent grinding.

1 Volumetric feeder / 2 Extruder / 3 Compact cooling conveyor / 4 Pre-grinding

chart Plant for the production of toner.

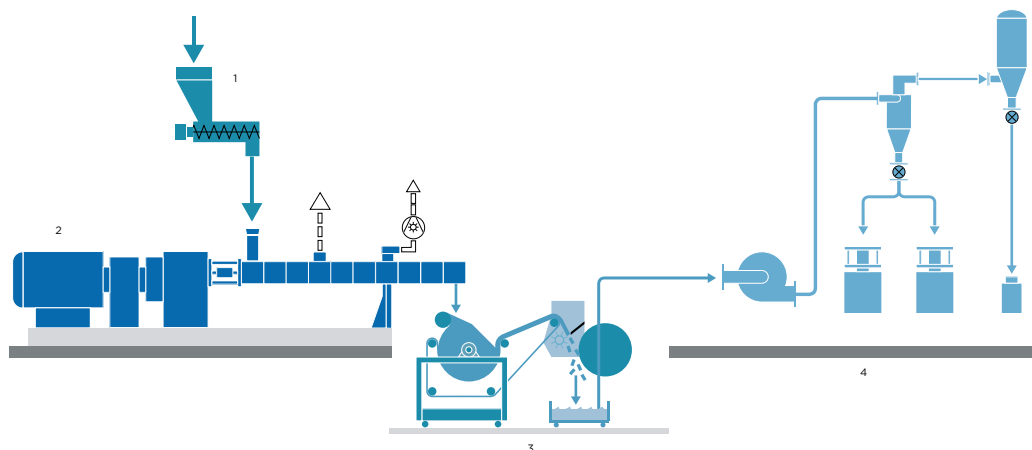
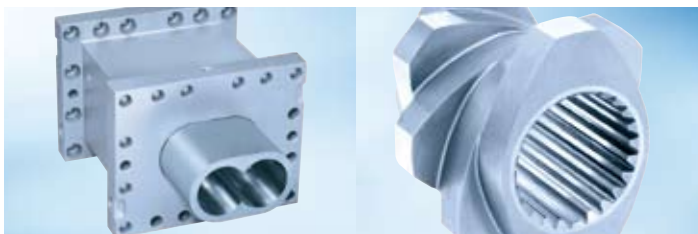


image 1 ZSK flange barrel with exchangeable, wear-resistant oval liner.

image 2 Highly wear-resistant ZSK kneading block with special internal profile.



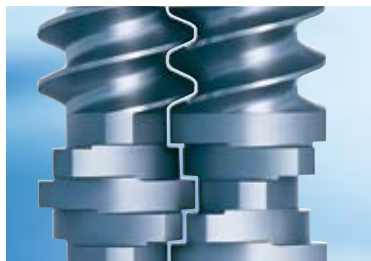


image 1 Self-cleaning screw profile.



image 2 ZSK MEGAcampounder standard model.



image 3 ZSK MEGAcampounder ATEX model.

ZSK – ideal for compounding toner

The ZSK twin-screw compounder is composed of two main modules, the drive section and the processing section.

The drive section consists of the speed reduction gear and a variable speed direct current motor (alternatively AC-Motor).

The processing section of the ZSK twin-screw compounder is designed on the modular principle. It consists of the barrels and the two closely intermeshing, co-rotating screws.

The barrels are heated by means of electrical resistance or induction heating, and cooled with water. The screw consists of deep flighted screw elements and kneading blocks assembled

on a splined shaft. The segmented design allows the process to be tailored to the end product.

The important feature of the ZSK screw is its' self-wiping profile. The flight of one screw, intermeshes with the trough of the opposite screw. The clearance between the two screws is minimal, guaranteeing optimal self-cleaning of the machine.

Particularly effective plastification, dispersion, and homogenization zones are achieved through the installation of kneading elements. The cross section shape of these elements matches the screw barrels, allowing the walls to be wiped clean.

ZSK twin-screw compounder

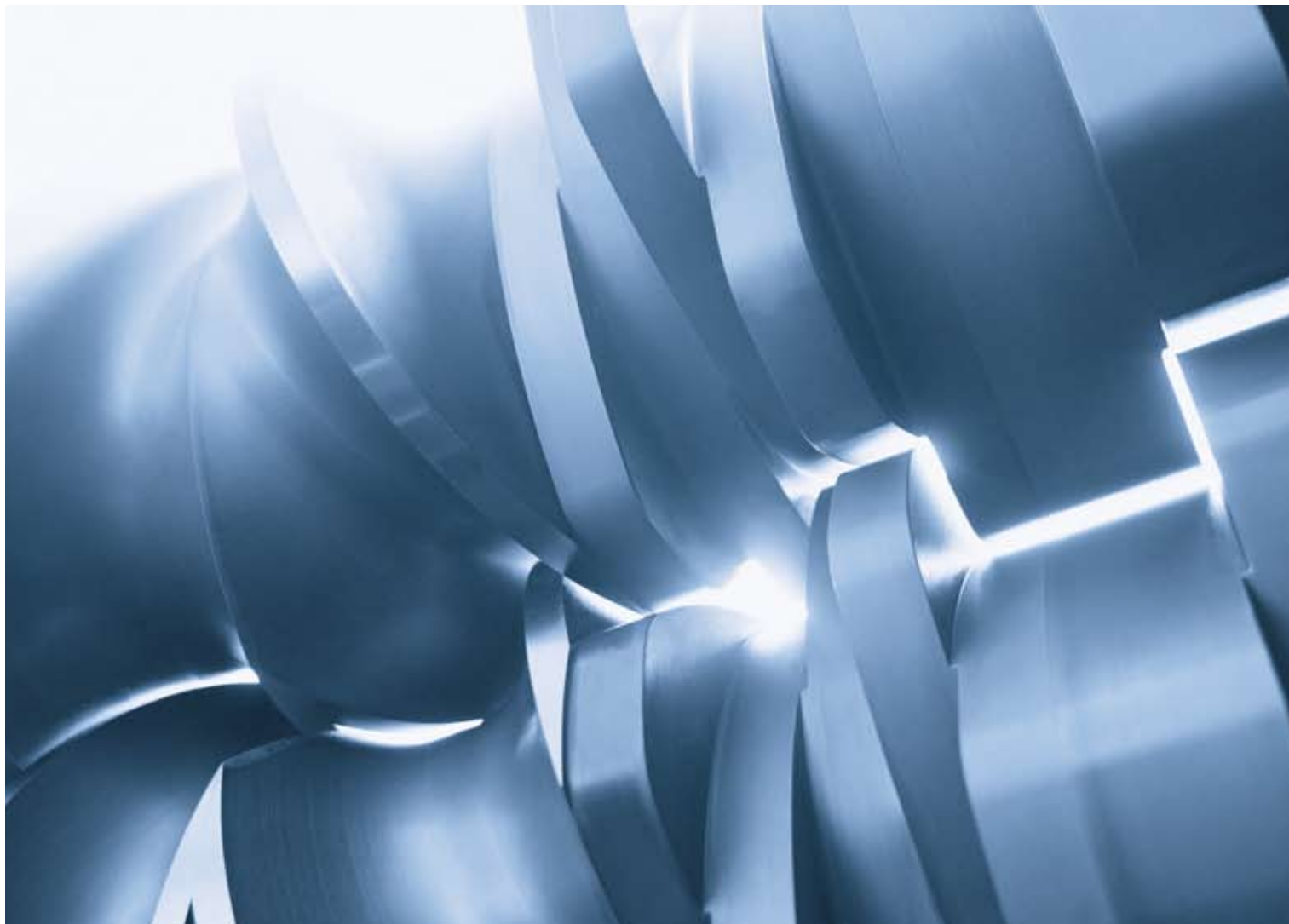
	Drive capacity [kW]	Max. Screw speed [min ⁻¹]	One-component toner Max. throughput +/- 30% [kg/h]	Two-component toner Max. throughput +/- 30% [kg/h]
ZSK 26 Mc	5.2	600	25	15
ZSK 32 Mc	15	600	50	30
ZSK 40 Mc	20	600	90	70
ZSK 50 Mc	27	600	180	150
ZSK 58 Mc	32	600	270	200
ZSK 70 Mc	80	600	500	350

Wear protection

The processing section of the ZSK is wear-protected in the feed and plastification area of the machine. This causes wear to be reduced to a minimum, especially during the compounding

of one-component toners. Coperion Werner & Pfleiderer has decades of know-how in wear protection.

› OPTIMUM SELF-CLEANING, EFFECTIVE DISPERSION AND PLASTIFICATION. ‹



Typical features of the ZSK machines

- › Excellent dispersion quality
- › Very good feed performance
- › Venting ability
- › Very good dispersion and distribution characteristics
- › Short residence time
- › Uniform energy input
- › Low energy consumption
- › Gentle product handling
- › Reliable devolatilization
- › No dead spots
- › Ability to add liquid components
- › Product discharge at atmospheric pressure
- › Short cleaning time
- › Excellent wear protection
- › Reproducible product quality
- › Universal use for broad range of products and formulations without reconfiguration
- › High efficiency
- › Economical operation due to high throughputs
- › Compounding of fines up to 100%
- › Low material requirement during formulation development
- › Easily adaptable to future requirements

> ECONOMICAL OPERATION, MAXIMUM EFFICIENCY, NO DEAD SPOTS. <



Coperion worldwide.

> EUROPE

BELGIUM, LUXEMBOURG,
NETHERLANDS
Coperion N.V.
Industrieweg 2, 2845 Niel, Belgium
Phone: +32.3.870.51.00
Fax: +32.3.877.07.10

SWEDEN, DENMARK,
FINLAND, NORWAY
Coperion AB
Sjödalsvägen 42
14124 Huddinge, Sweden
Phone: +46.8.608.18.18
Fax: +46.8.608.08.68

FRANCE
Coperion Sarl
2 Boulevard de la Libération
Urba Parc 2 / Bâtiment B1
93284 Saint-Denis Cedex
France
Phone: +33.148.13.13.80
Fax: +33.148.13.13.85

UNITED KINGDOM
Coperion Ltd.
Victoria House, 19-21 Ack Lane East
Bramhall, Cheshire, SK7 2BE
Great Britain
Phone: +44.161.925.6910
Fax: +44.161.925.6911

ITALY
Coperion S.r.l.
Via Calvino 32
44100 Ferrara, Italy
Phone: +39.0532.77.99.11
Fax: +39.0532.77.99.80

Coperion S.r.l. Milan Office
Via Milanese 20
20099 Sesto San Giovanni (MI)
Italy
Phone: +39.02.241.049.01
Fax: +39.02.241.049.22

SPAIN, PORTUGAL
Coperion, S.L.
Balmes, 73, pral.
08007 Barcelona, Spain
Phone: +34.93.451.73.37
Fax: +34.93.451.75.32

CIS-STATES
Coperion CGS Moscow
pr. Mira 72, 129110 Moscow
Russian Federation
Phone: +7.495.725.58.93
Fax: +7.495.725.58.93

> ASIA

SINGAPORE
Coperion Pte. Ltd.
Plaza by the Park
51 Bras Basah Road #07-04
Singapore 189554
Phone: +65.641.88.200
Fax: +65.641.88.204

CHINA
Coperion Machinery & Systems Co. Ltd.
No. 8 Jiuliting Industrial Park
1620 Nong, Husong Road
Shanghai 201615, P.R. of China
Phone: +86.21.5763.7770
Fax: +86.21.5763.7808

Coperion International Trading Co. Ltd.
No. 8 Jiuliting Industrial Park
1620 Nong, Husong Road
Shanghai 201615, P.R. of China
Phone: +86.21.5763.7770
Fax: +86.21.5763.7808

Coperion Representative Office
2F, Tian Fu Ge, Tian He Square
No. 268 Zhong Shan Da Dao
Tian He District, Guangzhou 510660
Guangdong, P.R. of China
Phone: +86.20.8230.7248
Fax: +86.20.8230.2606

TAIWAN
Coperion Pte. Ltd.
Taiwan Branch Office
9F-2 No. 30 Chung San
North Road, Sec. 3
Taipei, Taiwan
Phone: +886.225.91.50.51
Fax: +886.225.91.53.04

JAPAN
Coperion Ltd.
Kotobuki-Bldg.-9F
3-18, Kanda-Nishikicho, Chiyoda-Ku
Tokyo 101-0054, Japan
Phone: +81.3.5217.1050
Fax: +81.3.5217.1055

INDIA
Coperion Ideal Pvt. Ltd.
Ideal House, A-35, Sector 64
201307 Noida (U.P.), India
Phone: +91.120.240.16.86
Fax: +91.120.240.16.91

> AMERICAS

USA, CANADA
Coperion Corporation
663 East Crescent Avenue
Ramsey, NJ 07446, USA
Phone: +1.201.327.6300
Fax: +1.201.825.6494

Coperion Corporation
Cleveland Office
30109 Ednil Drive
Bay Village, Ohio
OH 44140, USA
Phone: +1.440.899.4960
Fax: +1.440.899.4965

Coperion Corporation
Houston Office
3955 World Houston Parkway
Suite 190, Houston
TX 77032, USA
Phone: +1.281.449.9944
Fax: +1.281.449.4599

Coperion Corporation
Wytheville Office
285 Stafford Umberger Drive
P.O. Drawer 775
Wytheville, VA 24382, USA
Phone: +1.276.228.7717
Fax: +1.276.228.7682

MEXICO
Coperion Corporation
663 East Crescent Avenue
Ramsey, NJ 07446, USA
Phone: +1.201.327.6300
Fax: +1.201.825.6494

Coperion Corporation
Houston Office
3955 World Houston Parkway
Suite 190, Houston
TX 77032, USA
Phone: +1.281.449.9944
Fax: +1.281.449.4599

BRAZIL
Coperion Ltda.
R. Dona Germanie Buchard 418
05002-062 Sao Paulo-SP
Brazil
Phone: +55.11.387.42741
Fax: +55.11.387.42757



Coperion Keya (Nanjing) Machinery Co., Ltd.
No. 59, West Tianyuan Road
Jiangning District
Nanjing, 211100, P.R. of China
Phone: +86.(0)25.5263.0877
Fax: +86.(0)25.5261.1188



Coperion Waeschle GmbH & Co. KG
Niederbieger Strasse 9
88250 Weingarten, Germany
Phone: +49.(0)751.408.0
Fax: +49.(0)751.408.200



Coperion Werner & Pfleiderer GmbH & Co. KG
Theodorstrasse 10
70469 Stuttgart, Germany
Phone: +49.(0)711.897.0
Fax: +49.(0)711.897.3999