coperion

ZSK twin screw extruders.

The benchmark for maximum throughput and highest product quality.

Unlocking possibilities
for maximum performance

Content

4 - 9 → ZSK functionality and features

12 - 17 → ZSK Mc^{18}

18 - 19 → ZSK Mv^{14}

20 - 21 → Kombiplast

22 → ZSK 18 MEGAlab

23 → ZSK MEGAcompounder

24 - 25 → Complete systems

26 - 28 → Latest developments and special features

29 → C-BEYOND

30 - 31 → Control systems

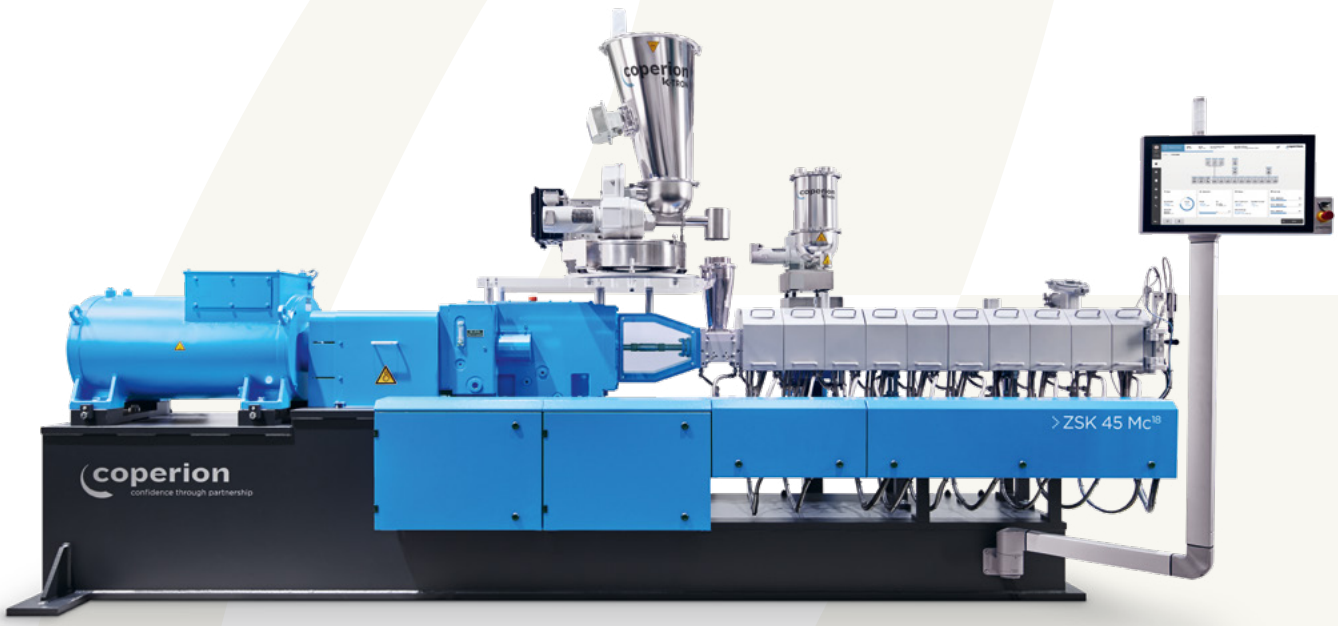
32 - 33 → Wear material portfolio

34 → Test centers

35 → After sales services

Why three letters define the market. Every single component of the ZSK twin screw extruder is an example of top class high technology.

With the know-how and experience of the pioneers in the development of the co-rotating twin screw extruder we design every single process step of the extrusion system to meet your individual product requirements. As a result, you benefit from maximum throughput rates and highest product quality. More than 16,000 twin screw extrusion systems installed worldwide provide the daily proof.



→ Twin screw extruder ZSK 45 Mc18

Unlocking success without any risk

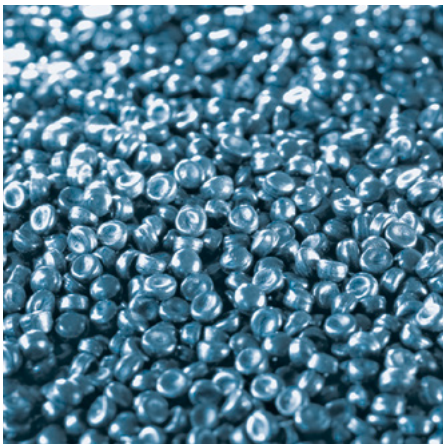
The continuous research and development work of Coperion has made the ZSK co-rotating twin screw extruder into what it is today: A top-quality product at the highest technical level. It is the high-end, high-tech heart of our processing plants and is continuously setting new standards in the plastics, plastics recycling, chemical, batteries, pharmaceutical and food industries.

The quality of the end product is the decisive factor in complex processes such as the processing of viscous materials. From raw materials feeding through conveying, melting, dispersing, homogenizing, devolatilizing, pressure build-up, filtering and pelletizing, we use our decades of experience and extensive know-how to adapt every process step exactly to your application.

The ZSK twin screw extruder gives you a processing plant featuring maximum throughput rates, gentle handling of the product, optimum efficiency and highest reliability and robustness.

One solution, endless possibilities

→ Plastics Recycling



→ Polyolefins

→ TVP & HMMA

→ Engineering Plastics

→ Masterbatch

→ Food & Pet Food

→ Pharmaceutical & Nutraceutical Processes

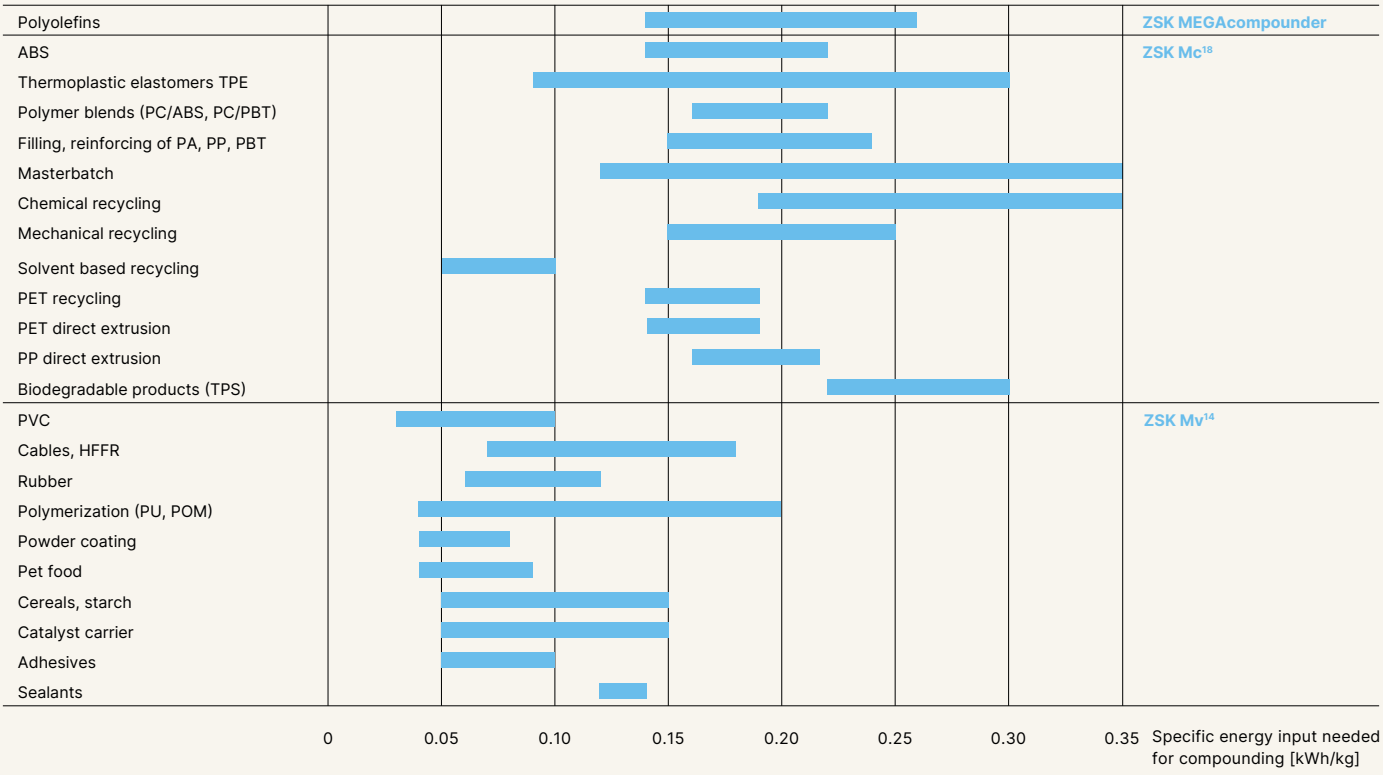
→ Chemical Applications

→ Battery Manufacturing

The right ZSK twin screw extruder for every application

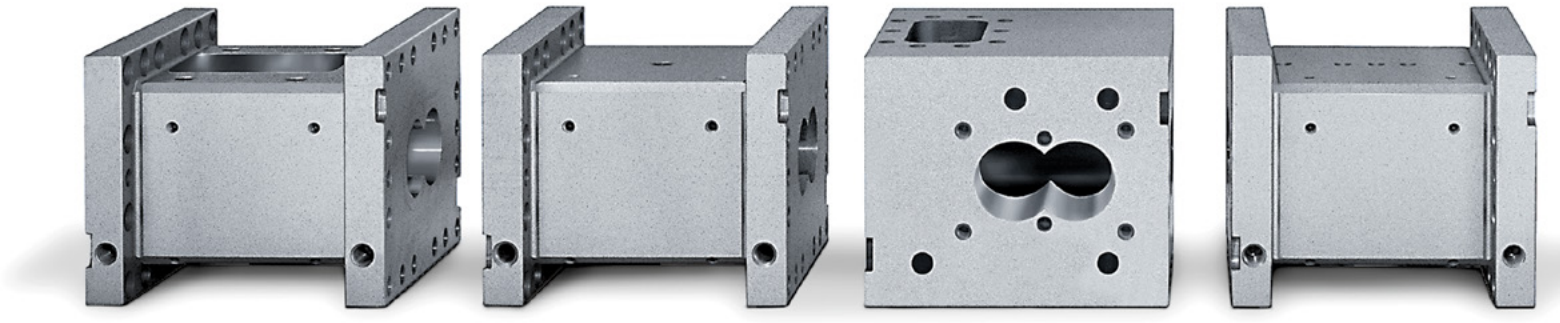
ZSK Mc[18]	Extruder for products with high torque requirement such as engineering plastics
ZSK Mv[14]	Extruder for processes with high volume requirement such as products from the chemical and food industries
ZSK MEGAcompounder	High capacity extruder for homogenization and pelletizing of polyolefins downstream of the polymerization reactor
Kombiplast	ZSK with a single screw discharge for gently building up pressure for temperature and shear sensitive products such as PVC
ZSK MEGAlab	Laboratory extruder for recipe development and basic scientific research
Compounding plants	Turnkey compounding systems with all components from raw material feeding to downstream periphery

Areas of application of the ZSK twin screw extruder



Minor details
with a major effect

With the extensive knowledge of the technology leader for the design of processing plants, we continuously develop and optimize every single detail of the ZSK. It is demonstrated by countless technical achievements and innovations which are all perfectly adapted to each other. They make the ZSK the ideal compounder for maximum flexibility, reliability and efficiency at maximum product quality and throughput requirements.



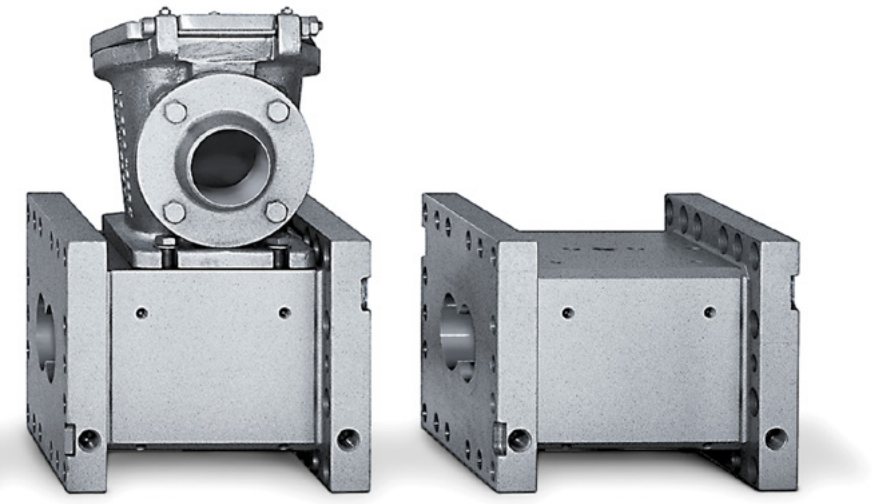
Modular design

The process section of all ZSK series is designed as a modular system. It consists of several barrels in which the co-rotating screws operate. The advantage of this modular principle is its maximum flexibility in compounding and extrusion.
Our process engineers configure the barrels and screw elements individually to your applications. Different process zones are created alternately as required for conveying, plasticizing, mixing and shearing, homogenizing, devolatilizing and pressure build-up to benefit from highest product quality and maximum throughput rates.

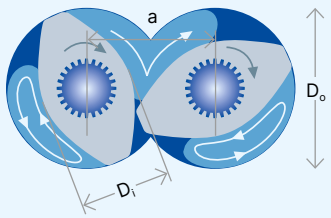
The temperature of every barrel can be controlled separately. The heating is usually electric by means of heater cartridges and heater shells, the cooling is achieved by water. In addition, barrels can also be tempered with liquid or steam heating.
Standard barrels and screw elements are made of nitrided steel or in the enhanced wear and corrosion protected version of appropriate materials.

Advantages of the ZSK twin screw extruder

- ↗ Maximum power density
- ↗ Gentle product handling for maximum quality
- ↗ Maximum screw speed
- ↗ Maximum efficiency and productivity
- ↗ High reliability and proven technology
- ↗ Excellent mixing behaviour
- ↗ Maximum conservation of resources by high efficiency
- ↗ Maximum flexibility in product changes and machine modifications
- ↗ Very wide range of wear protection solutions
- ↗ Comprehensive process engineering support
- ↗ Optimum graduation of the machine sizes
- ↗ Reliable scale-up
- ↗ Flexible solutions for control system
- ↗ Large number of application-specific solutions to increase throughput and productivity, e.g. quick-release features, side devolatilization ZS-EG, Feed Enhancement Technology (FET)
- ↗ Comprehensive after sales services
- ↗ Very long service life
- ↗ Fast ROI (Return On Investment)
- ↗ Low TCO (Total Cost of Ownership)



Cross-section of the two co-rotating screws



D_o/D_i = diameter ratio, determines average shearing, devolatilization and intake
Md/a^3 = specific torque, determines power density and degree of fill
n = screw speed, determines shearing and mixing
D_o = outer diameter
D_i = inner diameter
a = centerline distance

Optimum diameter ratio

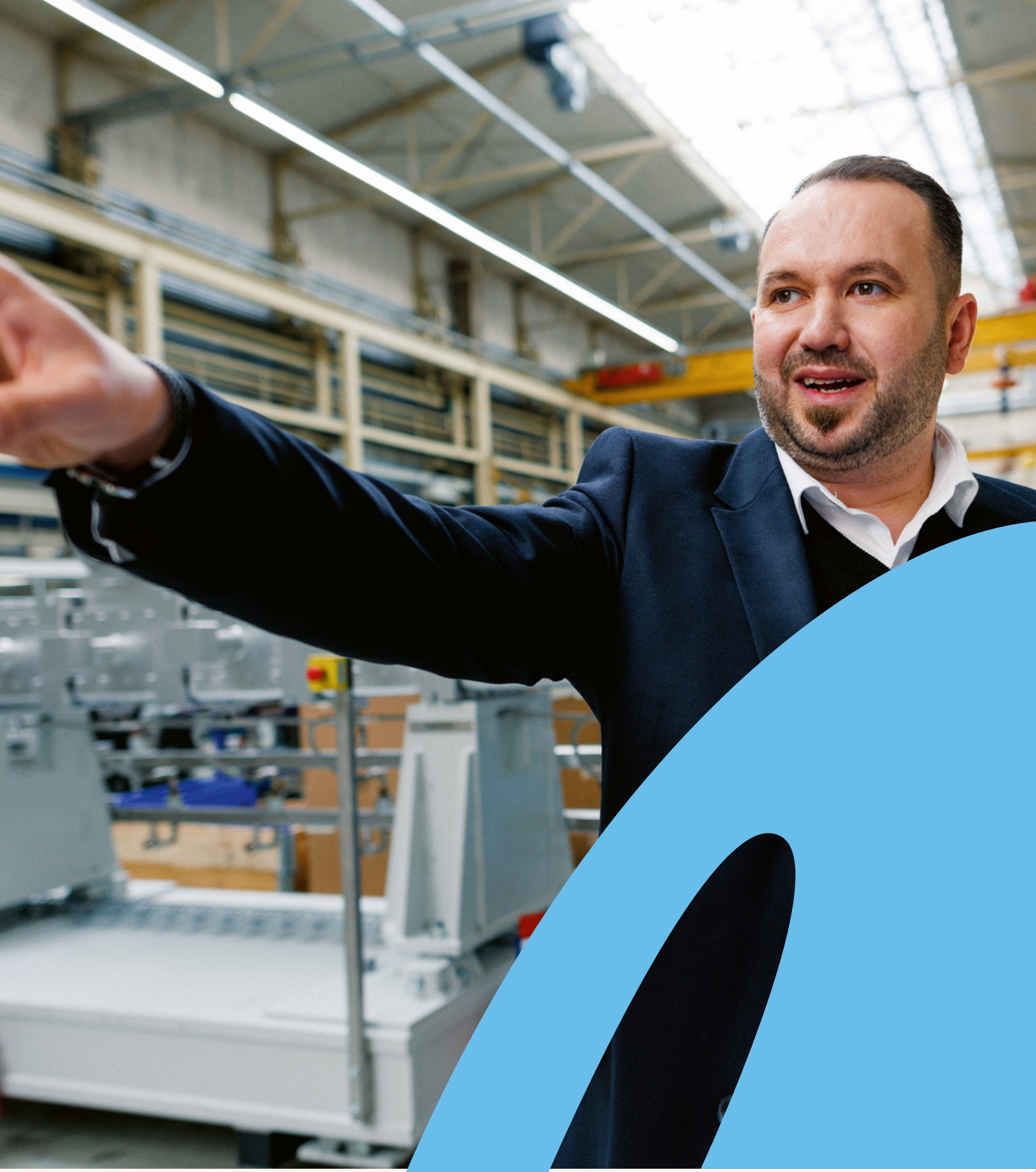
The diameter ratio D_o/D_i, which determines the free volume of the twin screws in the process section is constant over all sizes of the respective ZSK series. In this way we ensure the reliable scale-up from the knowledge gained in the laboratory to full-scale production plants. Important parameters such as screw configurations or product recipe contents can reliably be transferred from small to large ZSK sizes.

Highest efficiency

Coperion ZSK extruders operate at maximum efficiency. They achieve very high throughput rates and deliver the highest product quality - all at comparatively low energy consumption. With many years of experience and comprehensive know-how for the entire manufacturing process, we design the extrusion and compounding lines as well as each individual unit to work as efficiently as possible.

Self-cleaning screw profile

The closely intermeshing twin screws of the ZSK series eliminate with their tight, self-wiping profile stagnant zones over the whole length of the process section. The effect is a constantly high degree of process reliability and optimum self-cleaning in the process section.



Designed to boost your performance

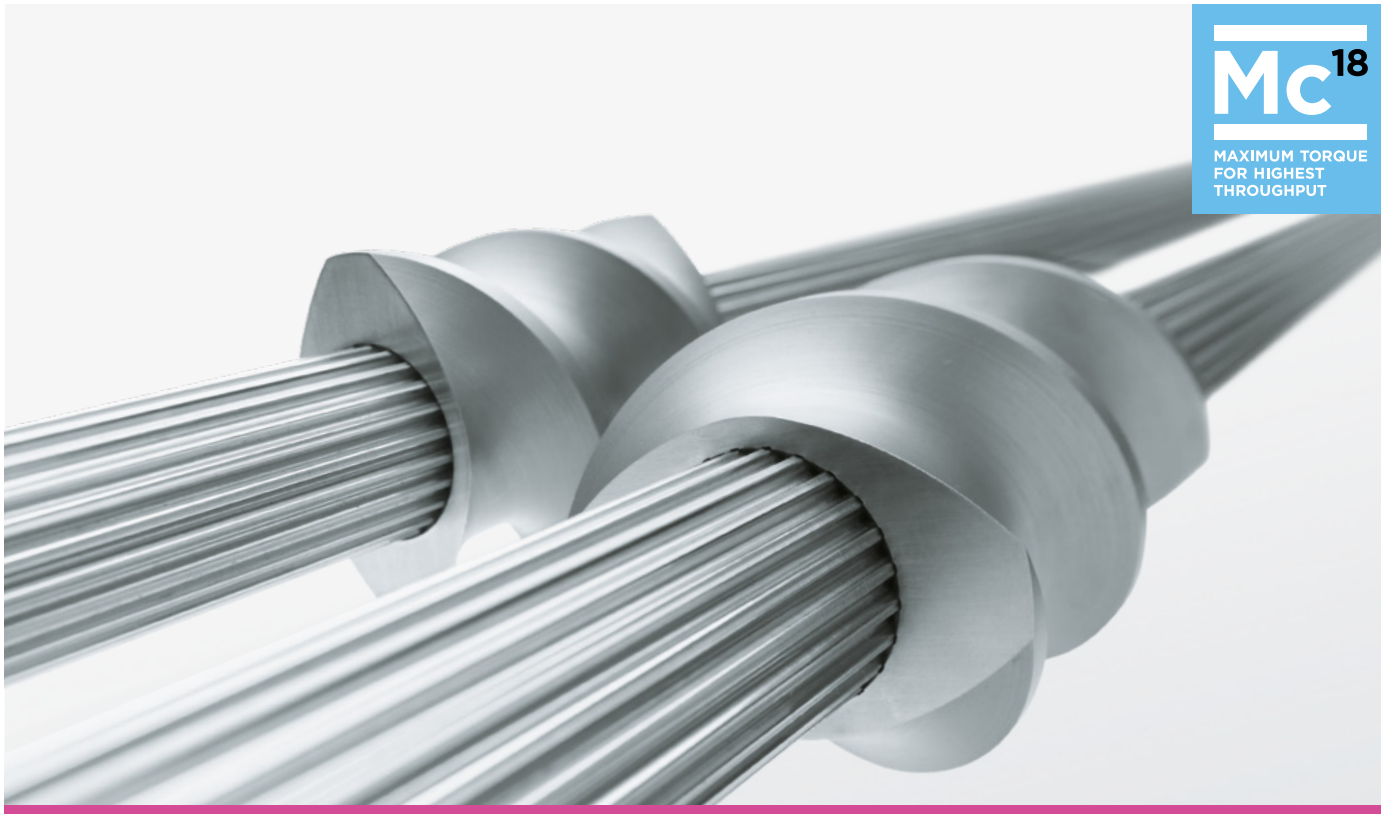
The ZSK Mc^{18} is a success story. With its specific torque of 18 Nm/cm^3, it is the most powerful ZSK ever. It impresses with its extremely high throughput rates, optimum product quality and maximum efficiency.

The ZSK Mc^{18} high performance extruder is a superlative product. With its torque of 18 Nm/cm^3, it has made a name for itself on the market as a throughput champion. The ZSK Mc^{18} ensures production with maximum efficiency. The optimum price/performance ratio, the extremely energy-efficient operation, the reliability, the wide range of applications, and the associated high level of flexibility of the machine are additional advantages of the ZSK Mc^{18}. With its D_o/D_i of 1.55, the ZSK Mc^{18} strikes just the right balance. It has proven itself in the processing of products with high torque requirements and enables reliable scale-up within the entire ZSK series.

Together with a range of application-specific special solutions such as the Feed Enhancement Technology (FET) or the ZS-EG side devolatilization, the ZSK Mc^{18} fulfills its promise in guaranteeing the highest levels of productivity. It is possible to scale-up and modernize the ZSK Mc PLUS to the ZSK Mc^{18} series.

Typical areas of application of the ZSK Mc^{18}

- → Continuous processes with high energy consumption
- → Processing of all previously torque-limited products such as polyamide with glass, PBT with glass, glass fiber-reinforced polypropylene
- → Mixing and dispersing of pigments and additives
- → Reinforcement with glass, carbon and other fiber materials
- → Degassing of volatile components
- → Filling with talcum, calcium carbonate, sawdust or other fillers
- → Alloying
- → Reactive extrusion
- → Chemical reactions such as polymerization, polycondensation and polyaddition
- → Direct extrusion



Advantages of the ZSK Mc^{18} at a glance*

- ↗ More than 30 % increase of specific torque
- ↗ Up to 100 % increase in throughput
- ↗ Increased energy efficiency by reduced specific energy input
- ↗ Greatly improved productivity
- ↗ Maximum efficiency for processes, costs, energy, and other resources
- ↗ Maximum flexibility in product changes and machine modifications
- ↗ Maximum product quality
- ↗ Improved compounding quality by gentle processing with a higher filling degree
- ↗ Reduced compound temperature at much greater throughput rates
- ↗ Flexible, wide area of applications
- ↗ Minimal downtimes for screw changes, cleaning, and maintenance
- ↗ Proven high ZSK safety enabled by new designs and developments
- ↗ Comfortable handling
- ↗ Very long service life
- ↗ Fast ROI (Return On Investment)
- ↗ Low TCO (Total Cost of Ownership)

* In comparison with the predecessor model ZSK Mc PLUS.

Why is the ZSK Mc^{18} such a success

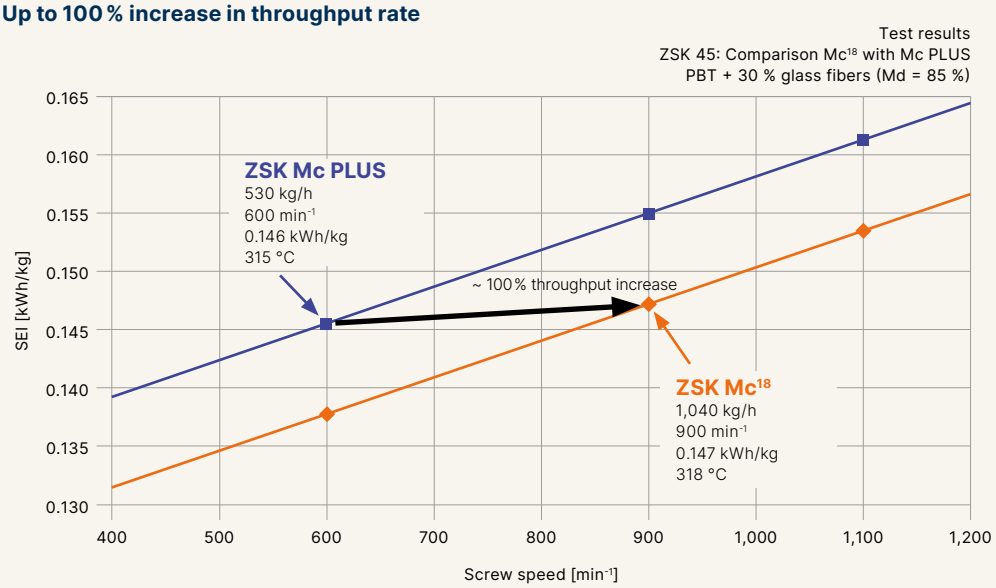
The ZSK Mc^{18} represents the interaction of numerous innovative developments that all serve a collective requirement: achieving the highest throughput rates with optimum product quality and maximum economic efficiency.

Technical data

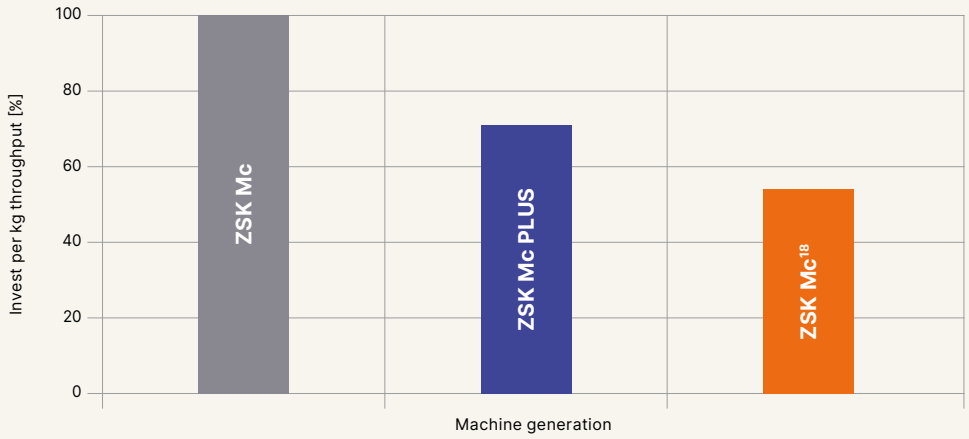
ZSK	Max. screw speed [min^{-1}]	Screw diameter [mm]
18 MEGAlab*	1,200	18
26 Mc^{18}	1,200	25
32 Mc^{18}	1,200	32
45 Mc^{18}	1,200	45
58 Mc^{18}	1,200	58
70 Mc^{18}	1,200	70
82 Mc^{18}	1,200	83
92 Mc^{18}	1,000	92
119 Mc^{18}	1,000	118
133 Mc PLUS	1,000	133

* Laboratory extruder.

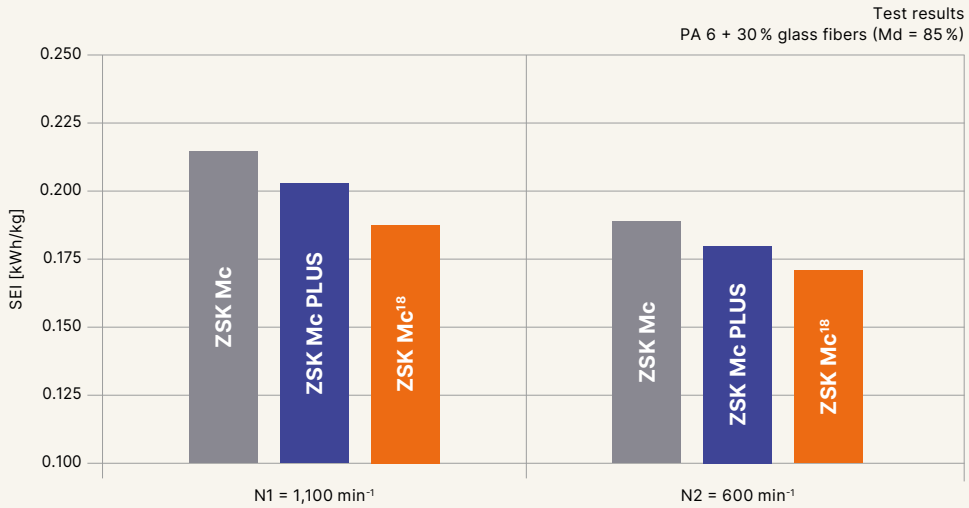
Up to 100 % increase in throughput rate



Optimum price-performance ratio



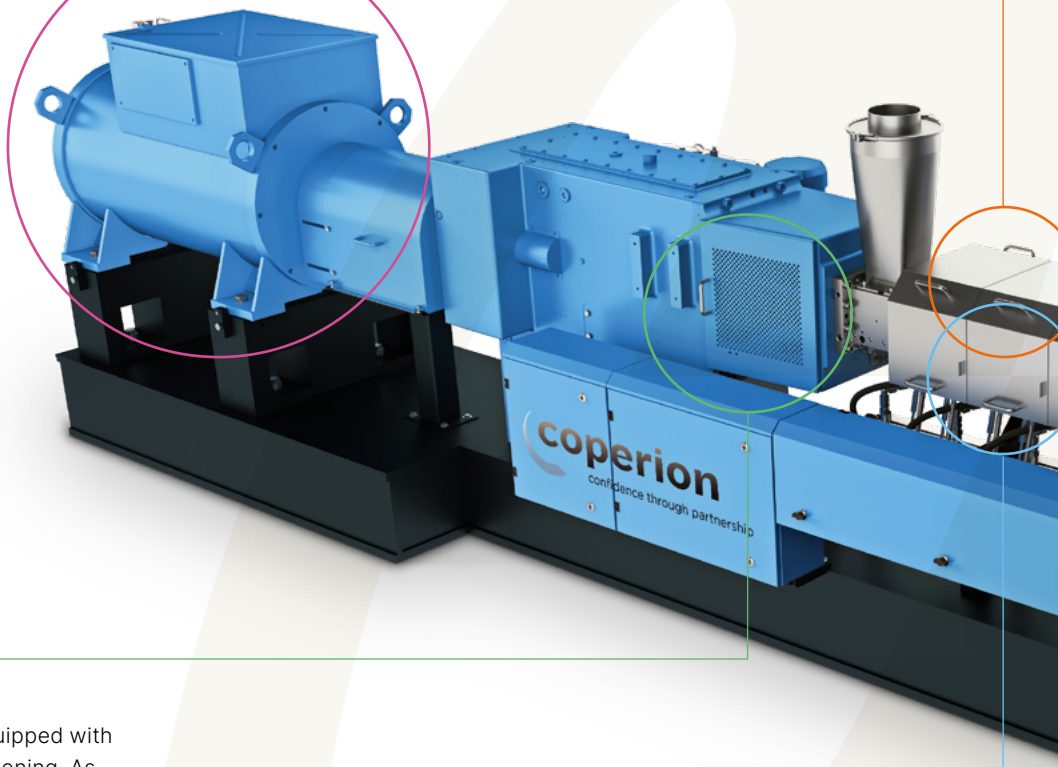
Considerably reduced energy consumption with increased throughput



Equipped for maximal output

Optimum D_o/D_i of 1.55 for compounding products with high torque requirement
With a D_o/D_i of 1.55, the ZSK Mc^{18} provides optimum free volume and low shearing stresses – with absolute mechanical safety and reliability. You benefit from the highest throughputs, maximum product quality, and a reliable scale-up.

Specific torque of 18 Nm/cm^3
With its 18 Nm/cm^3 torque, the ZSK Mc^{18} is the most powerful ZSK of all time, achieving highest throughputs.



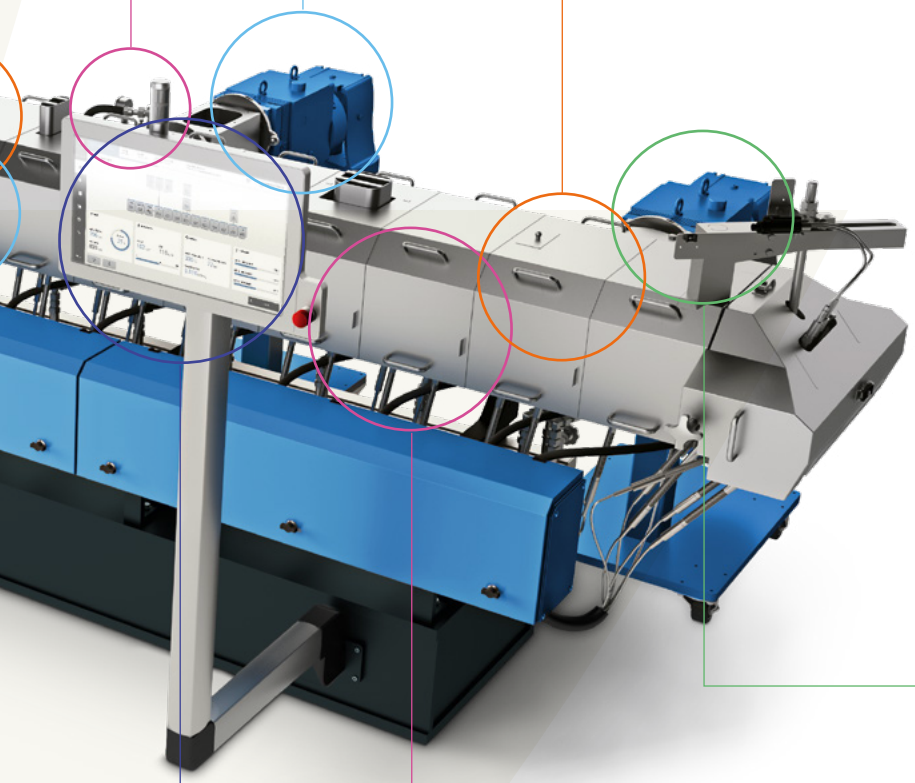
Gear lantern with easy access
The gearbox lantern can be optionally equipped with an electronically secured maintenance opening. As soon as the screw shafts come to a complete stop, service personnel can open the gearbox lantern without tools, guaranteeing secure, easier access to the screw shaft coupling during maintenance.

Innovative materials and screw designs
Revolutionary material solutions for extraordinarily long operating times, as well as a selection of new screw configurations, provide the highest throughputs and maximum product quality.

Controls with user-friendly interface
Coperion offers control solutions that are individually modified for your requirements and that can be seamlessly integrated into your Industry 4.0 environments. The modern user interface meets the most current operating standard and, along with numerous comfortable functions and smart Industry 4.0 features, enables intuitive operation.

Feed Enhancement Technology (FET)
With the patented FET equipment, it is possible to optimize the product feed such that you benefit from the full available drive power of the ZSK Mc^{18} even when processing powder bulk materials. The result: 200 to 300% throughput increases at maximum productivity, the greatest operational safety, and the highest energy efficiency.

ZS-B easy twin screw side feeder
For side feeding of fillers and additives in powder or pellet form or cut glass fibers the ZS-B in easy design can be removed quickly from the process section, significantly reducing the time needed for screw changes, cleaning, or maintenance.



Heat insulation covers
The single-part heat insulation covers are very easy to handle – they can be detached without removing the cartridge heaters. They insulate the process section completely. You profit from maximum energy efficiency.

ZS-EG side devolatilization
Using a ZS-EG achieves throughput increases of up to 30% with improved product quality. The machine's availability and profitability are markedly increased. For cleaning and maintenance purposes the ZS-EG in easy design can be removed from the process section in shortest time.

Pluggable cartridge heaters
Cartridge heaters enable efficient individual tempering within the interior of each barrel. They are individually connected using IP67 plugs and can be removed for maintenance in no time, no electrician needed.

The ZSK Mv^{14}. With its ratio of very high drive power to large screw volume this series ensures maximum throughputs especially in processes with high volume requirement.

Coperion sets standards with the ZSK Mv^{14}: This extruder series unites an optimally adapted large free screw volume with high screw speeds and a high specific torque. This particularly allows production of products with a specific energy requirement <0.13 kWh/kg with very high throughput rates. The system excels maximum recipe flexibility and maximum productivity.

Typical areas of application of the ZSK Mv^{14}

- → Processes with high volume requirement, e.g. for products with low bulk density, poor intake properties or high filler content
- → Devolatilization processes, e.g. in substances containing solvents
- → Processes with low energy consumption
- → Shear sensitive products (e.g. effect-pigment masterbatch)
- → Carbon black masterbatch
- → PET masterbatch
- → HFFR (ATH, $Mg(OH)_2$)
- → Cross linkable cable compounds
- → PVC
- → Rubber
- → Polymerization (PU, POM)
- → Powder coating
- → Catalyst carrier
- → Adhesives, sealants
- → PP/hollow glass
- → Food
- → Pet food
- → Cereals, starch

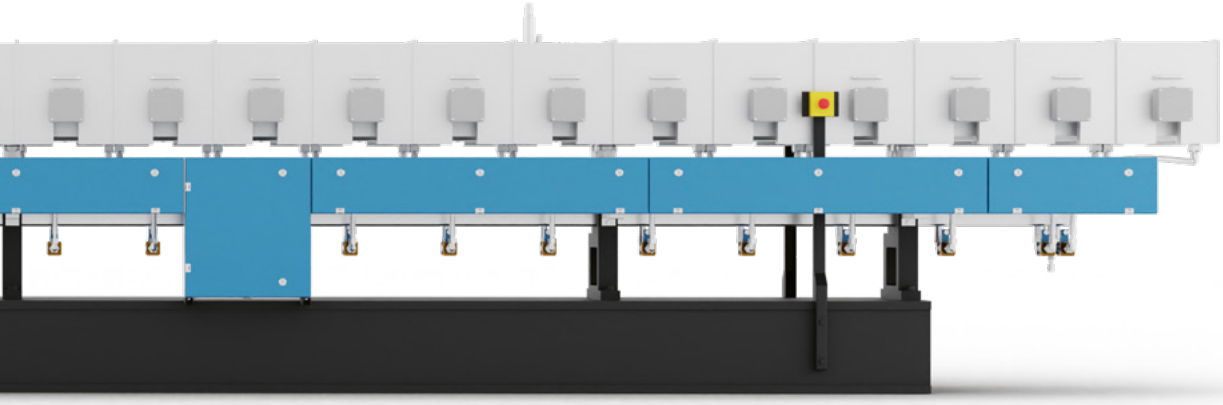
→ ZSK 98 Mv^{14} for film production and chemical reaction applications

Special features of the ZSK Mv^{14}	The advantages
Screw volume The deeply cut screw flights with a diameter ratio D_o/D_i of 1.8 result in a very large free screw volume.	↗ Very good feed intake of additives with low bulk density such as flours, starches, pigments, fillers, additives ↗ Low shearing ↗ Minimal thermal stress on the raw materials ↗ Long residence time for reaction processes ↗ Safe devolatilization
Screw speed The ZSK Mv^{14} series is designed for speeds up to 1,800 min^{-1}.	↗ Very high throughput rates ↗ Low investment and operating costs due to smaller machine sizes at the given throughput rate ↗ Favorable price-performance ratio
Torque The specific torque of the Mv^{14} is 13.6 Nm/cm^3. It has been increased by 20 % in comparison to the predecessor model ZSK Mv PLUS.	↗ Increase in throughput of up to 20 % in comparison to ZSK Mv PLUS ↗ Wide operating window ↗ Great recipe flexibility

Technical data

ZSK	Max. screw speed [min^{-1}]	Screw diameter [mm]
27 Mv PLUS	1,800	27
34 Mv^{14}	1,800	34
43 Mv^{14}	1,800	43
54 Mv^{14}	1,800	54
62 Mv^{14}	1,800	62
76 Mv^{14}	1,800	76
98 Mv^{14}	1,500	98
125 Mv^{14}	1,500	125
140 Mv^{14}	1,000	140
248/250 Mv PLUS	300*	248

* Higher screw speeds upon request.



The Kombiplast. This two-stage processing system ensures optimum product quality and maximum economy in the processing of PVC, cables and special compounds.

PVC, cables and special compounds can only be processed in top quality and at the same time economically with reliable compounding and pelletizing technology. Our Kombiplast two-stage processing system fully meets this requirement. Coperion has designed the compounding system especially for the production of temperature and shear sensitive plastics – so that you benefit from maximum product quality, maximum economy and flexibility.

Advantages of the Kombiplast

- ↗ Excellent feeding properties, even for powders that are difficult to feed and hot premixes
- ↗ Short, defined residence time
- ↗ Precise temperature control
- ↗ Effective devolatilization of volatile ingredients
- ↗ Fast, convenient cleaning
- ↗ Gentle materials handling, in the pressure build-up zone before the die plate
- ↗ Uniform product flow through the die plate
- ↗ Low, specific energy input
- ↗ Easily adaptable to new requirements
- ↗ Wide range of application

Typical areas of application

Soft PVC

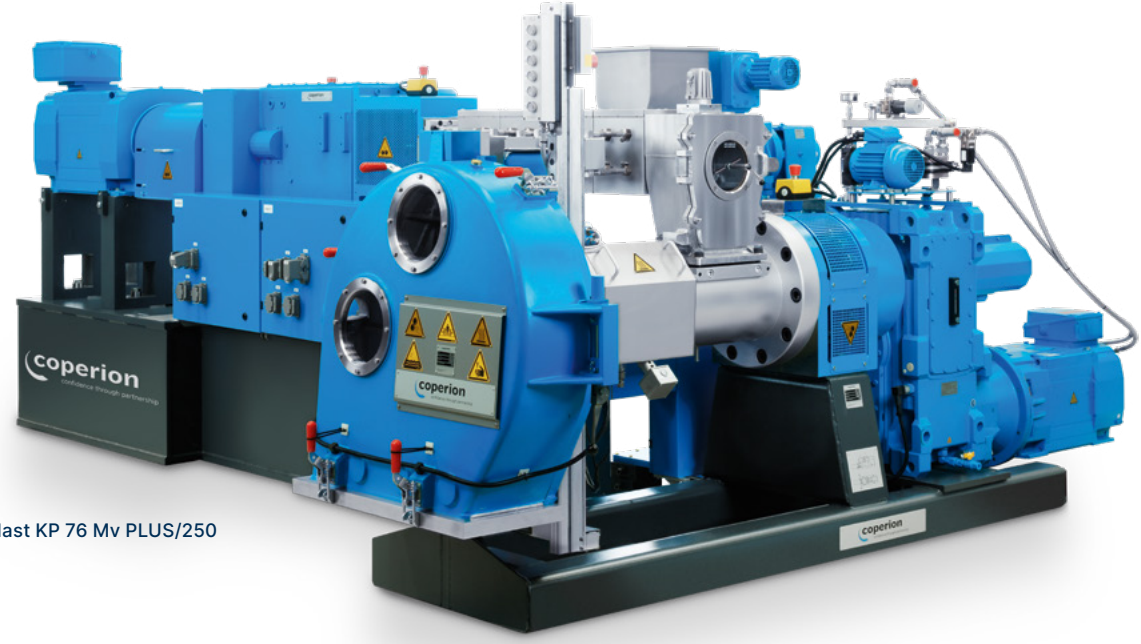
- → PVC cables: insulation material, sheathing and bedding compounds
- → Materials for shoes and shoe soles (also PVC-P with foaming agent)
- → Materials for the extrusion of profiles and hoses (including medical applications)
- → Injection molding compounds
- → Films and sheets for flooring

Rigid PVC

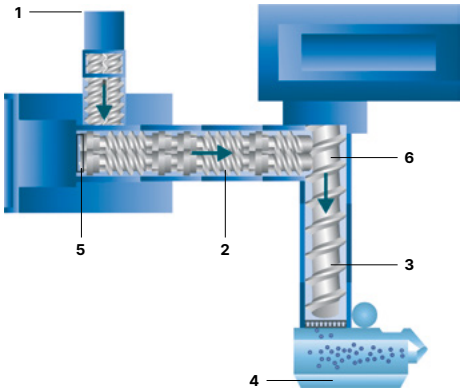
- → Materials for the extrusion of profiles for interior and exterior uses
- → Injection molding grades for fittings, etc.
- → Blow molding grades for bottles, containers, etc.
- → Alloys and blends
- → Films (calender feeding)

Special compounds

- → Halogen-free, self-extinguishing formulations for cables (HFFR)
- → Elastomer-based compounds for low, medium and high voltage cables
- → Peroxide cross linkable PE
- → Silane cross linkable flame retardant compounds



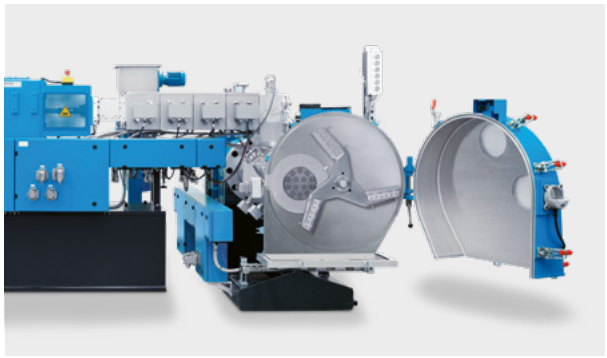
→ Kombiplast KP 76 Mv PLUS/250



The raw materials are fed to the process section of the ZSK twin screw extruder by the ZS-B twin screw side feeder. They are conveyed, plasticized, mixed and homogenized in the process section. The product is discharged through the ES-A single screw discharge, which gently builds up sufficient pressure for the eccentric pelletizing.

Principle of the two-stage Kombiplast (ZS-B + ZSK + ES-A + EGR)

1 ZS-B twin screw side feeder
2 ZSK twin screw extruder
3 ES-A single screw discharge
4 EGR eccentric pelletizer
5 Atmospheric degassing
6 Vacuum degassing



Knife rotor for EGR

The knife rotor of Coperion's eccentric pelletizing systems EGR makes it possible to produce extremely low-dust pellets. Rotating directly on the die plate, the rotor permits particularly smooth and gentle cutting of temperature and shear-sensitive plastics. This greatly improves the quality and further processability of the pellets produced.

Technical data of the Kombiplast with ZSK Mv^{14}

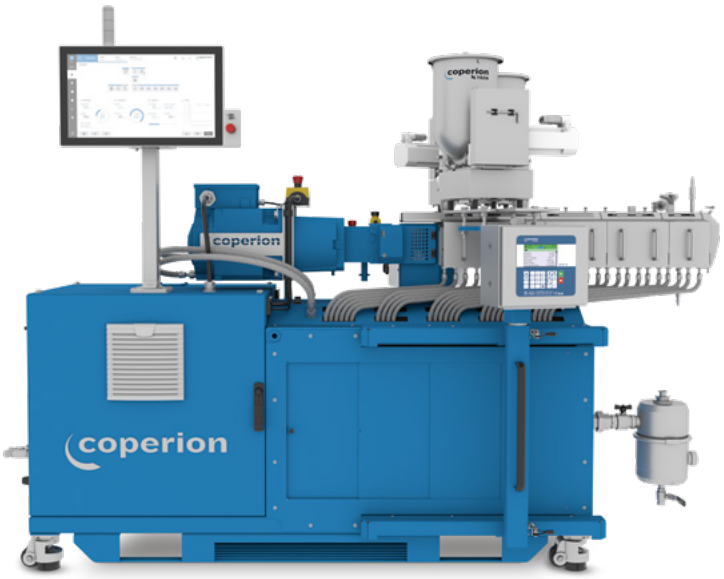
Kombiplast ZSK/ES-A	Max. screw speed [min^{-1}]	Screw diameter [mm]
27 Mv^{14}/60	600/115	27/60
34 Mv^{14}/100	600/100	34/100
43 Mv^{14}/150	600/75	43/150
54 Mv^{14}/150	600/75	54/150
62 Mv^{14}/200	600/75	62/200
76 Mv^{14}/250	600/60	76/250
98 Mv^{14}/300	400/50	98/300
125 Mv^{14}/350	400/50	125/350

Technical data of the Kombiplast with ZSK Mc^{18}

Kombiplast ZSK/ES-A	Max. screw speed [min^{-1}]	Screw diameter [mm]
26 Mc^{18}/60	600/115	25/60
32 Mc^{18}/100	600/100	32/100
45 Mc^{18}/100	600/100	45/100
58 Mc^{18}/150	600/75	58/150
70 Mc^{18}/200	600/75	70/200
92 Mc^{18}/250	600/60	92/250
92 Mc^{18}/300	600/50	92/300
119 Mc^{18}/300	400/50	118/300
133 Mc PLUS/350	400/50	133/350

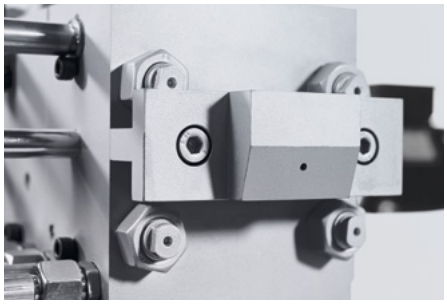
The ZSK 18 MEGAlab laboratory extruder. This smallest extruder in the ZSK series offers high performances even for smallest batch sizes.

The ZSK 18 MEGAlab laboratory extruder is based on the successful ZSK technology. It was developed especially for the processing of smallest batch sizes. The reliable scale-up to larger ZSK extruders makes it the ideal compounding system for recipe development and basic scientific research.

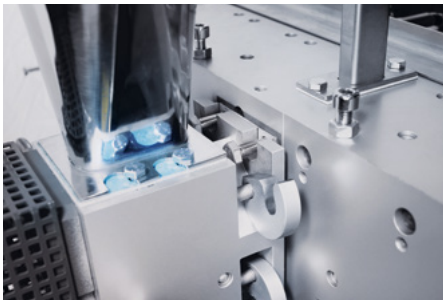


→ Laboratory extruder ZSK 18 MEGAlab

→ Die head of the ZSK MEGAlab



→ Twin screw side feeder ZS-B



→ ZSK MEGAlab in GMP-design

Special features

- → Throughput rates of up to 40 kg/h
- → Small batches from 200 g
- → Fast plug & play commissioning
- → Reliable, low noise drive concept
- → Modular structure with exchangeable 4D barrels and all standard screw elements
- → Easy to operate by PLC and touch screen
- → Easy handling and fast product change by using quick-release connections
- → Compact design – mobile baseframe with integrated controls, water cooling and vacuum unit
- → Reliable scale-up due to ZSK features

Technical data

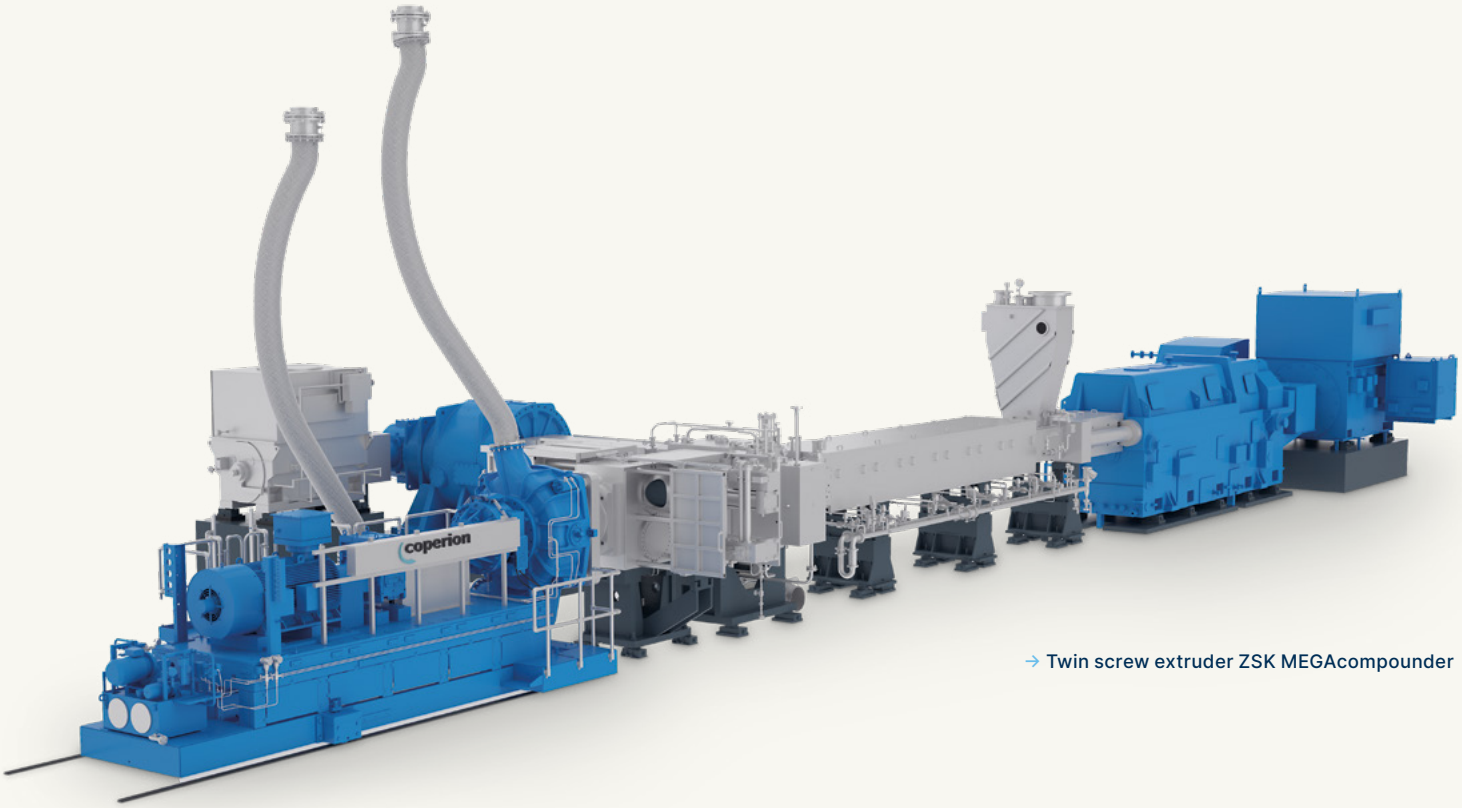
Centerline distance [mm]	15
D_o/D_i	1.55
Outer screw diameter D_o [mm]	18
Barrel length [mm]	72
Centerline height [mm]	1,100
Max. output speed [min^{-1}]	1,200
Overall dimensions (L x W x H) [mm]	2.200 × 690 × 1.850

The ZSK MEGAcompounder. This large-scale processing system is a milestone in the development of high capacity compounding systems.

Because of its exceedingly high productivity, this twin screw extruder is ideal for high capacity processing of polyolefins. It constantly achieves maximum product quality especially in continuous processes with high energy requirements. The current series features a specific torque of 12.5 Nm/cm³. This brings polyolefin processing to the throughput rate of 135 t/h and beyond.

Technical data of the ZSK MEGAcompounder

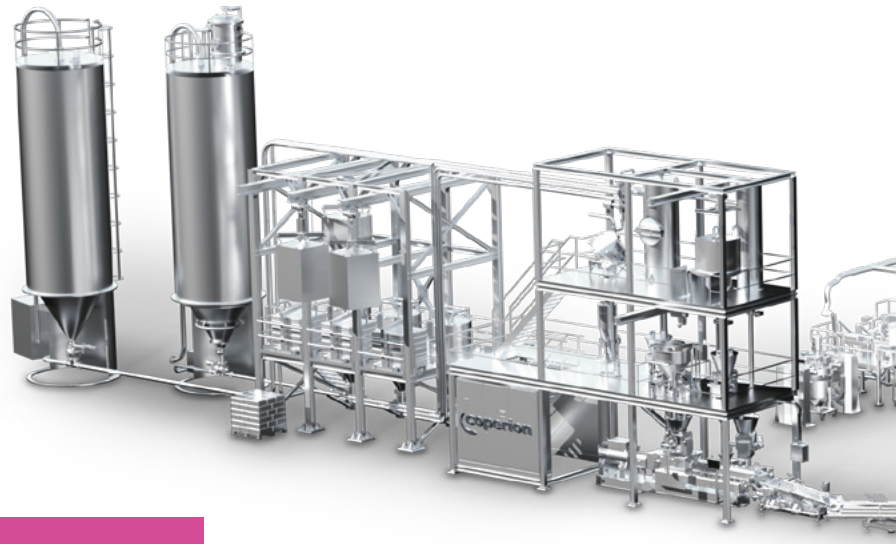
ZSK MEGAcompounder	Max. screw speed [min^{-1}]
177 Mc	550
250 Mc	500
320 Mc	400
350 Mc	350
380 Mc	320
420 Mc	upon request



→ Twin screw extruder ZSK MEGAcompounder

Single components
to complete systems

Coperion's compounding systems have been successfully in the market for many years. The provision of these complete solutions – either using a conventional or modular turnkey design – allows you to benefit from our unique expertise in the entire compounding process chain.
All key components for the main process steps are developed and produced in-house – from raw material handling, feeding, extrusion, pelletizing, sifting, drying and cooling, right through to gentle conveying and bagging of the finished products. We provide single components, or you will receive a complete, ready-to-use system, in which all sub-processes have been optimally combined into an overall process – in no time at all and at fixed conditions. We will send a team of experienced experts to your premises to install and commission the system on site. Once the system has been handed over ready for production, our experienced and motivated service team provides worldwide support and assistance.



Your advantages

- ↗ One contact and supplier – from engineering and production of key components to commissioning of the plant
- ↗ Optimum design of the plant to meet your individual product requirements
- ↗ Efficient, professional project execution and maximum security in costs, schedule and product quality
- ↗ Short project schedules
- ↗ Optimum linking of all process steps
- ↗ Fast assembly and commissioning on site, supported by the worldwide service network of Coperion
- ↗ Easy plant control by a uniform operating philosophy
- ↗ Numerous solutions for fast product changes in production
- ↗ High operating safety
- ↗ Digital solutions for optimum compounding system operation
- ↗ Service for the entire compounding system from one supplier

Compounding plants in modular design – additional advantages

- ↗ Commissioning of the plants at Coperion prior to delivery
- ↗ Sampling prior to delivery
- ↗ Training of the operating personnel already before delivery
- ↗ Fast assembly and disassembly due to modular design
- ↗ Easy transport by road and ship

Bulk material handling
Pneumatic and hydraulic conveying processes together with all associated steps, such as cooling, heating, degassing, discharge, blending, separating and cleaning

Components
Coperion components are designed for a wide variety of applications to transfer liquid and dry ingredients, such as additive powders, resin pellets, stabilizers or colors.

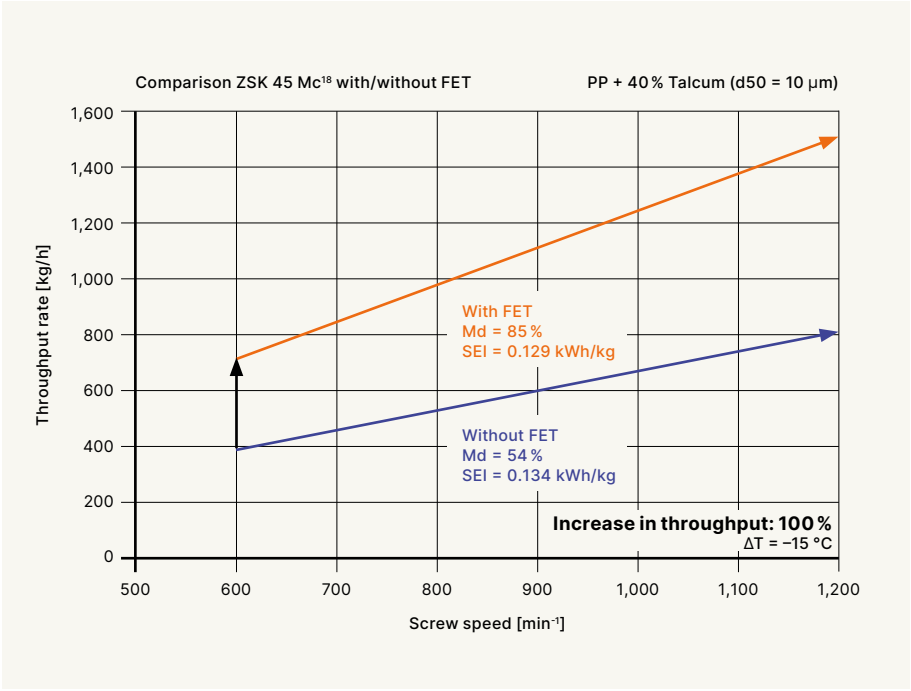
Feeding
Wide range of feeding solutions, from screw feeders to vibratory feeders, bulk solids pumps, weigh belts, liquid feeders to flow meters

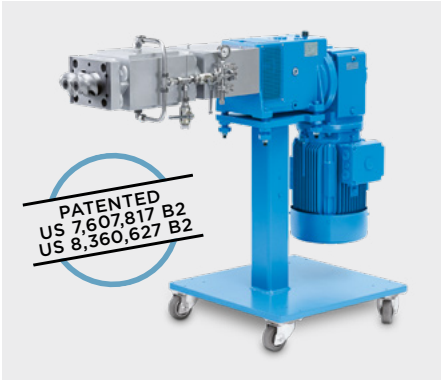
ZSK twin screw extruder
Superior extrusion and compounding equipment at the highest technical level which reliably transfers all ingredients into a homogeneous melt. Beside the ZSK, Coperion offers further extruder series, including clam shell extruders.

Pelletizers
First-class equipment to process the melt into high-quality, uniform pellets – at maximum throughput rates and with the greatest possible cost-effectiveness

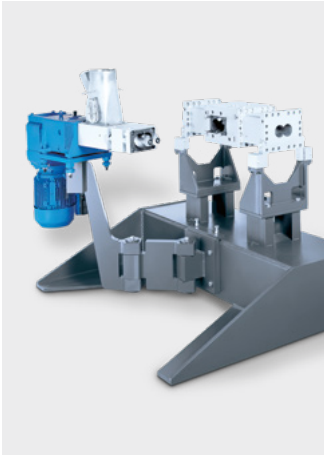
→ Coperion compounding system

Continuous research & development





Feed Enhancement Technology (FET)
In the Feed Enhancement Technology (FET) the feeding zone of the ZSK is equipped with a porous, gas permeable wall and a vacuum is applied externally. The results of the FET equipment are considerably improved feed and throughput rates in the processing of feed limited products.



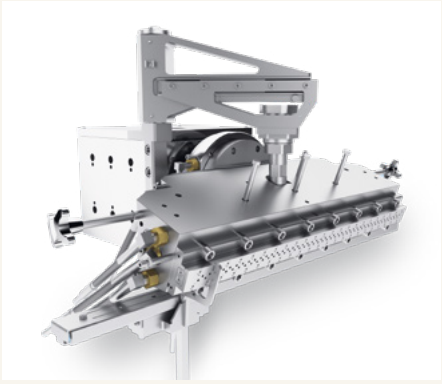
ZS-B side feeder
The ZS-B twin screw side feeder enables the feeding of powder or pellet fillers and additives or cut glass fibers into the process section of the ZSK twin screw extruder. It features the self-wiping profile of the twin screws and eliminates stagnant zones in the screw flights of the extruder. It requires very little space due to its compact design. It can be mounted anywhere on the extruder's process section with a side feed or combi barrel. In easy design the ZS-B permits much faster dismantling from the ZSK process section and the twin screws can be changed very simple.

ZS-B MEGAfeed side feeder
The ZS-B MEGAfeed makes the processing of lightweight, very voluminous materials, significantly more economical. Thanks to the innovative design of the ZS-B MEGAfeed side feeder, materials with bulk densities starting as low as 20 kg/m³, which were previously considered feed-limited and therefore not economically processable, can be reliably fed in large quantities into the ZSK twin screw extruder.

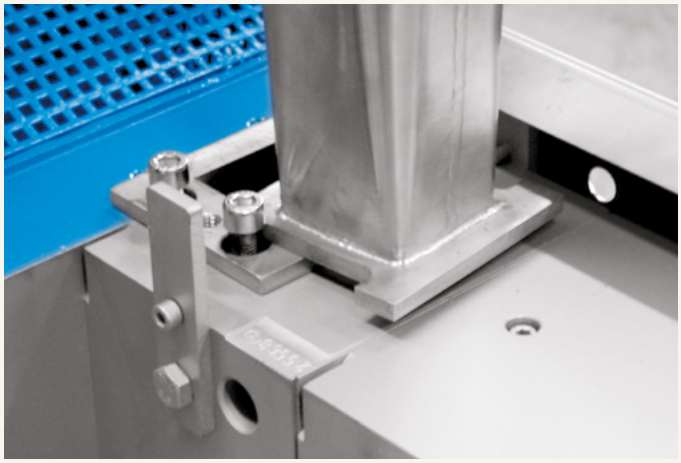
→ Side feeder ZS-B MEGAfeed

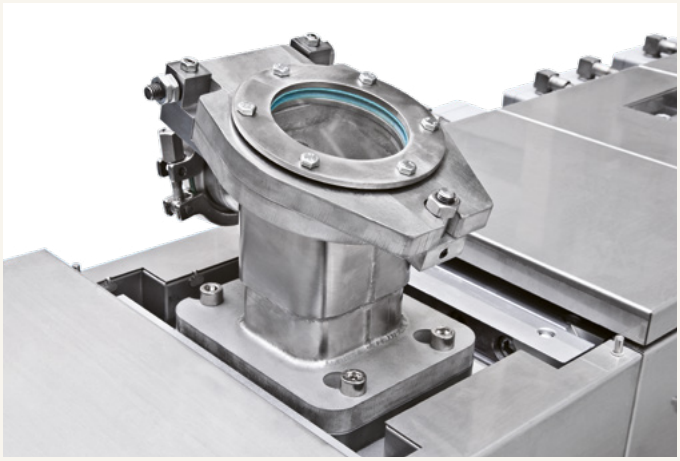
ZS-EG side devolatilization
With its large free cross section for the devolatilization, the ZS-EG keeps the melt reliably in the process section even at maximum specific torque. Throughput increases of up to 30% and considerably improved product quality are possible. The ZS-EG in easy design permits fast dismantling from the ZSK process section.

Quick-release screw shaft coupling
For ZSK 26 Mc^{18} extruders Coperion has developed a patented quick-release screw shaft coupling that enables screw changes to be performed as quickly as possible. Cleaning times are reduced to a minimum when changing colors and recipes.



Die head
The die head for ZSK systems features optimum flow geometry. It ensures highest throughputs with gentle product handling and maximum heat transfer.





Quick-release clamps at feed hopper, degassing dome and atmospheric venting
The ZSK feed hopper is only clamped to the process section with bolts. It can be removed very quickly by simply loosening these bolts. Then the quick-release insert which protects the barrel wall from contamination can very easily be changed. For quick and easy cleaning, the degassing dome and the atmospheric venting are also equipped with quick-release clamps. The units can be removed by loosening just four bolts. In addition, the connection of the vacuum line on the degassing dome is equipped with a quick-release c-clamp.

Pluggable cartridge heaters

ZSK extruders up to size ZSK 92 Mc[18] are equipped with pluggable cartridge heaters enabling efficient individual tempering within the interior of each barrel. They are individually connected using IP67 plugs and can be removed for maintenance in no time, no electrician needed.

Gearbox lantern with easy access

The gearbox lantern can be optionally equipped with an electronically secured maintenance opening. As soon as the screw shafts come to a complete stop, service personnel can open the gearbox lantern without tools, guaranteeing secure, easier access to the screw shaft coupling during maintenance.

Coperion ServiceBox

The Coperion ServiceBox is an integrated system for the online monitoring and logging of faults in your plant and components, ensuring trouble-free compounding with stable product quality. Our active start-up assistance and rapid expert support are the ideal solution for efficient production with reliable quality control.

Condition monitoring VibeTrack

Coperion offers the option to equip the ZSK extruder with a condition monitoring system which ensures a high level of plant uptime, identifies irregularities early enough to avoid potential damage, and significantly improves planning capability for maintenance tasks. The extremely reliable and yet affordable VibeTrack system focuses on vibrations and gear oil condition. Coperion provides a condition monitoring service agreement to ensure the qualified analysis of the collected data.

C-BEYOND:
Elevate Productivity

Enhance the productivity and reliability of your extrusion or compounding operations with Coperion's secure digital services platform C-BEYOND. It offers cutting-edge digital products and services specifically tailored for the plastics, food, recycling, and battery industries. Using C-BEYOND you can achieve new levels of efficiency, productivity, and sustainability.

Explore C-BEYOND's key features

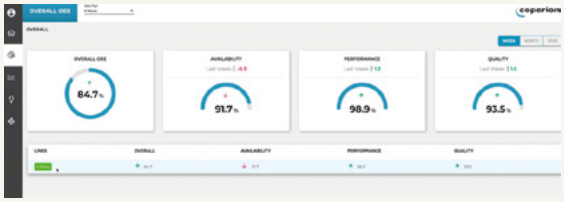
OEE Dashboard provides instant access to comprehensive production data through an intuitive interface. It eliminates the guesswork by offering detailed OEE analysis charts and quick overviews to ensure your plant operates at peak performance.

Downtime Tracking minimizes unplanned downtimes. Identify the root causes of stoppages. C-BEYOND helps to implement corrective actions to keep your production line running smoothly.

Life Cycle Manager optimizes your maintenance strategy with AI-powered maintenance tools that increase plant availability. The Life Cycle Manager offers predictive maintenance insights, helping you to address potential issues before they result in costly downtimes.

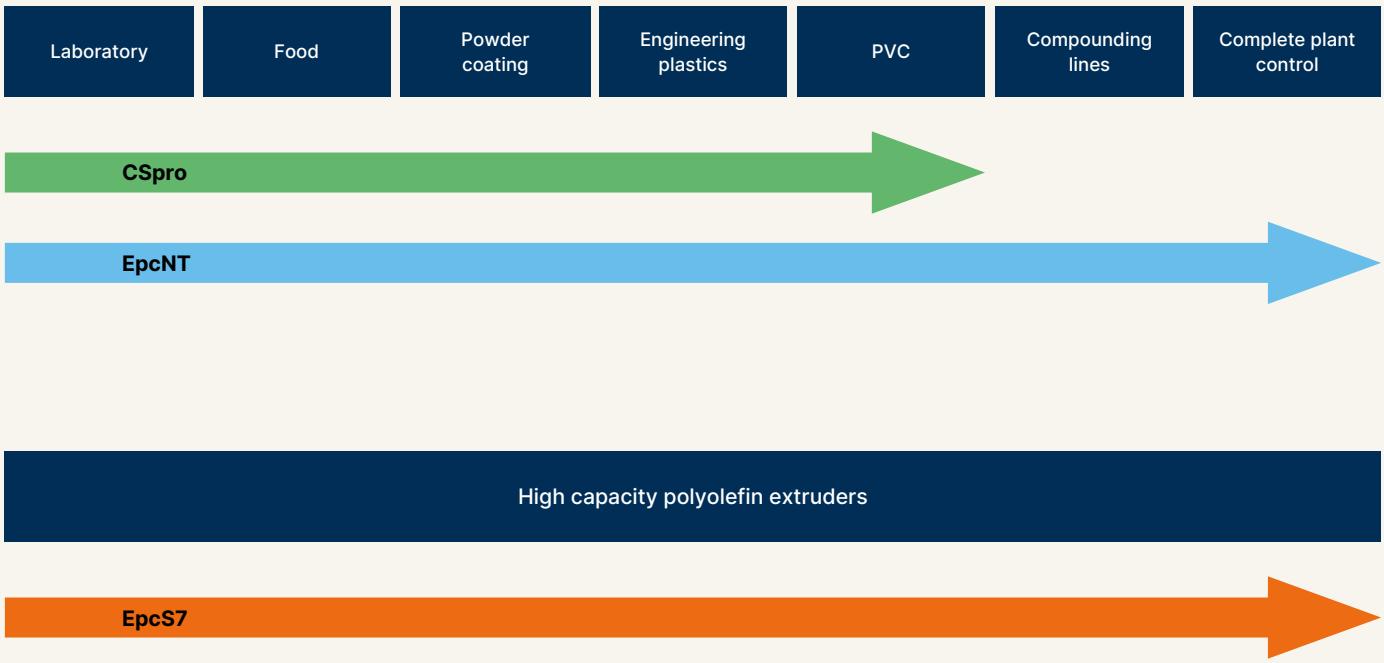
Smart Monitoring & Alarm Management helps you to stay ahead of any operational issues. These include intelligent diagnostics, enhanced alarms with probable cause analysis, and recommendations to prevent system failures.

Energy Monitoring tracks your energy consumption and associated CO_2 emissions. It is part of Coperion's Sustain App. It provides a breakdown of energy use from plant level to individual equipment, helping you optimize energy efficiency.



Control systems

Coperion provides control solutions for twin screw extruder systems individually tailored to customers' requirements ranging from standardized control systems to customized open control systems for complete compounding plants. The control systems can be easily integrated into customers' Industry 4.0 environments and offer a large number of functions such as the full recording of production data, reporting, recipe management and much more. The clearly designed, user-friendly interface of the control systems increases the operational availability of Coperion processing plants.



The advantages

- ↗ Highly standardized and pretested control software
- ↗ Sophisticated software functions such as recipe management and historical data evaluation
- ↗ Based on newest PLC technology from Siemens (S7-1500, ET 200SP, S7-400HF, ET 200SP HA)
- ↗ Display of HMI screens on external devices like tablet PCs, smartphones or office PCs via web access
- ↗ Integration into I4.0 environments via standard protocol OPC-UA and more
- ↗ Integration of Coperion ServiceBox for remote service

CSpro

CSpro is based on the latest Siemens control components. With its clean design and attractive appearance it is simple and intuitive to operate. A variety of evaluation options of the production process are available and trend values can be exported to text files or network devices. It offers a clear overview of the complete plant on one simple and intuitive touch screen. An alarm system and a large capacity archive for data storage and evaluation are integrated. The recipe management tool stores an unlimited number of recipes which can easily be displayed, edited and filtered. Addional functionalities provided include the possibility to switch between different machine configurations among others. CSpro allows for the completely integrated operation of up to 12 feeders.

Highlights

- → Panel in IP65 with separate high performance industrial PC and UPS
- → Multitouch 21" full HD widescreen display in 16:9 format
- → Integrated emergency stop button and signal lamp in the panel
- → Data storage via SSD (Solid State Disk)
- → Windows operating system
- → Operating text available in nearly all languages
- → Display possible on external devices such as tablet PCs
- → OPC UA as standard data interface

PLC

- → Latest Siemens PLC generation S7-1500
- → Compact ET 200SP peripheral modules via Profinet connection

EpcNT

EpcNT is particularly suitable for customer-specific plant configurations and for controlling entire extrusion and compounding lines from raw material feeding through to finish product discharge. It also allows for the integration of several compounding lines. EpcNT is Coperion's control system with most extended scope of functions which includes but is not limited to recipe management, along with trend display, reproducibility and traceability of the production parameters, feeding calculation and analysis of production data. EpcNT is highly flexible and adaptable to all customer-defined needs and uses self-explanatory symbols for user-friendly and intuitive operation.

Highlights

- → Integration of nearly any unit, including units from third parties suppliers
- → Latest generation of Siemens S7-1500 and TIA portal
- → Windows IoT operating system (IoT for industrial applications)
- → Integration and data exchange in master networks (MES, ERP) via standardized OPC-UA protocol, tailored interfaces also possible

PLC

- → Latest Siemens PLC generation S7-1500
- → Compact ET 200SP peripheral modules via Profinet connection

EpcS7

EpcS7 is the optimum control system for all high capacity polyolefin extruders. It is based on the fully integrated PCS7 software system and on control components from Siemens. The PLC hardware S7-400HF ensures maximum performance, availability, and control of safety functions. The easy to read graphic visualization of EpcS7 on a 24" touchscreen panel simplifies operation, enables signal monitoring down to an individual sensor and enables problems to be localized quickly. Further advantages include the quick start-up and high level of availability of polyolefin extruders.

Highlights

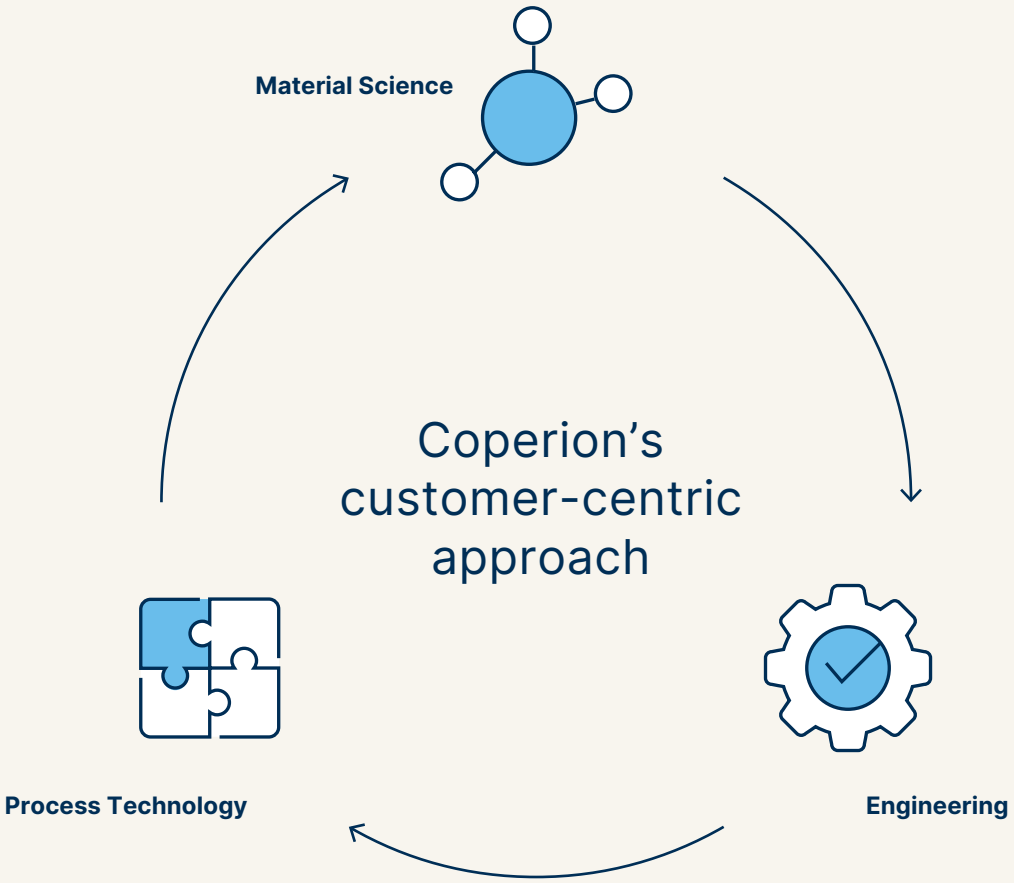
- → Standardized Siemens advanced process library (APL)
- → Interlocks visualized on HMI making troubleshooting quick and easy
- → Visualization of safety interlocks
- → Tag numbers and tag descriptions can be synchronized with external engineering tools such as Comos and E-Plan
- → Implementation of SFC editor tool with graphical representation of complex processes
- → HMI based on P&ID diagrams to allow intuitive operation and efficient interpretation of the process status by process engineers, operating and maintenance personnel

PLC

- → Latest Siemens PLC generation S7-400
- → Compact ET 200SP HA peripheral modules via Profinet connection
- → Use of components (PLC and PC) for maximum process and spare parts availability

Wear material portfolio

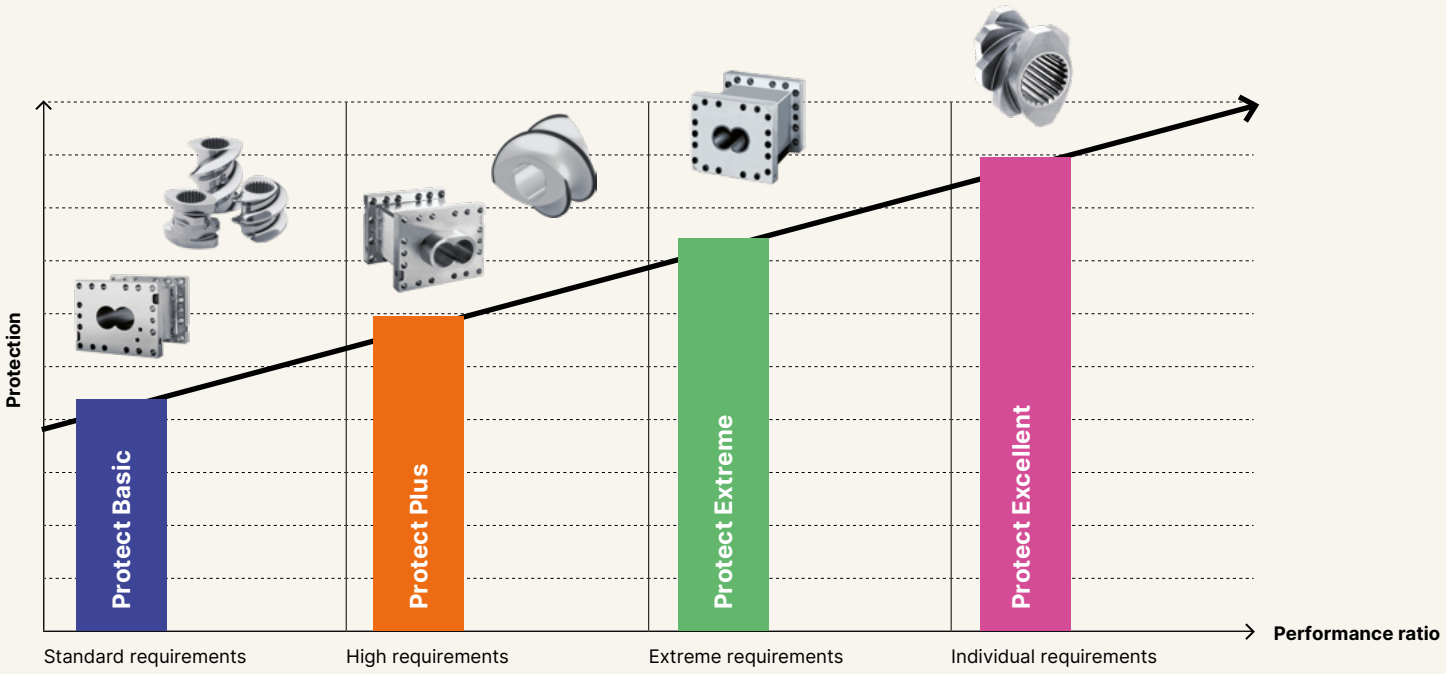
ZSK twin screw extruders are designed to excel in challenging applications, particularly when dealing with aggressive products. The collaboration between our experts in material science, process technology and engineering is crucial in developing effective solutions. The integration of knowledge from various fields ensures that the material solutions are tailored to meet specific needs. This approach enhances the performance and longevity of the extruders. Taking your specific requirements into account, we assist you in identifying the ideal material solution for screw elements and barrels. This ensures optimal durability of all machine components and maximum reliability of the entire extrusion system, while also considering economic factors. This approach applies not only to the purchase of a new ZSK extruder but also to our extensive spare parts service.



Our team of experts in material science, process technology and engineering collaborate closely to develop the perfect material solution for your needs – one that offers maximum protection while also being economically viable.

Benefits of Coperion's expertise

- **Durability and reliability:** The wear parts are designed for maximum durability, reducing the frequency of replacements and maintenance.
- **Economic efficiency:** Solutions are developed with cost-effectiveness in mind, ensuring that investments yield significant returns.
- **Minimized downtime:** The reliable operation of ZSK extruders leads to defined and reduced downtime, contributing to maximum overall system efficiency (OEE).
- **Consultative approach:** Ongoing consulting services help adapt to changing needs, ensuring that the systems remain efficient and effective.



Protect Basic:
- Compounding of PP/PE with additives < 5%
- Alloying of ABS/PC, compounding/additivation of POM
- Compounding/additivation of PC
- ...

Protect Plus:
- Reinforcing PA 6/66 with glass fibers
- Filling of PP/PE with talcum, calcium carbonate, wollastonite or glass fibers
- Reinforcing of ABS/PC with glass fibers
- Filling of PE with carbon black/carbon black masterbatch
- Reinforcing of POM with glass fibers
- Reinforcing of PC with glass fibers
- Processing of powder coating
- Food & pharma applications
- Filling of PE with carbon black
- Sealants and adhesives
- Chemical applications
- Mechanical, chemical and solvent-based recycling
- Battery masses
- ...

Protect Extreme:
- Processing of ceramic/mineral masses
- Compounding of fluoropolymers
- Grafting of PE with MSA/peroxide
- ...

Protect Excellent – tailored solutions for individual requirements:
- New and innovative products
- ...

Coperion test centers around the world.
Helping you optimize your processes.

Coperion provides test centers for various applications and process steps. Tests with throughput rates of a few kg/h up to a medium production scale can be carried out before making an investment. Using proven scale-up methods, our experts transfer the test results from the tests to production scale.

Coperion's test centers are the ideal platform for advanced testing of any challenge, such as product behavior, new formulations and throughput rates. Depending on the process task, the latest Coperion developments are integrated into the setup. Tests in our test centers support the determination of the ideal equipment configuration for an application as well as the development of first-class designs for processing systems under realistic production conditions, while also further enhancing our existing technology through internal testing.

Some of our test centers also feature laboratories, where our engineers have access to numerous analysis options to evaluate product quality and characteristics.

Test Centers for Compounding & Extrusion
Coperion has the world's most extensive test labs for compounding and extrusion systems. The modular design of the twin screw extruders permits them to be set up specifically for each test.

Test Centers for Plastics Recycling Applications
Coperion offers extensively equipped test centers for a wide range of plastic recycling applications to process and recyle all kind of used plastics under real production conditions.

Test Centers for Material Handling and Conveying
Coperion offers some of the most advanced facilities for studying bulk solids handling and processing. In these test centers future applications in production plants, such as properties of new bulk material and optimal conveying modes can be tested.

Service that makes a difference

Once your ZSK system has been installed, we will remain in close contact with you. Our comprehensive range of services and intensive consulting ensure that you benefit from the maximum performance of your systems in the long term. We inspect your entire extrusion system and evaluate the impact of individual services on your overall process. We advise you in all matters – from investment and analysis of existing plants through maintenance and modernization issues.

Worldwide Service Network & Consulting
With our many locations and numerous service technicians, we are on site wherever you need us. Worldwide and in the shortest possible time.

Predictive Maintenance
We help you to increase the overall performance and lifetime of individual components and your entire extruder:
- Wear diagnosis (e.g. barrel bore measurement)
- Barrel overhaul & repair
- Condition monitoring VibeTrack
- Gearbox overhaul & repair
- Gearbox exchange program

Spare Parts Service
To help ensure top performance of your extruder, Coperion produces and supplies a comprehensive number of original replacement and spare parts. You can rely on the quality: all parts are genuine Coperion parts and a large number is readily available from stock.

Modernization
There is a lot of potential in the modernization of installed ZSK systems. Since the ZSK is built modular, we are able to upgrade individual parts of the system. We identify opportunities and bottlenecks to increase the overall performance of your system:
- Modernization of equipment and controls to increase reliability
- Modification to adjust throughput or process parameters
- Risk reduction and safety improvements
- Modernization services to achieve energy savings

Remote Service & C-BEYOND
Coperion offers online remote support and an the digital platform C-BEYOND to ensure trouble-free compounding at stable product quality and to boosts productivity and efficiency of your extrusion system.

Service Agreements
From a basic inspection to a full-service agreements: Our service agreements are geared to accommodate your individual requirements. They minimize your risk whilst maximizing the availability of your machines and plants.

Training
Our extensive range of training courses is geared specifically towards your requirements – from entry level staff all the way up to specialists.

coperion

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Headquarters

Coperion GmbH | Theodorstrasse 10 | 70469 Stuttgart, Germany | info@coperion.com
coperion.com | fhn.coperion.com

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Coperion location