

DROPPO®

Precise spherical pellets for your competitive edge

Automatik Plastics Machinery offers the perfect solution for your individual requirements: DROPPO® Mini for product development and for laboratory applications, DROPPO® 50 for small to medium throughput rates, and DROPPO® 300 for large-scale production.

Range of applications

DROPPO® drop pelletizing systems are ideally suited for low-viscosity melts and liquids with viscosity less than 500 mPas such as:

- Plastic preproducts, e.g. dimethylterephthalate, bisphenol A, maleic anhydride, urea
- Low-viscosity plastics, e.g. PET
- Additives for the plastics industry, e.g. light and heat stabilizers, lubricants, and surfactants
- Active ingredients for the flavor and food industry, e.g. encapsulated products

Operating throughput rates of up to 1,500 kg/h are feasible per drop process unit. Multiple drop process units can be combined into one single DROPPO® system to achieve higher throughput rates.

Functioning of the DROPPO® system

The low-viscosity melt or liquid is discharged from a feed vessel **01**, filtered **02**, and passed to the drop process unit **03**.

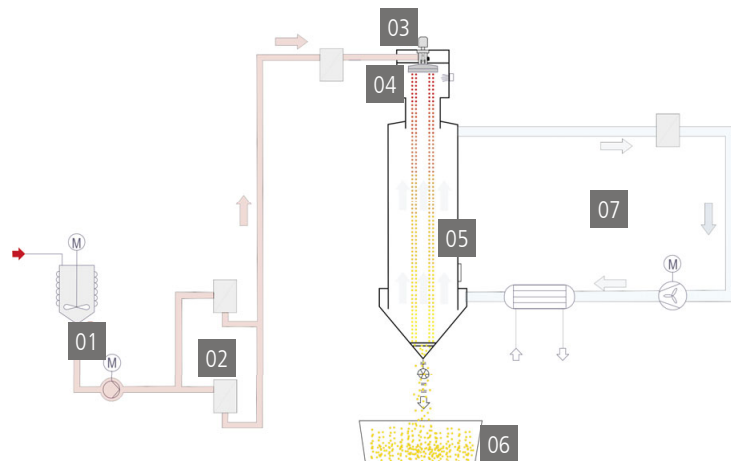
There the product is distributed onto the die plate and forced through a concentric arrangement of die holes **04**.

Harmonic vibration applied to the melt ensures separation of the molten strands into extremely uniform droplets. Surface tension then forms the droplets into perfect spheres during free fall.

These droplets are solidified **05** in a cooling gas (air, nitrogen) as they continue to fall. Alternatively, they can be solidified in a water bath or reaction liquid.

The solidified DROPPO® droplets are conveyed onward for subsequent processing **06**.

The cooling medium is filtered, temperature controlled, and recirculated **07**.



Drop pelletizing process

The core component of the system is the die head, where the low-viscosity melt or liquid flows through concentrically arranged die holes and emerges as a fine molten strand which then separates into droplets. Harmonic vibration applied to the melt ensures that these droplets are extremely uniform in size. Surface tension, a specific material property, then forms the droplets into perfect spheres as they continue to fall. Droplets may be produced with diameters ranging from 0.25 to 4.0 mm depending on the product characteristics and on the diameter of the die holes. As soon as the droplets have formed into perfect spheres, they are cooled and solidified.

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DROPPO® drop pelletizing systems

The DROPPO® Mini test facility can be used for in-house optimization of process parameters before going into large-scale production. It also allows the production of sample quantities. The system is equipped with an exchangeable single-hole die so that meaningful test runs may be made with just three liters of material. DROPPO® Mini is functionally equivalent to a full-scale DROPPO® production line.

Cooling and solidification

Air, nitrogen, or water may be used as a cooling medium for the droplets, in a range of different configurations.

Air cooling or nitrogen cooling is recommended for water-soluble products or for products where it is difficult to remove the adhering water from the droplets, e.g. additives such as waxes or fatty acids. These droplets are cooled by flowing air as they drop through a cooling tower. Required drop heights range from 8 to 20 m, depending on the diameter of the droplets as well as on their heat capacity and thermal conductivity.

Products with high heat capacity, e.g. low-viscosity polyesters, must be cooled in a water bath. The system can also operate with reaction liquids for product applications involving chemical hardening, such as encapsulation of active ingredients. In these applications, the formed droplets fall directly into the water bath or reaction liquid, where they are cooled and solidified.

The drop pelletizing system is very flexible and can be readily adapted to virtually all low-viscosity products and production applications.

Primary components and functionality

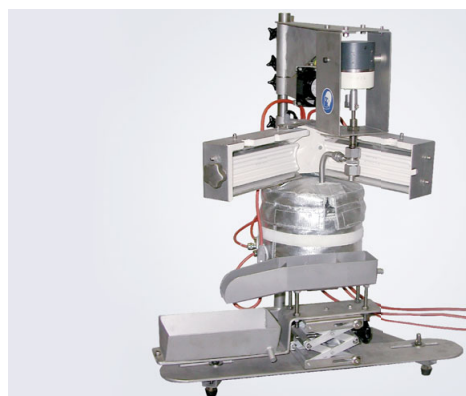
- **Melt processing** – The feed vessel melts the product in an electrical heated container with a capacity of three liters. The melt is then forced out by air or nitrogen under controlled pressure.
- **Drop process unit** – The melt is forced through the single-hole die, which can be readily exchanged. Vibration is applied to the melt to ensure that the emerging molten strand separates into extremely uniform droplets as it falls. The formation of the droplets may be directly observed by means of a stroboscope.
- **Cooling section** – This section is to solidify the droplets in a water bath and conveys them onward.

Highlights

- Test quantities of products can be readily produced
- Process parameters for large-scale production may be determined with just three liters of material
- Die holes of various diameters and geometries allow the process to be optimized to the specific product
- Process and product can already be optimized at the trial stage



Gastight version of the DROPPO® 300 system, with view into the process chamber



DROPPO® Mini equipped with feed vessel, single-hole die, and water bath



Die plate on lifting device

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Technical data

Technical data:

Drop pelletizing of fatty acids, $\eta = 30$ mPas, into cooling gas

Droplet diameter:	0.4 mm	0.6 mm	0.7 mm	0.8 mm	1.0 mm	1.2 mm
Die hole diameter:	0.22 mm	0.3 mm	0.35 mm	0.4 mm	0.5 mm	0.6 mm
No. of die holes:	1,000	600	600	480	480	400
Throughput:	350 kg/h	600 kg/h	900 kg/h	1,000 kg/h	1,300 kg/h	1,500 kg/h
Required drop height:	8 m	11 m	12 m	14 m	16 m	20 m
Cooling gas flow:	5,000 m ³ /h	5,500 m ³ /h	6,500 m ³ /h	6,500 m ³ /h	12,000 m ³ /h	12,000 m ³ /h

Drop pelletizing of active substances, $\eta = 400$ mPas, into reaction liquid

Droplet diameter:	0.6 mm	1.0 mm	1.2 mm	2.0 mm	2.4 mm	2.8 mm
Die hole diameter:	0.3 mm	0.5 mm	0.6 mm	1.0 mm	1.2 mm	1.4 mm
No. of die holes:	240	200	180	140	100	80
Throughput:	160 kg/h	200 kg/h	230 kg/h	320 kg/h	350 kg/h	400 kg/h

The above data refers to a DROPPO® 300 drop pelletizing system with a die hole of 300 mm. Further data is available on request.



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