



Polymer Technology and Equipment

Form plastics to fibers,
advanced solutions for mass transfer
heat exchange under high viscosity conditions.

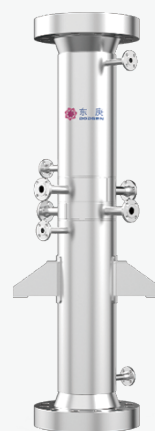
SHANGHAI DODGEN CHEMICAL

Polymerization Technology

Polymer reaction equipment requires not only good mixing capabilities but also efficient heat transfer. The temperature of the reaction system can be precisely controlled by good mixing and efficient heat transfer in order to reduce the occurrence of side reactions and obtain high quality polymers with uniform and controlled molecular weight distribution.

According to the characteristics of polymer high viscosity system mass and heat transfer and based on the principle of static mixing and heat transfer for design, DODGEN has introduced the world's advanced experience in static mixing and efficient heat transfer reactors for continuous polymerization reactions.

We refer to this reactor as: **DSR (DODGEN Static Mixing Reactor)**



Advantages of Polymerization Reaction Technology

- The characteristics of piston flow ensure a high degree of uniformity in residence time, which facilitates the control of molecular weight distribution.
- Efficient heat transfer and mixing ensure precise temperature control in the reactor, reducing the occurrence of side reactions.
- No trench flow, uneven distribution and dead zone.
- Different grades of polymer products can be produced with precise and independent temperature control in separate reaction zones.
- The ability to handle process fluids with a wide range of viscosity distribution and low operating costs.
- Continuous operation to ensure stable product quality, reduce energy consumption (low-pressure drop, no mixing equipment) and low maintenance cost.

Typical Applications

- Polyester
- Nylon
- Copolymer
- Polylactic Acid
- Polystyrene
- Polycarbonate
- Polyformaldehyde
- Poly Methyl Methacrylate

Devolatilization Technology

The molecular weight and the distribution of polymers have a great impact on the performance of the product. Unreacted monomers, oligomers, solvents or other small molecule impurities in the polymerization process will lead to a decline in the performance of polymer products, and thus fail to meet the customer's needs, environmental protection and other aspects of the product. Therefore, in the polymer production process, it is necessary to remove volatile small molecule compounds from the polymer, a process referred to as devolatilization.

The principle of DSXL devolatilization is to heat the polymer to a certain temperature quickly and uniformly through an efficient high viscosity fluid heat exchanger, and/or add additives to the polymer to help the volatiles escape. After that, the polymer is uniformly dispersed in the devolatilizer to increase the surface area of the polymer in the reactor and to reduce the interfacial mass transfer resistance of the volatile substances, thus achieving the efficient devolatilization.

Based on the characteristics of polymer and the rich application experience of polymer devolatilization, DODGEN has designed single or multistage devolatilization process. The core equipment of the process is heat exchanger with mixing element, mixer and high efficiency distributor, to achieve the ultimate goal of improving product quality and reducing operating costs.



Typical Applications

- | | |
|----------------------|-------------------------------------|
| • Polystyrene | • Polyformaldehyde |
| • Styrene Copolymer | • Polyisobutylene |
| • Polycarbonate | • Carbon Fiber |
| • Ethylene Copolymer | • Almost all Biodegradable Plastics |

Devolatilization Technology

Characteristics of DODGEN DSXL Devolatilization Technology

Improving Product Quality

1

The Polymer degradation is reduced, which avoids the destruction of polymer molecular structure due to high shear forces.

2

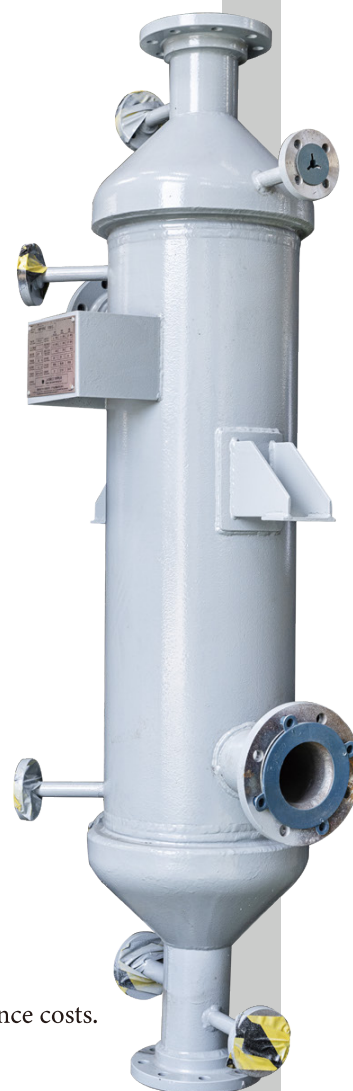
High-efficiency distributor system with large polymer surface area and high devolatilization efficiency.

3

Low residue content, reduced energy consumption and low operating costs.

4

No moving parts, stable operation and low maintenance costs.



Heat Exchange Technology

Due to the viscosity, polymers are prone to hysteresis, large temperature gradients and low heat transfer coefficients during flow and heat exchange. Therefore, efficient heat exchange of polymers is a crucial aspect to ensure product quality and improve polymer production efficiency.

01 Change of melt viscosity flow state according to process requirements.

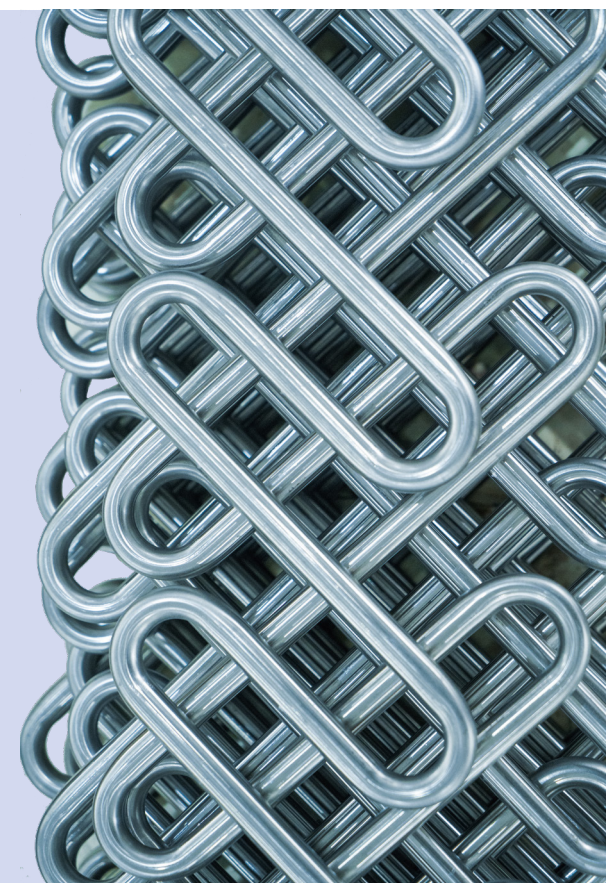
02 Mixing materials in the reaction and removing heat.

03 Heating of the polymer and cooling of the polymer melt.

04 Cooling the polymer melt before spinning.

05 Heating of the polymer melt before devolatilization.

06 Cooling of polymer melt before granulation.



The DSXL and DSR play important roles in their respective application fields. The DSXL mixed heat exchanger disperses the product into each parallel tube, while the DSR mixer fills the entire vessel with the materials. The clever combination of the two allows for precise control of reaction time, concentration gradients and temperature gradients to achieve optimal reaction results.

Monomer Purification Technology

The purity requirements of polymer monomers and raw materials are very high, and these monomers usually present in the form of isomeric mixtures.

In the distillation, dozens or hundreds of plates and high reflux ratio and decompression operation are often required. It also asks high equipment material and processing accuracy.

Charring, coking and polymerization in the distillation kettle are also unavoidable.

Meanwhile, the product yield is low, and high purity products cannot be obtained.

Coupling with melt crystallization, these problems can be avoided and high purity polymer monomers can be easily obtained.

Typical Applications

- Polybutylene Succinate
- Polycarbonate
- Polycaprolactone
- Polylactic Acid
- Polyether Ether Ketone
- Polyglycolic Acid
- Aramid

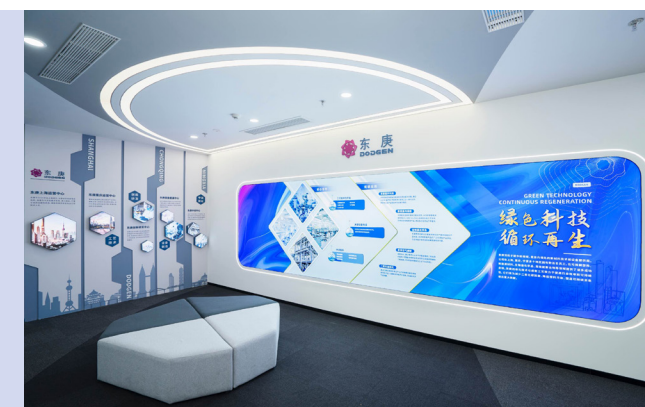


Founded in 2005, Shanghai DODGEN Chemical Technology Co., Ltd. is a high-tech enterprise dedicated to the research and development of new chemical materials technology and breakthrough of the existing production technology.

Through efficient integration of technology and market resources, we provide advanced, reliable and competitive process technology, process system technology based on unit operation and advanced process equipment for synthetic biomaterials, degradable plastics and recycling, electronic chemicals, new energy and other fields.

Brand Features

- ✓ Emphasize Research and Development
- ✓ Advanced Equipment
- ✓ Professional Team
- ✓ Pilot Platform
- ✓ Industry-leading Technology



WeChat Official Accounts



Add Our WhatsApp



@ DODGEN Chemtech



inquires@chemdodgen.com



+86 180 1605 8776



<https://www.dgchemtech.com/>



27th Floor, No.388, Fushan Road
Pudong New Area, Shanghai

