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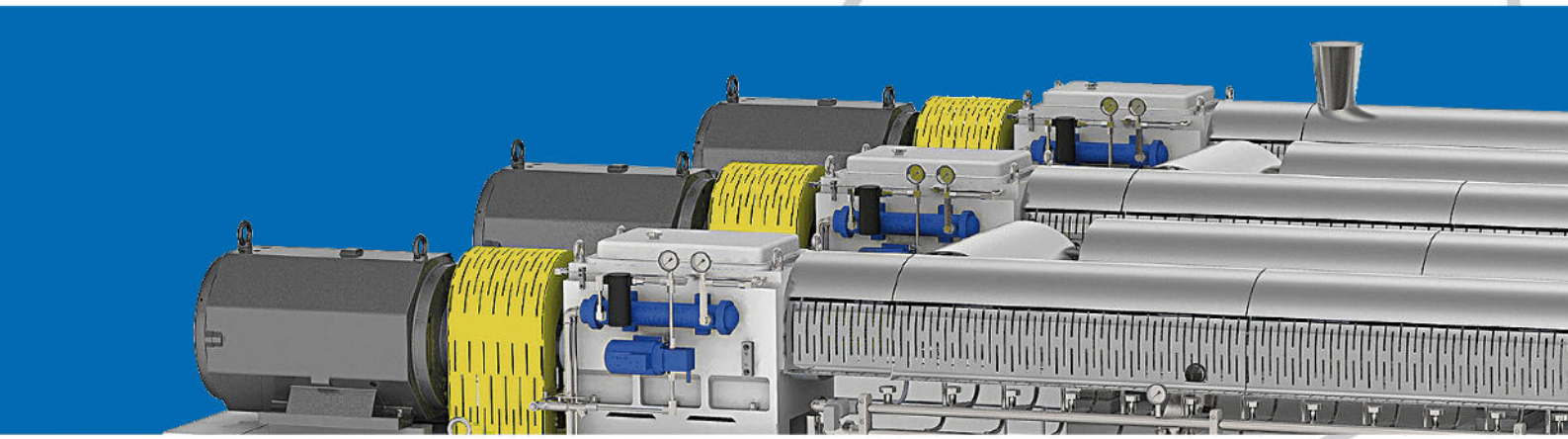
Keimei Plastifizierung Technik GmbH

BLEND REACTOR



Blend Reactor

Multiple-stage Blend Reactor

A multi-stage blend reactor is formed by a number ‚n' of mixing extruders (twin- or triple-screw type) plus the associated control devices. As shown in the illustration, the structure of each twin- or triple-screw extruder is the same as for the conventional unit, e.g., the cylinders, screw elements, shaft, gear unit, etc., are standardized. Likewise, the same design sizes and models are used (ø12, ø24, ø38, ø53, ø67 and ø 97). As for the power source, heating method and insulation characteristics, each system must be individually configured to address the materials and reaction characteristics of the specific application.

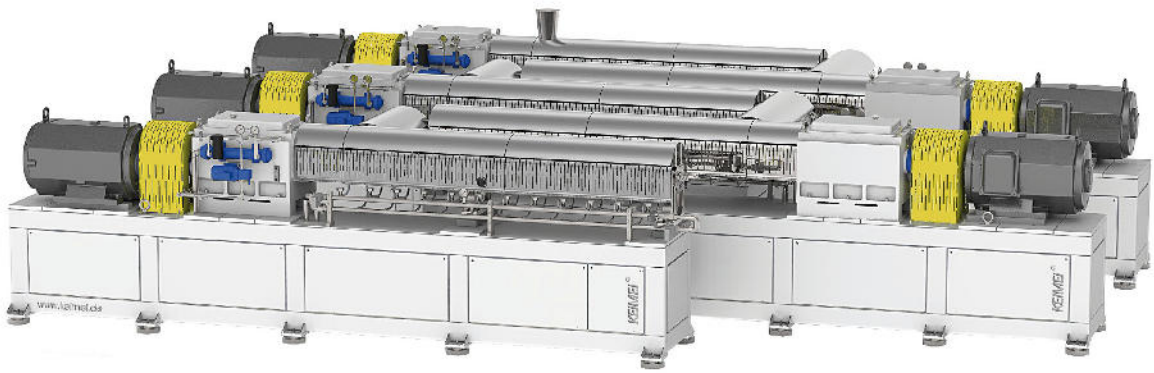
Suitable fields of application:

Suitable for polymer synthetics reaction and physical processing of some special polymer, for example, the preparation of polymer-based nano-composite material, dissolving of polymer in ionic solvents or critical gas, pyrolytic polymer reactions, etc.

Main characteristics:

Comparison with a conventional tank-type reactor:

1. Flow-dynamic response
2. Homogeneous reaction without excessively vigorous reaction or lag effects between zones, resulting in: through dispersion and blending to micron or nanoscale level;
   uniform blending without any no-flow areas in which material remains unstirred.
   As a result, more and smaller particles may be present in the reaction system and will react simultaneously due to more even intermixing at any given time – a key advantage in high-viscosity polymer reactions which is not achievable with a tank reactor.
3. Uniform molecular distribution throughout the product.
4. Self-cleaning features prevent fouling, smearing or swelling of the material during the mixing process.
5. Uniform heat input, large heat exchange surfaces and dynamic heat exchange characteristics ensure very homogeneous heating of the material.
6. Reliable temperature control with dynamic response prevents any degradation in material flow that might severely interference the measurements and operations of the temperature reading devices and the heat exchangers.
7. High control accuracy, can achieve control of fixed point sampling.
8. at fixed points to add different materials is according to the reaction state and phase, instead of mere “blind” time-based addition of materials into the reactor vessel, as conventional tank-type reactors.
9. Low energy consumption.
10. No excessively vigorous reaction.
11. High level of safety due to flow-dynamic response and small reaction volume, i.e., virtually no ignition or explosion risk compared to a tank reactor.

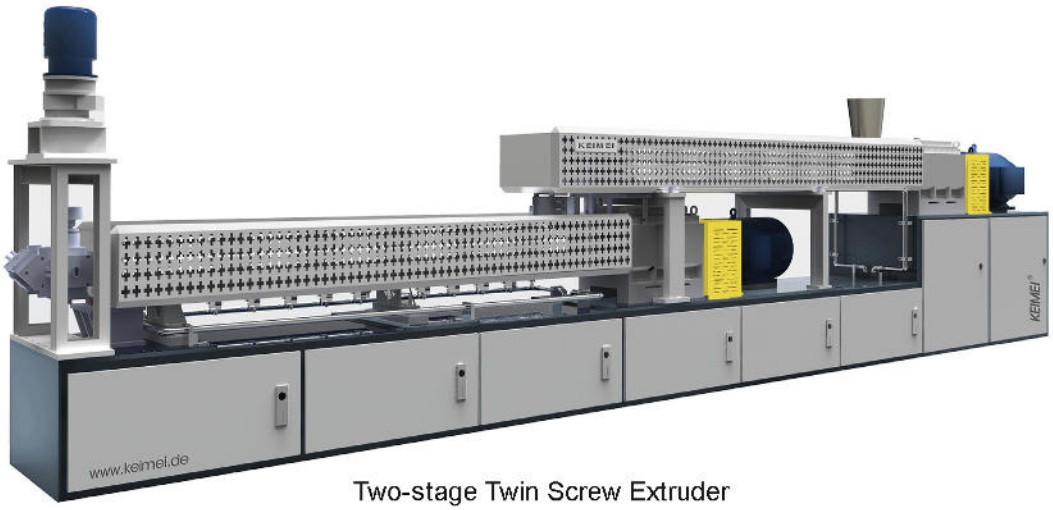


Multiple-stage Blend Reactor

12. Accurate process control based on actual reaction status rather than just time-based management.
13. Fast, accurate and controllable heat exchange.
14. Facilitates removal of volatiles.
15. Easier removal of reaction residue.
16. Superior convenience for production management.
17. High productivity.
18. High yield.
19. Low operating costs, due to:
    - high equipment versatility, standardized parts and accessories;
    - direct heat transfer with high efficiency;
    - time and energy savings due to synchronous, uniform and very efficient blend reactions with more particles in an extended size range;
    - reduced material consumption due to high yield;
    - convenient process management and realization of volume production runs;
    - no hidden cost associated with safety risks;
    - high process stability providing controllable benefits.

Two-stage Blend Reactor (Two-stage Twin Screw Extruder)

A two-stage blend reactor is composed of two twin-screw or triple-screw extruders



Two-stage Twin Screw Extruder

Main characteristics:

1. Transformation of material from a highly elastic to a viscous flow state, i.e., suitable for blending of special polymers
2. No limitation to extend the L/D ratio without reduction in input torque (essential for blending some special polymers)
3. No limitation to extend the L/D ratio without any loss in screw/barrel precision, yield or mixing effectiveness

Suitable fields of application:

Suitable for physical processing of some special polymer and basic chemical conversions, e.g., production of polymer-based nano-composites, blending of multiple polymers, blending of polymer and inorganic powder, etc.

The specific equipment layout and configuration will depend on the design of the given chemical process. For further information and advice please provide additional application data.

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