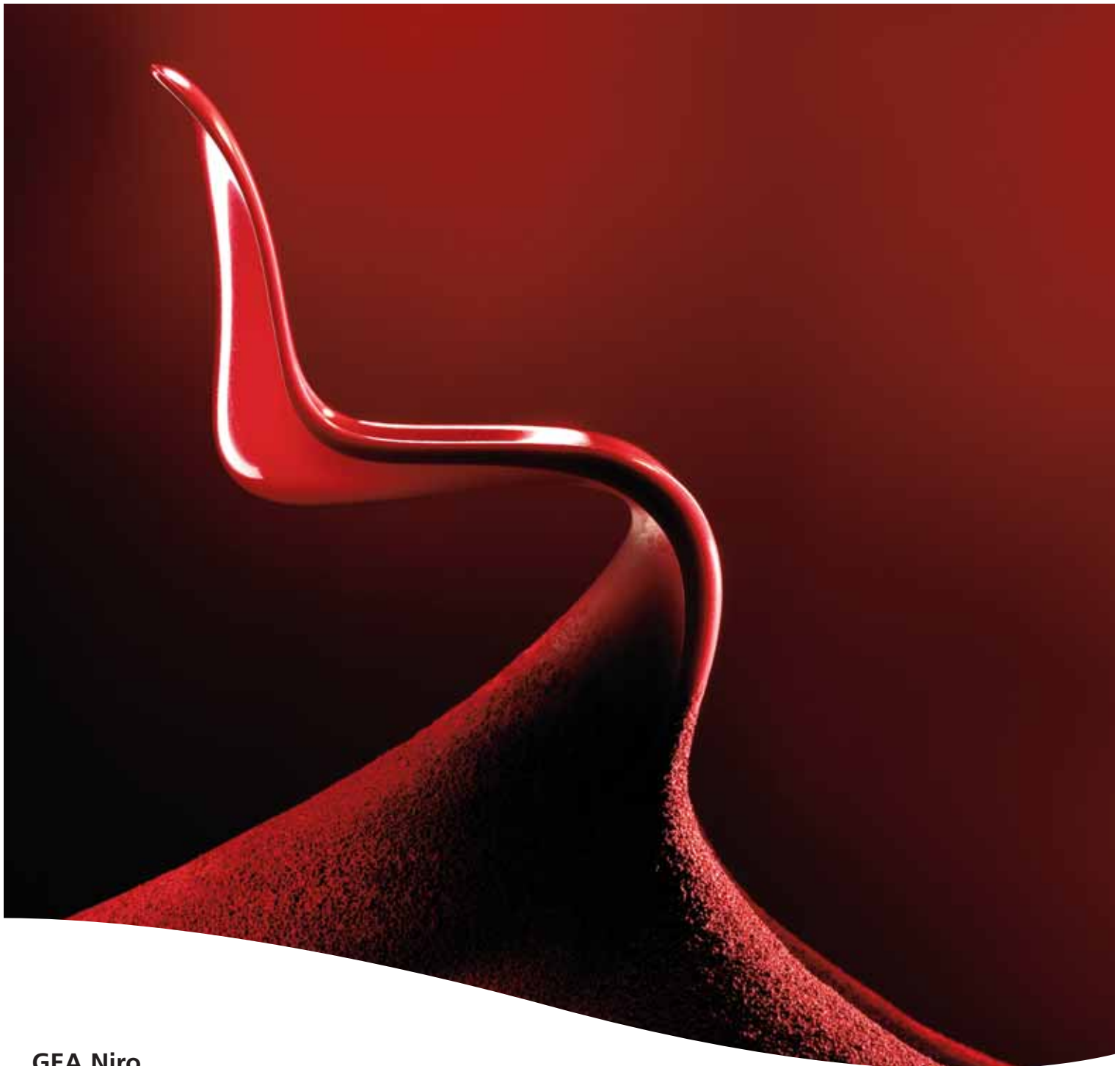


# Industrial drying systems

We know what makes  
outstanding polymers



# Meeting precise needs



Benefits include:

- Tailor-made plants
- Fully scalable
- Energy efficient
- Limitation of VOC

No one knows more about the role of industrial drying and engineering of high-performance products than GEA Niro. With data gathered from more than 70 years of experience, a reference list of some 10,000 plants and more than 500 polymer plants installed since 1949, GEA Niro is the world's largest and most experienced supplier of polymer drying solutions. We're equipped to engineer the properties you want into your products – and the processes needed to produce them. We call it Powder Engineering.

### A world of drying options

GEA Niro specialises in the design of plants for processing liquid, particulate and solid materials, and the drying of polymers is an area of special expertise. We supply a full range of dryers, including large-capacity units for high-volume operations. This comprehensive product range includes both spray and fluid bed drying systems tailored to meet your exact product specifications.

If you need to dry wet powders where the particles have already been formed (such as s-PVC, c-PVC, ABS, MBS, HDPE, PP, PAN, c-PE, POM and PVA), GEA Niro fluid bed dryers, CONTACT FLUIDIZER™ and flash dryers are ideal. For emulsions and solutions in which the particles are formed during the drying process (such as e-PVC, EVA, UF, MF, PF, PMMA, PVAc, PVP and Acrylic resins), GEA Niro spray dryers are the solution. Spray drying is often followed by fluid bed post-drying and/or cooling. Spray congealing is applied for low melting polymers like paraformaldehyde and polyethylene wax. Both open- and closed-cycle solutions are available for evaporation of water or organic solvents.

### Knowledge through experience

Many of the world's leading manufacturers are GEA Niro customers. Our experience includes some of the world's largest projects within the petrochemical industry, projects that meet the most stringent regulatory and environmental standards. Above all, GEA Niro is a process engineering company – each project begins with our deep understanding of chemical engineering and process technology. We start with our customer's product and

Applications overview : ABS EVA HDPE cPAN c-PE PMMA





The GEA Niro CONTACT FLUIDIZER™ fluid bed utilizes heating panels submerged in the fluidized product layer, which provides energy savings of 10-25% depending on product type and grade.

design the optimum drying technology needed. We work in teams of cross-disciplinary experts, ranging from the world's leading product engineers to professional project managers and construction experts. All of which gives GEA Niro an unmatched ability to offer customised solutions to your specific polymer drying requirements.

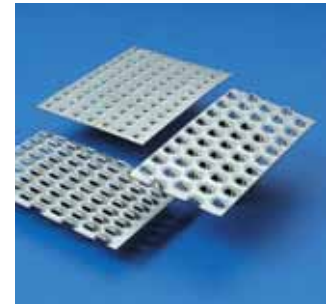
Our test facility is unique in the industry – a staff of more than 35 specialists supports our customers before and after projects. This enables us to help you maximise competitiveness through superior product quality. GEA Niro maintains a global presence and draws on experience gained in countries worldwide. Yet wherever you deal with us you'll find a staff of local professionals, which means that we speak your language – both technically and literally.

**Energy savings**

Energy costs are rapidly becoming an increasingly large percentage of every manufacturing budget – polymer production is no exception. GEA Niro can help minimise your production costs through efficient energy utilisation. Contact heating (heating panels) can be incorporated in fluid beds to great advantage. We employ efficient heat recovery for all drying systems. Partial recirculation of the drying medium can further reduce energy consumption for spray and flash dryers.

**Special requirements**

Some polymers are standardised, others are special, virtually one-of-a-kind products. Depending on the specifications of your product, a specialised solution may be appropriate. We assist in powder formulation and process verification through laboratory and pilot plant testing, unmatched scale-up experience and global project execution – on time and according to your specifications. We also help secure maximum plant utilisation and possible plant modification to meet new market requirements. It's all part of the GEA Niro solution.



Our patented FLEX PLATE™ can be designed with different patterns and shapes – all with sufficient strength to protect against vibrations during operation



The NOZZLE TOWER™ spray dryer enables production of extra-fine grade e-PVC powder.

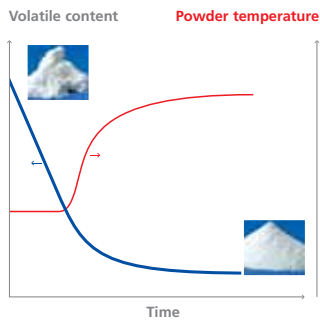
POM PVAc PVA c-PVC e-PVC s-PVC PVP UF MF PF



# Delivering proven processes and technology



## Product drying curve



GEA Niro offers the ideal combination of proven components and customised configurations. Our state-of-the-art equipment and industry-leading product standards increase manufacturing availability and reduce downtime. GEA Niro dryers are designed for continuous, round-the-clock operation, with scheduled shutdowns for cleaning and grade changes. Automatic Cleaning-In-Place (CIP) systems can be incorporated in all dryers when required. Moreover, scale-up of polymer dryers presents no problems. Both present day and expected future process stream rates can be handled in single dryer units. Current dry product rates already exceed 55 tonnes an hour for fluid bed dryers, and 6 tonnes an hour for spray dryers.

### Fluid Bed:

Open system (CONTACT FLUIDIZER™)

### Application:

ABS, MBS, PAN, s-PVC, c-PVC, c-PE, \*PTA

### Benefits:

- Able to handle powdery water wet feeds
- Feed disintegrator for light cohesive feedstock
- Low specific energy consumption
- Average particle size range 50-800  $\mu\text{m}$
- Long product residence time, gentle drying
- Optimised drying profile due to combination of back-mix and plug flow sections
- Low specific air flow due to the use of heating panels

\*Monomer for PET

### Fluid Bed:

Closed cycle (CONTACT FLUIDIZER™)

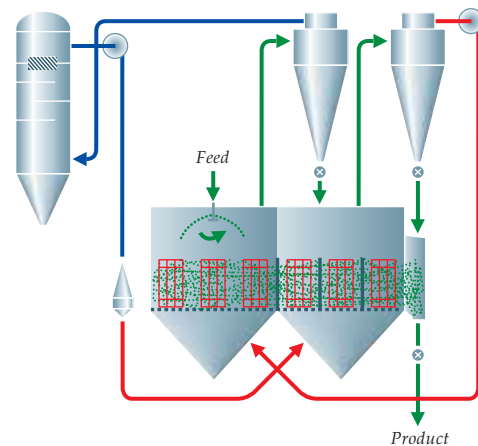
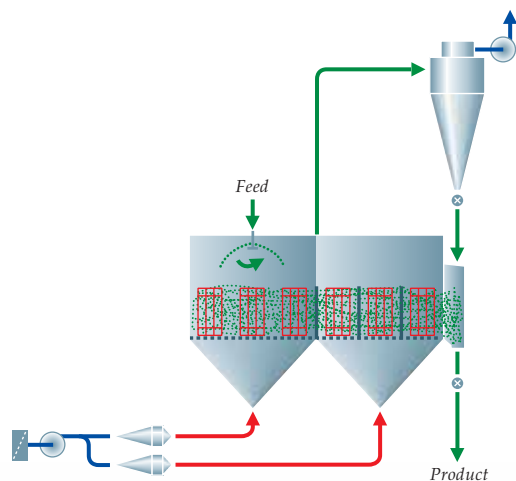
### Application:

HDPE, POM, \*CTA

### Benefits:

- Able to handle polymers wetted with organic solvents
- No fire or explosion risk due to the use of inert (nitrogen) gas
- Efficient removal of residual monomer and solvent in the plug flow section
- Low total circulating gas flow due to the double pass of drying gas
- Low specific energy consumption
- Average particle size range 50-800  $\mu\text{m}$
- Long product residence time, gentle drying
- Optimised drying profile due to combination of back-mix and plug flow sections

\*Monomer for PET



**Flash Dryer:**

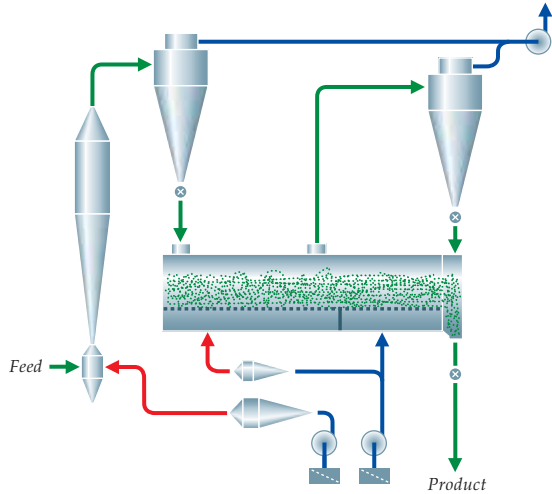
Open and closed cycle with fluid bed

**Application:**

ABS, MBS, PAN, s-PVC

**Benefits:**

- Surface volatiles evaporated rapidly and with short residence time
- Final drying at lower temperature and longer residence time
- Average particle size range 50-800 µm
- Low product hold-up
- Two-stage drying, co-current + cross-current flow modes



**Spray Dryer:**

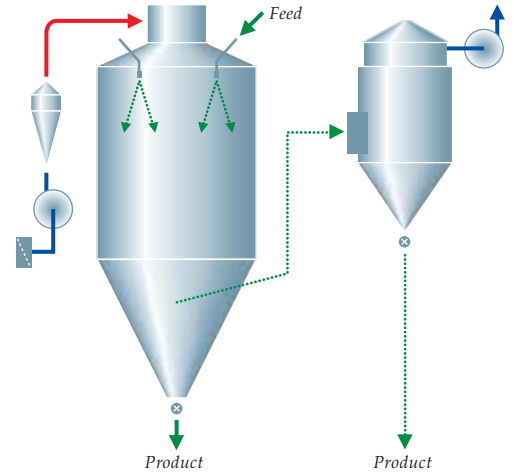
Open and closed cycle with nozzle atomization (NOZZLE TOWER™)

**Application:**

PMMA, e-PVC, PVP

**Benefits:**

- Liquid feeds
- Multiple atomizer assembly, two-fluid nozzles or pressure nozzles
- Average particle size range 15-250 µm
- Co-current flow mode
- Rapid and gentle drying
- Powder collected by bag filter



**Spray Dryer/Congealet:**

Open and closed cycle with rotary and nozzle atomization

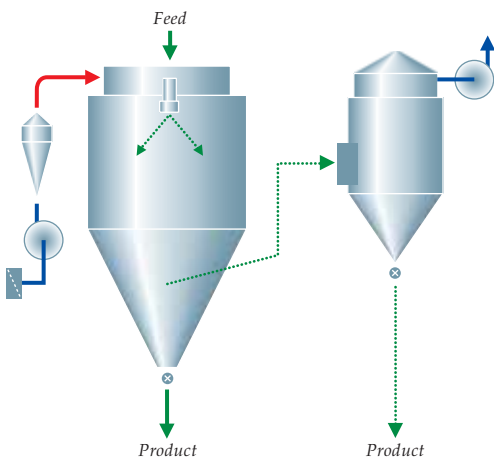
**Application:**

Drying: PMMA, e-PVC, PVP

Congealet: PE Wax, Paraformaldehyde

**Benefits:**

- Liquid feeds
- Single atomizer unit
- Average particle size range 30-125 µm
- Co-current flow mode
- Rapid and gentle drying
- Powder collected by bag filter



**Spray Dryer:**

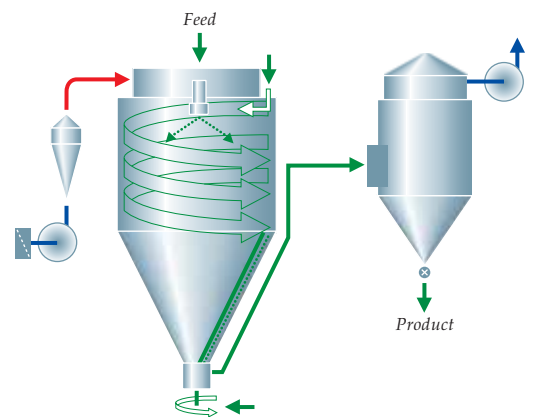
Open system with rotary atomizer for sticky polymers

**Application:**

PVAc, EVA, UF, PF, MF

**Benefits:**

- Liquid feeds
- Average particle size range 30-125 µm
- Co-current flow mode
- Deposits inside drying chamber minimized by combination of an air broom and the patented JET SWEEP™ system
- Special features for adding of flow-aids available
- Powder collected by bag filter



# Committed to a brighter future



## Lasting advantages:

- Maximum uptime
- Prevent dust explosions
- Meet VOC regulations
- Receive global support

We work constantly to develop new capabilities that contribute to the efficiency and the profitability of polymer production. GEA Niro's test facilities and accompanying analytical laboratories allow you to establish the feasibility of using GEA Niro equipment, optimise process conditions and provide samples for market analysis. We offer the industry's most advanced analytical capabilities, including GEA Niro's proprietary dynamic flow modelling system DRYNETICS™, which can take into account drying kinetics measured using the GEA Niro DRYING KINETICS ANALYZER™. GEA Niro's analytical capabilities enable you to move smoothly from development to profitable production by quickly and accurately establishing the drying parameters for your product.

## Environmentally sound

GEA Niro can also help you address two of the industry's most pressing challenges: safety and environmental compliance. We have an established record of assisting manufacturers meet increasingly demanding environmental regulations in markets worldwide – not least by optimising the energy consumption of the drying process. From heat recovery technologies to meeting Volatile Organic Compounds (VOCs) emissions standards, GEA Niro can provide answers.

In particular, stripping of VOCs from dry polymers is a growing requirement. It could well become a general processing standard, due to concern about the release of VOCs during handling, storage and fabrication. GEA Niro dryers can include both integrated and separate stripping stages. Stripping of VOCs is a special form of heat treatment/drying often performed in specially designed Stripper Fluid Beds.



*Highly reliable rotary atomizers with special features are used for drying of water dispersible polymers.*



*Detailed risk and safety studies are carried out in collaboration with our customers and recommendations are made for the ideal safety concept.*



*An Original GEA Niro Spare Part is more than just another replacement. It is your guarantee of perfect compatibility, reliability, optimal operation, and maximum plant longevity.*

### **Safety first**

All GEA Niro plants are designed to fulfil the most demanding safety requirements. In fact, we not only strictly follow all EU regulations, but are also in the forefront of establishing European safety standards. We examine your product and its properties, analyse the risks according to well-established safety procedures and recommend the safety concept that is best suited to your situation.

Dust explosion is a potential risk when drying some products, such as ABS and PVAc. When needed, we provide additional safety protection by installing explosion-relief or suppression systems, in combination with automatic fire extinguishing systems. Alternatively, a low-oxygen plant with nitrogen as the drying gas in a closed loop may be the best solution. Another option is the self-inertized plant, where a special direct-fired heater ensures sufficiently low oxygen content.

### **After sales support**

GEA Niro's global project management skills take your project smoothly all the way to completion – coordinated and documented for you by an organisation that implements hundreds of drying projects each year. With GEA Niro, you also benefit from a comprehensive after-sales programme that ensures your return on investment is optimised throughout the lifetime of the plant.

Maximum uptime is the focus of our spare parts programme. We combine a ready stock supply and customized service programme with a global network of experienced GEA Niro service engineers. The polymer industry is dynamic, with market demands and conditions changing over time. Whether you need a new investment, process modification or optimisation or even a complete plant retrofit – GEA Niro can help.





## Experience

**GEA Niro has contracted and installed more than 10,000 plants worldwide**

GEA Niro is a world leader in industrial drying, with spray drying, spray cooling/congealing, flash drying, freeze drying, granulation and fluid bed processing as core technologies. Having installed more than 10,000 plants around the globe, GEA Niro is known for delivering solutions that meet customers' exact requirements. The GEA Niro companies are part of the Process Engineering Division of the GEA Group.



Process Engineering

### **GEA Niro**

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