

# Globally established polyolefin plants.

Competence in PE and PP projects opens markets.





# Knowing what makes the market tick. We're familiar with the processes for PP and PE – worldwide.

Polyethylene (PE) and polypropylene (PP) belong to the polymers with the highest demand and growth rates worldwide. More than 50% of all ethylene produced is consumed in polymerisation processes for the production of PE and PP. More than 30 years of experience in the polyethylene and polypropylene market have given Linde a profound knowledge base in both engineering and project execution for such plants.

Our experience of having constructed PE and PP plants in numerous countries around the world gives us, Linde, the capability to focus on the planning and project development required to provide a truly successful turnkey plant.

## One-stop individual support

We offer the full range of engineering services for polyethylene and polypropylene projects, including:

- Consulting services
- Project development
- Economical and technical feasibility studies
- Licensing arrangements
- Financing
- Arrangement of premarketing and off-take
- Support and documentation for authority engineering
- Project management
- Engineering and design
- Procurement
- Construction
- Commissioning and start-up
- Training of operational and maintenance personnel
- After-sales support

## Integrating petrochemical complexes

Very few companies have the know-how to build turnkey integrated petrochemical complexes. Linde is in a unique position of being able to offer a complete spectrum of technologies along the olefin/polyolefin chain, such as gas separation, ethylene, propane dehydration, polyethylene and polypropylene, linear alpha olefins.



# Working hand in hand. Success through efficient coordination of the complexes.



Our approach is to structure typical polyethylene and polypropylene plants into separate complexes.

## Complex 1

The PE or PP process plant forms the core of the entire unit, comprising the purification of raw materials, reaction system(s), resin degassing, vent recovery, additive handling and pelletising systems. These sections are typically covered by the licensor's process design package.

## Complex 2

Homogenisation and intermediate storage of the pelletised product take place in the blending and storage area. Finally, the product will be either loaded as bulk into container trucks or filled into bags – the bagged product being stored on pallets in a warehouse.

## Complex 3

Off-sites and utility systems must be provided in order to supply feedstock, raw materials and plant utilities at optimum operational parameters.



# Investing safely. Integrated engineering for flexible reactions.



## Superordinate data alignment

Linde Engineering Dresden GmbH uses computer-based engineering tools linked to form an integrated system of in-house data exchange to perform the project task required by each discipline. This highly developed software is used for intelligent P&IDs for process engineering and 3D CAD modelling to develop plant design.

## Accuracy through design reviews

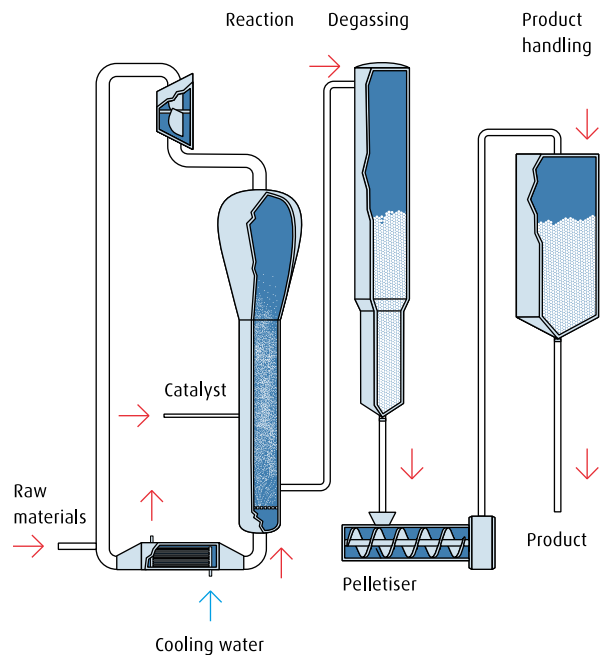
It is one of the declared goals of Linde Engineering Dresden GmbH to involve client engineering and operational staff to the maximum possible extent during the design phase. The client is invited to participate at regular plant design review meetings, in which all details of plant layout (equipment, piping, steel structure, buildings etc.) are openly discussed using the 3D CAD model.

## Linde Integrated Management System (IMS)

The Linde IMS was developed in order to secure quality and timing through the entire engineering process. This business, quality and HSE management platform links activities and deliverables of all engineering disciplines during all stages of the planning process in a database, thus making the engineering and workflow efficient and transparent for our clients.



# Technologies and processes with a future. Variable, flexible, safe.



## Leading technology

Linde Engineering Dresden GmbH is an Approved Bidding Contractor for the following technologies:

- UNIPOL® PE process of Univation Technologies
- UNIPOL® PP process of The Dow Chemical Company

Upon specific client request, alternate technologies can be offered.

## Simple processes

Both UNIPOL® PE and PP are fluidised bed gas phase processes, each providing a maximum of operational safety and flexibility, combined with low capital investment, due to the relative simplicity of the technology derived from reliable equipment and moderate operating conditions.

## A broad range of products

The UNIPOL® PE and PP processes offer clients the unique opportunity to produce the widest range of products for the market requirements of today and tomorrow, providing for such product applications as film, pipe, tubing, blow moulding, injection moulding, roto moulding, fibres etc.

## UNIPOL® PE and PP – the process chain

### Raw material purification

The raw materials are treated to remove poisons which could negatively affect the catalyst performance. Other specified chemicals are simply used as received, without further treatment.

### Reaction system

A compressor circulates the reactor gas through a heat exchanger to fluidise the reactor bed and remove heat from the polymerisation reaction. The product is conveyed to the degassing system.

### Degassing

The product is treated to remove residual hydrocarbons. The purged product is combined with additives and fed into the pelletising system.

### Pelletising

The combined granular resin and additives are intensively mixed, kneaded and melted before being pelletised. After being dried, the pellets are conveyed to the product handling facilities.

### Product handling

This process section is tailored to the requirements of the client. Therefore, the product handling is designed in close cooperation between the client and Linde Engineering Dresden GmbH. We can offer all equipment required for dense and dilute phase conveying, elutriation, blending, bulk storage, bagging, packaging and pelletising facilities etc.



# Planting seeds for the future.

Our customers' success is our success. With innovative technologies and our employees' extensive know-how, we are consistently turning our customers' goals into our own – in a fair, transparent and cost-conscious manner. Therefore, every plant we build is a reference for the next one – creative in its concept, efficient in its implementation.

As one of the leading companies in the planning and construction of chemical, gas, biotechnological and pharmaceutical plants, we offer our customers the security of consistently high quality standards. In cooperation with reliable business partners, we combine capacity and expertise in order to realise projects of any dimension.

We regard every assignment as a chance to define a new market standard and to expand our strong international position. Driven by our own performance capability, it is our goal to make the name Linde a globally recognised seal of quality, with plants that speak for themselves – and for us.

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