

The one-stop shop for PLA bioplastics

Three companies who wanted to simplify the manufacturing of bioplastics from renewable vegetable sources have teamed up to offer PLA process installations from a single source. As process technology and equipment specialists, Futerro, Sulzer and TechnipFMC have formed the PLAnet™ initiative to promote the production of sustainable plastics made of polylactic acid (PLA). Newcomers to the PLA market benefit from process guarantees and technology integrations which only a one-stop shop can offer.



[Click here to see the PLAnet™ animation.](#)

Thanks to the growing awareness about waste, recyclability and sustainability, the plastics industry is looking for improved recycling processes and alternative materials to petroleum-based plastics. Because it is a biopolymer, PLA, such as the kind produced through the PLAnet™ technology, perfectly complements the polymers that are already available on the market. These include polyolefin, polystyrene, cellulose and polyester, which are used in many applications. PLA has a renewable origin, many end-of-life management possibilities and special properties. It has a similar rigidity to polyesters and can be spun into fiber on conventional extruders.

It performs like traditional polymers — such as PET and nylon 6 — and it can be processed in casts made by blown film machines. PLA provides industry transformers with new opportunities to meet changing product specifications and market demands.

How to benefit from a technology network?

Driven by ecological awareness, more and more companies are seeking to replace their oil-based polymers with sustainable bioplastics. Among the bioplastics, PLA is one of the fastest-growing polymers because of its versatility and broad raw material base. For customers, the most comfortable and calculable solution is to get all the machines for PLA production from one source. Until now, this option has not been available on the market. Thus, the idea of a one-stop shop was born. The combined expertise and experience of the three players offers proven solutions for customers. The risk in installing new plants is minimized thanks to the expertise brought by the parties of this industrial network, who have already realized several successful plants in the past few years.

PLAnet supports the construction of plants of any size, including PLA facilities with a throughput of up to 100'000 tons per year — that permits manufacturers to save both capital expenditures (CAPEX) and operating expenses (OPEX) by providing for integrated and optimized plant section design.

Investment security for newcomers

The one-stop shop for PLA production installations offers investment security for newcomers who want to go green and join the bioplastic movement now. Sulzer, a technology pioneer, has been active for over 25 years in the bioplastic movement. With its cooperation partners (Fig. 1), PLAnet can offer customers:

- Proven technology from Futerro and Sulzer merged with a tailor-made optimized process integration from TechnipFMC
- A single guarantee for the entire process instead of multiple contact points
- Engineering and process design of the whole plant
- Site service activities
- Consulting and support services for new entrants to the market
- Reliable after-sales service and long-term cooperation with customers

PLAnet™

futerro

Poly lactide production from sugar



Fermentation of sugar



Prepolymerization of lactic acid to lactide



TechnipFMC

Tailor-made technology links



Process integrations

SULZER

Purification and polymerization of lactide



Purification of lactide



Ring-opening polymerization of lactide to PLA



Fig. 1 Three companies are part of the PLAnet cooperation.

“ Greener alternatives to traditional plastics need to be backed by suitable technologies that allow businesses to mass-produce high-quality bioplastics efficiently. PLAnet, the collaboration between Sulzer, Futerro and TechnipFMC, makes this possible. By leveraging our superior technologies for the entire PLA value chain, we can help processing industries to establish reliable integrated PLA plants and increase their competitiveness, while making sustainable plastics a reality.

Sven Cammerer, Head Polymer Business, Winterthur, Switzerland

Produced from bio-based materials

The demand for PLA is growing rapidly. PLA effectively reduces the carbon footprint thus minimizing the impact on global warming. Why? Because PLA is not only biodegradable, it can also be produced from bio-based materials and can replace petroleum-based plastics in a wide range of applications. The plants involve different process steps (or sections) to convert sugars from crops into lactic acid, lactide and subsequently PLA.

Up to now, all process plants have produced PLA from first-generation raw material such as food sugars or starch. However, research in universities and private companies has started to show reliable results using second-generation raw material from lignocellulosic fibers, such as wheat straw, corn stover, etc. (see article in STR 4/2018).

Good things come in threes

Futerro, a well-established technology provider for lactic acid and lactide production, and Sulzer Chemtech, a leading specialist in separation and mixing technologies, have further shown their commitment to facilitating the production of bioplastics by establishing a partnership with TechnipFMC. The company has rapidly growing activities in bioplastics and green chemicals. Besides that, TechnipFMC is a global leader in subsea, onshore/offshore and surface projects with experience in technology development and licensing.

Futerro — lactide and lactic acid production

Within the PLAnet partnership, Futerro's proprietary technology focuses on the production of lactic acid and raw lactide from sugar or from any other raw material which can be converted into sugar (Fig. 2). Futerro, founded in 2007, is a 100% subsidiary of Galactica SA, a Belgian lactic acid producer. Futerro has extensive industrial experience in lactic acid fermentation on different substrates in the USA, Europe and Asia, and is continuously upgrading its bacteria and processes to produce cheaper and better lactic acid.



Fig. 2 Lactic acid process installation from Futerro (Source: Futerro).



Fig. 3 Sulzer equipment for the processing of PLA.

Sulzer — key components for PLA

Sulzer contributes the technology and equipment for the purification of crude lactide and polymerization to obtain PLA. Most industrial plants in the world that produce the biopolymer PLA use Sulzer technology and/or Sulzer equipment (Fig. 3).

Some of the key equipment developed by Sulzer as part of its PLA production offering includes lactide crystallizers (falling film or static crystallizers), loop and plug-flow reactors (SMR™), and Sulzer Mixers (SMX™), as well as distillation and devolatilization technologies. With the Sulzer technology, the monomer ratio and the molecular weight of the PLA can be set precisely according to the market applications. The flexibility of the plant allows operators to set relative amounts of D(-) and L(+) lactides and, thus, meet the specific requirements of the market. Playing with the D and L lactides content, customers can influence the biodegradability, respectively the speed at which PLA-based products will biodegrade.

TechnipFMC — the technology integrator

TechnipFMC acts as technology integrator to deliver seamless and optimized front-end engineering design (FEED) packages. TechnipFMC is a leading engineering, procurement and construction (EPC) contractor with in-depth experience in process technology development and licensing. It actively pursues renewable and green chemical opportunities as a part of its strategy to expand its technology portfolio in this field. TechnipFMC Process Technology has a global network and a wide portfolio of onshore process technologies in petrochemicals, refining, hydrogen and syngas, polymers (Fig. 4), gas monetization and renewables. Through innovative technologies and improved efficiencies, clients benefit from new possibilities when developing new projects.

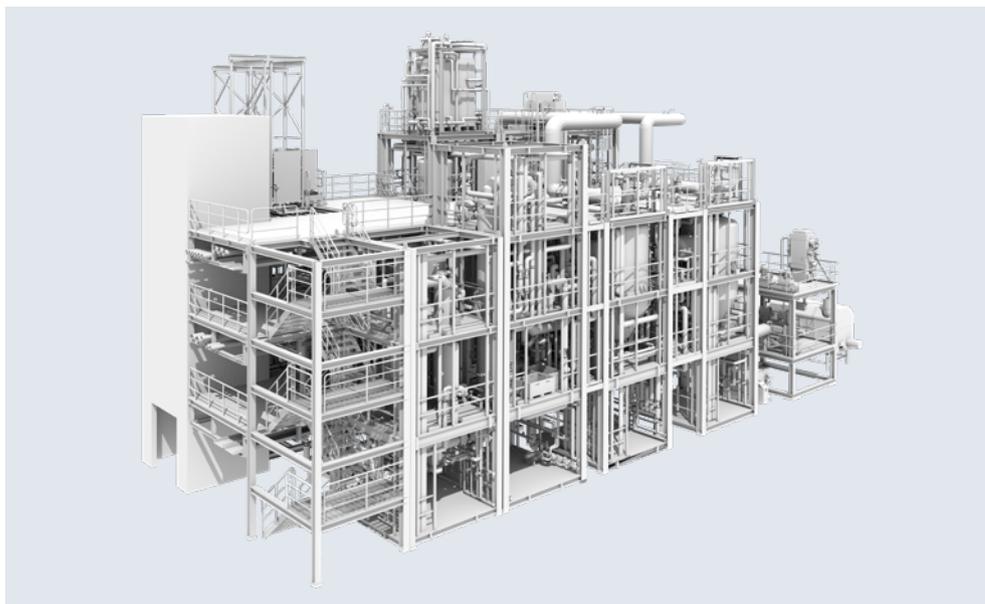


Fig. 4 PLA polymerization section of the plant.



Alex Battù,
Winterthur, Switzerland

Use leading technology to go green

The promotion of greener alternatives to traditional plastics needs to be backed by suitable technologies that enable the industry to produce high-quality bioplastics efficiently. The PLAnet partnership between Futerra, Sulzer and TechnipFMC offers leading technologies, expertise and skills that you can rely on for the entire PLA value chain.