Lorenzo Ghelfi: “Jolanda is the masterpiece of our biopolymer team.”

You and your team call the new pilot plant Jolanda. What can Jolanda do?
With this facility, we can produce the bioplastic polylactic acid (PLA) on an industrial scale. Jolanda can produce up to 1000 tons of PLA a year. The starting materials for our innovative processes are dimers of lactic acid, which are extracted from natural raw materials such as sugar, starch, or cellulose.

What is so innovative about this process?
Our polymerization process is characterized by the unique mixing technology. With our static mixer technology and the SMR™ plus mixing reactor, we can considerably shorten reaction time and nevertheless have very good control over the entire process. Our competitors are using processes in which the polymer is retained in large reactors over much longer time periods. With the increase in viscosity during the reaction, the dwell time in such reactors cannot be controlled across the complete volume of the tank. Our facility, on the other hand, is equipped with numerous, very efficient heating and cooling zones. As a result, we can precisely control temperature, viscosity, and pressure at every stage of the polymerization process, and we can thereby achieve the desired product properties.

How did the idea for the new PLA process arise?
Sulzer has already accumulated more than twenty years of experience with lactic acid and derivatives for the production of PLA. At the beginning, our interest was in the preparation and cleaning of lactic acid products through rectification. We then developed the crystallization technique for lactides. Sulzer Chemtech strengthened its expertise in the systems area with the acquisition of the Kühni company in 2009. Cooperation with Purac—the world leader in lactic acid and lactide production—and Synbra as our end customer then led to our PLA activities. We thereby used our well-tested mixing and reaction technology as the basis, and we continued to develop the process specifically for the production of PLA. A first, continuous pilot plant in Winterthur with this new PLA technology delivered such convincing results that a contract to build a large installation at Synbra in Holland came about within a very short time.

With the new process, our customer can produce bioplastics with higher quality and tailor-made properties—and that at a price that can increasingly compete with conventional petrochemical plastics.

The new pilot plant now opens up entirely new possibilities. What are the major benefits for the customers?
The new PLA facility in Pfäffikon is larger and more efficient than the existing pilot system in our test center in Winterthur. We can now also ensure continuous operation with the operational concept of the new plant. We employ nine operators in three shifts in Pfäffikon. In addition, we work closely with our development laboratory in Winterthur, where our analysis team is based.

The new plant has a variety of functions. It serves as a demonstration plant for future customers and makes it possible to train their employees. It is also used for production—both for larger
product samples for customers and for the development of our own formulations and new PLA products.  

Why do customers want a demonstration of the technology?  
Customers invest millions in large-scale production plants, and want to take on as little risk as possible on the technical side. It is therefore understandable that the customers would like to see our polymerization process one-on-one before they make their investment. With our new plant, the customers can precisely check the energy consumption and efficiency of the process, as well as the quality of the product, well in advance.

The production of samples is also an important issue for the customers.  
Yes, because the customers carry out their market development in the time period from the purchase to the completion of a PLA plant—and there are many risks in marketing. Before you produce the corresponding amounts in the kiloton scale in a large plant, there is always the question of whether the right products have been selected, whether the quality meets the requirements of specific applications and whether enough end consumers can be found. Our customers therefore require PLA samples to be produced in advance, in order to be able to manufacture and test end products such as foils or fibers. With our facility, we can deliver PLA samples with various formulations in quantities from 20 to 200 tons and thereby ensure that the later production and sale runs smoothly for the customers.

Who are your customers?  
We have received inquiries from major plastics producers as well as many smaller companies who have cost-effective access to the natural raw materials. In many countries in Asia and South America, plants such as sugar cane or cassava roots are cultivated in large quantities, so that sugar and starch are easily accessible. The construction of processing plants or even complete PLA systems there—in the immediate vicinity of the cultivation areas—is particularly attractive.

More and more companies around the world are becoming interested in PLA.  
What is the reason for this?  
Companies increasingly see a strategic advantage in producing products from alternative raw materials instead of mineral oil. At the moment, almost all the products in the plastics market are based on mineral oil and natural gas. The desire to become independent of rising prices and the limited availability of fossil fuels is a major trend.

Is the PLA business also a growth market for Sulzer?  
Yes, we have ambitious goals. The new PLA technology and our demonstration system should act as a trigger and lead to the development of several years in R ussia and is now accessible. The construction of processing plants or even complete PLA systems there—in the immediate vicinity of the cultivation areas—is particularly attractive.

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You, yourself, have been with Sulzer for more than 30 years. What experience do you bring to this project?  
What were the greatest challenges?  
I bring experience in engineering and management. Managing a purely chemical production is a new challenge for me. But thanks to my life and professional experience, I can comfortably deal with unexpected situations.

It has been particularly challenging to coordinate the teams from three locations and to thereby keep to time and cost schedules. Our colleagues in Allschwil built the plant. The department in Winterthur is responsible for the engineering, while we in Pfäffikon carry out the assembly. Thanks to the great dedication of all our employees, we have been able to overcome all these difficulties.

How would you differentiate this project from the earlier ones that you carried out for Sulzer all over the world?  
I have worked for Sulzer all around the globe: in Brazil, Argentina, Russia, and the USA. This time, in the new project in Switzerland, there are no difficulties with regard to cultural and language differences. However, the official regulations and specifications for work and environmental protection are dealt with much more strictly here.

Why has Sulzer Chemtech decided on the location in Pfäffikon? Can production be cost effective in the high-wage country of Switzerland?  
Customers from all over the world visit us and appreciate the proximity to the sales department of Sulzer Chemtech as well as the easy accessibility via the nearby Zurich International Airport. Switzerland offers an ideal environment for high-tech industry. Furthermore, we also benefit from the proximity to our development department, which supports us in the operation and optimization of the plant. This would not be possible at other locations. And, as we work efficiently following LEAN principles, we are also competitive at the location Switzerland.

What is planned for the future?  
We are planning to operate Jolanda for some years in order to establish the new PLA technology on the market. The significant investment in this polymer system should act as a trigger and lead to the breakthrough of the technology.

Interview: Tünde Kirstein

Lorenzo Ghelfi  
studied mechanical engineering at the ZHAW (Zurich University of Applied Sciences), Winterthur, Switzerland. He worked as a project engineer in the field of industrial combustion technology for metallurgy and power plant construction. He has been working for Sulzer Chemtech for more than 30 years in the fields of international sales, project management, and engineering, as well as the production of process equipment for the international construction of chemical plants and oil refineries. During his foreign deployments in managing positions in Argentina, Brazil, Russia, and in the USA, he built up new business units for Sulzer and expanded the global market presence of Sulzer Chemtech. He recently returned to Switzerland following his deployment of several years in Russia and is now managing the buildup and the operation of the polymer pilot plant in Pfäffikon.