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The Art of Transforming Ideas into Products (Using Engineering)

“When I examined myself and my methods of thought, I came to the conclusion that the gift of fantasy meant more to me than my talent for absorbing positive knowledge.”

– Albert Einstein

How to define an industrial process? There are many possible methods that can be used when trying to establish a precise definition. It is possible to construct a definition using economic theories, an engineering approach, or a description based on a commercial point of view. It is necessary to go beyond this level, however, and add another ingredient to the formula: an industrial process, in addition to being a complex sum of chemical and physical engineering operations and administrative techniques, is also an art. If this is true, it is necessary, in addition to resolving technical issues, to be creative when developing new processes and products or improving established ones. Throughout the R&D process, it is essential that developers remember that the products and goods created must be sold for a reasonable profit to meet the expectations of the stakeholders.

To achieve good results, new food and feed products must be healthy, safe, taste good, and appear attractive, all while keeping manufacturing costs as low as possible. These general parameters must be considered when developing final products that are sold to consumers and when developing ingredients that are sold commercially. In both cases, the industrial process used must be designed with the above goals in mind.

Generally, the development of new processes or products begins with a briefing that is discussed within the R&D department. Food and feed companies operating at laboratory or pilot scale can create and develop products that have the taste, appearance, health-promoting functionality, safety, and other characteristics needed to meet the requirements of a specific market. To transform an idea or new product into a real innovation that successfully meets a market demand, further steps are necessary.

First, during development strong interactions between the marketing and commercial departments must be maintained, whether the product and process are new or they are an improvement of an existing system. However, even after a lot of hard work, meetings, laboratory analyses, and sensory panels and a final consensus is reached, the new product or improvement will not yet be ready to become a reality. A second important step in development involves the question of how to replicate the product at an industrial scale while maintaining its attributes. The answer seems very easy and obvious, but it is not. We can infer that everything has been discussed and planned previously, including the required investment, timetable, workforce, costs, and every-

thing related to industrial production. However, the question of how to perform the scale-up while retaining and protecting proprietary information remains, bearing in mind that it is often not possible, applicable, or convenient to issue a patent.

Machines are needed to manufacture products. They can be purchased in the market, or new and innovative machines can be developed for the manufacture of a new product. In both cases, to maintain control of the new ideas and techniques needed to develop a process or innovative product, some protective procedures should be considered. When purchasing a whole new line from one supplier as part of a “turnkey” supply contract, the proprietary technology developed will be shared with the supplier. This may raise concerns that the new ideas and technology could be disclosed involuntarily, even when protective contracts and non-disclosure agreements are in place. Some companies may opt to divide the construction of a process or industrial facility into separate parts or steps using multiple suppliers:

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|----------------------------|-----------------------------|
| 1. Utilities | 6. Main machines part three |
| 2. Conveying and transport | 7. Process engineering |
| 3. Packaging | 8. Automation |
| 4. Main machines part one | 9. Electrical and |
| 5. Main machines part two | mechanical assembling |

Every step can be completed using different suppliers and then be integrated using a process engineering supplier. For example, steps 4, 5, and 6 can be thought of as part one—prepare raw material; part two—convert the raw material prepared in part one into an intermediary product; and part three—finish the product.

It is difficult for manufacturers to produce a broad spectrum of machines that covers every necessary operation. Generally when manufacturers sell a whole new line to one customer, they purchase some equipment from other companies, a procedure that increases the value of the investment. It is important to assess each unique situation because there may be duplication of costs in a turnkey system. These financial considerations must be evaluated to determine the payback or return. To protect investments and proprietary technology, it is necessary to consider the options available when building an industrial process.

Gustavo Napolitano serves as the director of GrainSolutions Engineering Ltd. He attended Maringá State University, where he received a degree in chemical engineering (and later pursued post-graduate work in quality management). He also took technical extension and management enhancement courses in various areas, including automation and information technology, design, total quality, time management, and leadership. He received his MBA degree in agribusiness from the University of São Paulo. He has extensive experience working in large multinational companies, including Bunge Alimentos S.A. and Continental Grain. He currently serves as the treasurer of the AACC International Latin American Section. Napolitano can be reached at gnapolitano@grainsolutions.com.br.