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# KSE Webinar: From Plan to Plant: Innovation by Data Driven Design

# Q&A Summary

**Question 1: When a plant involves a pellet line or extrusion line (continuous process), how would be the approach from your perspective?**
When there is a continuous process involved in the automation, this is usually split in multiple units with each being able to hold a separate batch. This is the physical split where an actual different product could be before or after that point. Let's say a hopper with a closed-off valve or a cooler unit; in many factories the process moves from batch to continuous and back to the batch. It is important to align the Takt time or the heartbeat of the facility to the batch timing and have the continuous processes filled sufficiently to keep them going without interruption. This is a separate part of the pre-engineering that needs attention for petfood, aqua and feed facilities.

**Question 2: Do you also consult on scheduling algorithms that would work best when given a layout to minimize makespans or optimize some other performance measure? Or are your clients supposed to develop their own scheduling or sequencing approach?**
We do provide planning algorithms outside of our PROMAS ST software that can assist the operator in making the right choices. Whether it's contamination avoidance, Takt times or keeping lines full. This is not a magic button algorithm, but a helpful tool to align transport/packaging planning to production planning. Within the production planning, the software helps to avoid downtime of the continuous processes and scheduling to avoid flush batches and contamination. In simulations within the pre-engineering, it is possible to test a large variance of planning sequences, but it often proves that optimal planning changes rapidly over time. To keep this optimal is a continuous process during the lifespan of the plant, becoming more important as complexity of the plants increases.

**Question 3: Considering the power surge/cut risks in developing countries, what precautions you have in case there is an elevator or track malfunction? Assuming all the other systems come back online and there is just a breakdown or an issue at the elevator.**
When there is a power outage, there are safety matters in place to avoid damage or injury. The dosing slides are fitted with accumulators to close-off all bins when there is an outage. Computer systems have backup power to stay online or close-off in a controlled way and not lose data. For instance, the VCT lift for container-based installations will go on full brake in such a case. When starting up again, it is most important that the sequence is handled correctly to avoid loss of data or interfacing communication.

**Question 4: Does the system optimize the bin/silo usage?**
During the analysis, the optimal lay-out is considered. There is also analytics data available to evaluate this during the operation of the plant for years to come. Oftentimes, the ideal lay-out fluctuates over time or seasons and should be evaluated on a regular basis. The optimal set-up has an important relation to the flexibility and types of systems in the plant, as it provides a basis on how freely raw materials can be relocated or if they are "blocked" at a certain equipment, depending on dosing ranges, accuracy and silo sizes for instance.

**Question 5: Does the system provide a best product and silo combination for recipes scheduled in production plan?**
Oftentimes, the raw materials are already in a silo at the time of production start. If this is not the case, it is possible to optimize the lay-out. There are two critical factors for optimizing the lay-out; the first one being the balance between the systems in terms of workload/utilization. The second one is, in case of movable systems, to optimize the driving distances. For instance, frequently used products that are close to the discharge location or sequencing the dosings in the order of least distance (as long this is possible for contamination).

**Question 6: What is the strategy with 'difficult' raw materials like hemoglobin in your intake and dosing systems and how to keep maximum flexibility?**
Difficult materials come in all shapes and sizes, each with its unique challenges and possible solutions. From products that tend to fluidize and act like water to materials with a high risk of bridging or compacting. One you might be able to activate with a vibrator, the other will compact and form a rock-solid block. KSE has seen thousands of materials over the years and has vast experience with different types of materials and how to cope with them. Solutions can include knockers, vibrators, air bellows, air injection, silo lay-out, agitators and so on. KSE equipment is fitted with installation points for these kinds of equipment to tackle most of these challenges. If the product is on the dosing slide you are possible to dose it; the two main exceptions being products that are so light they tend to float (say a specific weight of 0.1 g or light as a feather kind of materials) or products that form a massive lump in the silo and tend to react like chewing gum.

**Question 7: When KSE hires an engineering company to work on the concept design for a new plant, does the technical solution always involve ALFRA/KSE equipment, or can the design concept also be developed with standard equipment?**
The developed concepts are based on the generic needs of the system, and thus more general. Of course, the goal for KSE in the end is to sell fitting equipment for these installations, so we will translate the generic needs to our systems that would fit that design. However, we are often a supplier of only a part of the solution and most always must work with partners. In the end it is our intention to deliver in cooperation with partners, each to their own best ability. The solution must be fitting for the customers' needs first, and sometimes that requires other types of equipment just as well.

**Question 8: The presentation has shown a whole list of possibilities, but is it also possible to only do certain parts as a tailored solution to customer's needs?**
Yes, this is possible. The sketched route is carefully crafted from our years of experience in this type of projects. In many cases customers are already set on parts of the design or can skip certain steps. It is highly dependent on the nature of the project and the nature of the customer and how far you need to go with this pre-design. We have done anything from just separate items like a dosing design analysis or simulation to full blown projects that involve all steps of the process. For instance, our Golden Acres project in the UK: https://www.youtube.com/playlist?list=PLtBAdmpRei5xryf0RBppEGrwN3QWx_oqR

**Question 9: Are the 3D and simulations also used to optimize the physical lay-out, to avoid collisions, define interfaces and such?**
The simulation and 3D provide different purposes. The simulation does provide a very nice overview of the 3D facility that can be used for internal stakeholders and to keep an overview, but the biggest value of the simulation is in the data gathering behind the scenes. Being able to run a thousand years of production in different set-ups and come back with the most optimal scenario. Running what-if comparisons to avoid pricey mistakes or over-engineering in the early stages. A detailed 3D model where the whole plant comes together is often used to avoid collisions, integrate the equipment of all suppliers and such, but this needs to be much more detailed and should provide as a sort of build view of the facility, whereas the simulation holds the theoretical model to test possibilities and changes. The technology is moving quick, however, and it is to be expected that these worlds will blend together more and more. Same for automation, since if you have a simulation model you could also run the same automation basis as the actual plant and use this for training purposes for instance.

**Question 10: Is your approach only for new facilities or also for existing ones, and what are the main differences?**

Our approach can be used in both cases. Of course, in an existing facility there are often more limiting factors involved in the starting points, but on the other hand it is also easier to validate simulations and assumptions. The starting points of a dosing design analysis are often the same, but in the steps towards engineering the nuances shift because of the nature of the project.