



PURSUING FOOD MANUFACTURING EXCELLENCE WITH BLENDING OPTIMIZATION

Unlocking increased yields while reducing cost and waste through innovation

MEET THE EXPERTS

THE FOOD INDUSTRY'S SUPPLY CHAIN CHALLENGES

AN INTRODUCTION TO BLEND OPTIMIZATION

THE EXPONENTIAL INCREASE IN COMPLEXITY FROM BLEND OPTIMIZATION

AN INTEGRATED SOLUTION TO OPTIMIZE FOOD PRODUCTION

THE PATH TO FOOD SUPPLY CHAIN SYNCHRONIZATION

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Geoff Locket

Senior Industry Process Consultant, DELMIA

Geoff Locket has over 20 years of advanced planning solution design, development and deployment experience in various global geographies across multiple Food & Beverage industries, including fresh produce, dairy, packaged ingredients, snacks and meals, sauces, protein, canned goods, brewing for on and off-trade, soft drinks distribution and other associated industries.



Roel Van Den Broek

Chief Revenue Officer, The Logic Factory

Roel Van Den Broek has over 20 years' worldwide experience in management consultancy and sales in Supply Chain Planning & Optimization and Artificial Intelligence. His industry expertise spans a wide range of sectors—notably Logistics, Retail, Postal & Express, Aviation, Commodity Trading and Food Manufacturing.

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THE FOOD INDUSTRY'S SUPPLY CHAIN CHALLENGES

Companies require a high level of agility to keep pace in the food manufacturing sector. Shifting market trends and consumer demand mean that manufacturers who can deliver the latest products to the market in the shortest time are well-positioned to reap the benefits.

However, this is just the tip of the food industry's challenges. The highly competitive nature of the market means that many products are sold on narrow profit margins, and the volatility in raw ingredient prices can strongly affect a company's bottom line. Managing the operational complexity in food manufacturing can also be a delicate balancing act for companies as they deal with factors like food safety constraints, ingredient shelf life, inventory and processing capacity.

One major challenge that is further amplified by global crises such as pandemic and international conflict is supply volatility. With suppliers everywhere hit hard by past and current disruptions, food manufacturers are scrambling to expand their supplier base in order to improve supply chain resilience and maintain business continuity.

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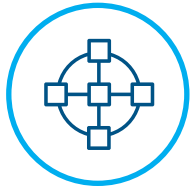
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DELMIA Industry Process Expert Geoff Locket says that the last 18 months have been “almost the perfect storm” for food manufacturers, exposing opportunities for improvement in three key areas that companies are now working towards through the implementation of new planning solutions.



Supply resiliency and planning agility enabled by having multiple sources of supply



Expanding the workforce to improve production capacity for non-automated processes



Last mile distribution to cater for more online purchases and doorstep delivery

“ Many companies have been moving towards improving resilience by enabling themselves to leverage multiple sources of supply for raw key materials. At the same time, they want to have agility in their production planning space so that they can potentially move products to different production lines or plants with similar capabilities when under pressure. ”

Geoff Locket,
Senior Industry Process Consultant, DELMIA



One area that provides significant opportunities for food manufacturers to drive profitability is in the **blending process**. With the right blend, companies can optimize their costs, sourcing and use of ingredients, as well as production output. However, blending affords a level of flexibility that also raises the complexity exponentially, making it impossible for planners to calculate and identify the best blend using traditional manual or spreadsheet-based approaches.

Relying on digital planning solutions can also benefit manufacturers in many more ways, including inventory management, waste reduction from improved planning, and business continuity from working around shortages in supply. The ability to test blends and recipes for extended shelf life while predicting its impact on production, inventory and profit will also help food manufacturers to make better decisions in line with business KPIs.

Read this eBook to learn about:



The flexibility and challenges that come with blending



How an optimization solution can provide decision support in food manufacturing



How to unlock supply chain synchronization through an integrated planning solution

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To illustrate the process of finding the right blend, let's look at a simplified example using waffles. The table below shows the different ingredients required to make the product and the price of each ingredient. The planner has a limited amount of flexibility to adjust how much of each ingredient to use without departing from the provided recipe that meets the customer taste test.

With this information, it becomes possible to work out how to optimize this blend within the predetermined ranges for each ingredient so that the final product can be produced at the lowest possible cost per batch.

Ingredient (unit)	Price per unit (in \$)	Minimum units	Maximum units	Ideal recipe for one batch	Cost per recipe (in \$)
Dry mix (cups)	0.25	0.80	1.20	1.20	0.30
Eggs (ea)	0.50	1.00	2.00	1.00	0.50
Milk (cups)	0.35	0.50	1.50	1.49	0.52
Butter (tbs)	0.20	1.00	3.00	1.00	0.20
Total cost per batch					1.52

This process creates many blend options to choose from but knowing which is the right one depends on a combination of many factors, including availability of raw materials. Substituting ingredients that are unavailable might be possible for some products, but the end product needs to meet the same taste and feel while still being feasible to produce in terms of cost and other factors.

The waffle example above is, of course, a highly simplified analogy. Real-world food products use far more ingredients and have many tolerances which add to the complexity. The average food manufacturer also simultaneously plans for multiple products with numerous options for blends and manages all ingredients required by the production plant as well as production capacity. With plans being made across multiple planning horizons from weeks to months ahead of time, this turns everything into a big and impossibly complex puzzle.

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Blending is applicable to a wide variety of processed food products, including (but not limited to):



Processed meat
(e.g. sausages and burger patties)



Dairy products
(e.g. various milk products, butter, yogurt and cheese)



Various beverages
(e.g. fruit juice, coffee, carbonated beverages, alcoholic beverages and more)



Baked goods
(e.g. bread, cakes and pastries)



Breakfast cereals
(including instant oatmeal)



Packaged snacks
(e.g. chips, cookies, snack bars, candy, chocolate and more)



Instant food
(e.g. baby food, condensed soup, instant noodles, frozen meals and more)



Ingredients
(e.g. flour, oils, milk powder, fats, starch and sugar syrup)

With advanced optimization technology, food manufacturers can cut the time needed to perform complex calculations from days to just seconds. This can also help them tackle other major challenges, such as:

- 1 Varying customer demand
- 2 Volatile supply
- 3 Many SKUs
- 4 Traceability challenges
- 5 Commodities impacted by climatic and geopolitical events
- 6 Recipe complexity
- 7 Production bottlenecks
- 8 Shelf life constraints

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THE EXPONENTIAL INCREASE IN COMPLEXITY FROM BLEND OPTIMIZATION

When formulating ingredient quantities between limits, the number of possible recipes multiply rapidly, raising the complexity of the calculation to an impossible level. Additionally, ingredient pricing is only one factor in the complex blending equation. The availability (or lack thereof) of certain ingredients from suppliers can add further complexity to the equation, and this variable can change over time, making it necessary for planners to adjust the blend accordingly whenever the situation changes.

There are many other factors and questions that need to be taken into consideration during the planning process:

- ✓ **How much raw material to purchase?**
- ✓ **How much raw material to keep in inventory?**
- ✓ **How much raw material to process?**
- ✓ **Food safety constraints**
- ✓ **Which suppliers to source from?**
- ✓ **Transportation and logistics?**
- ✓ **Batch mix composition and production quantity?**

With so many variables and constraints to consider, the reality is that the process of identifying the best blend is far too complex to be worked out by a human planner equipped with just a spreadsheet and their own wits. This is where optimization technology comes into the picture, providing food manufacturers with the support they need to make the best decisions in blending within the context of their end-to-end supply chain.

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AN INTEGRATED SOLUTION TO OPTIMIZE FOOD PRODUCTION

DELMIA Quintiq equips food companies with the capabilities to make the right choices and enable optimized decision support in blending and formulation. The solution takes into account all business rules, industry regulations, raw material constraints and more to help companies identify—out of millions of possibilities—the right blend that aligns with company KPIs such as:

As a single integrated solution, DELMIA Quintiq can effectively replace manual and legacy formulation systems, material forecasting workbooks and countless spreadsheets. The powerful optimization capabilities cut the planning time from days to just minutes, allowing planners more time to use their expertise to focus on disruptions. By evaluating millions of different scenarios for blend optimization and recommending the best one, DELMIA Quintiq helps food manufacturers to make the best decisions and drive significant improvements in production, in line with operational and business goals.

Business value unlocked through blend optimization:

- ✔ More accurate forecasts on raw material pricing for improved sourcing decisions
- ✔ Faster decision-making that considers all business rules, regulations and constraints
- ✔ Identify opportunities for significant savings by choosing the best blend



Cost efficiency



Profitability



Product quality



Sustainability

(ethical sourcing, responsible production, reduction of food waste)

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THE PATH TO FOOD SUPPLY CHAIN SYNCHRONIZATION

Blending is only one of the many complexities that food manufacturers deal with, and many companies rely on DELMIA Quintiq for not just their blending optimization needs, but also other aspects of supply chain and production planning to drive excellence across their global operations.

For true end-to-end supply chain synchronization, manufacturers have an opportunity to transform their operations by implementing the wider DELMIA portfolio of solutions, which can help with everything from integrated business planning to production planning and distribution. As a single source of truth, DELMIA helps manufacturers streamline their operations through full integration with other systems, including manufacturing operations management.



Integrated

Fully integrated analytics applications, serving as a single source of truth for all information, including data on supply and demand, shop floor activities, warehouse data and more.



Collaboration

DELMIA creates opportunities for more efficient collaboration between departments—eliminating operational silos—as well as across remote teams.



Simulation

Simulate 'what-if' scenarios in business and operations to make optimized decisions that will yield the best results in line with company goals for profit and sustainability.



Operations Management

Have end-to-end visibility from upstream and primary distribution to production operations, scheduling and inventory management for improved control over the whole supply chain.



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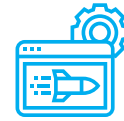
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Unlock business value across the entire food supply chain:



Shorter planning times that yield better results



Business agility from accurate forecasts on supply and demand



Improved supply chain resiliency and business continuity by working around supply shortages



Just-in-time inventory management for cost savings



End-to-end visibility and control over plant operations



Streamlined supply chain operations for improved production yield and minimal wastage



Optimized decision-making in line with business KPIs for profit and sustainability

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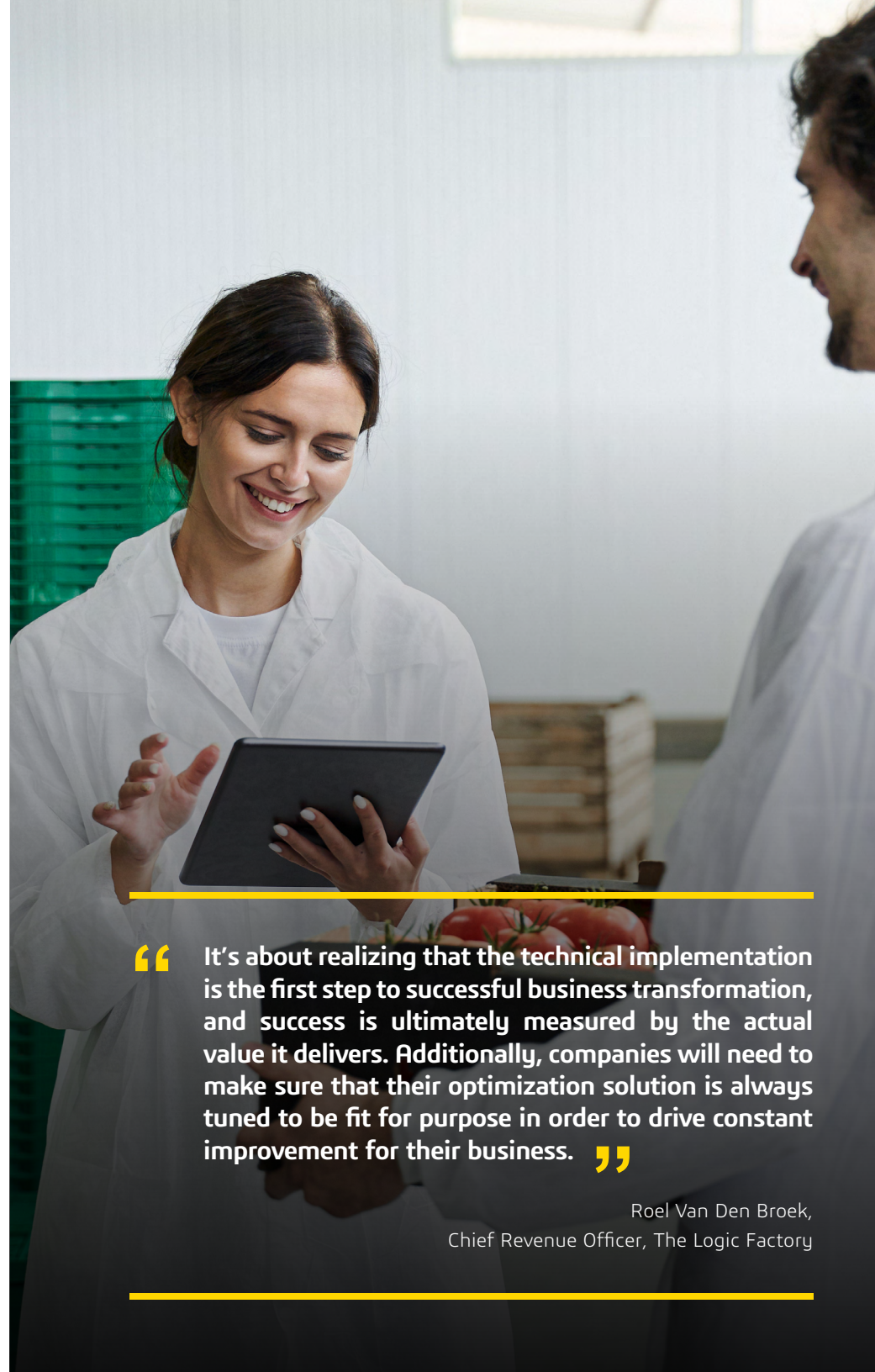
While disruption will continue to have significant impact on the global food manufacturing industry, agile companies equipped with the correct planning tools and processes can not only adapt to disruption, but even improve their supply chain and operational efficiency.

Blend optimization is proven to be a valuable strategy in helping food companies to drive significant savings in production time and cost, but it is impossible to execute with legacy formulation systems and processes. Food companies have an urgent need to embrace digital transformation so they can drive more effective planning and unlock greater business value.

DELMIA Quintiq has the technology and capabilities to help food manufacturers realize their vision of digital transformation to drive excellence in operations and supply chain. Powerful optimization technology helps planners to perform highly complex calculations within numerous rules and constraints at the touch of a button—to identify the best blend that meets company KPIs for quality, cost efficiency, profitability and sustainability.

As a holistic integrated solution, DELMIA Quintiq also creates business value for food manufacturers in integrated business planning and supply chain planning and optimization. Users can perform or evaluate scenarios to support decision making and enhance collaboration between departments and remote teams across global operations. The highly connected and collaborative environment fostered in companies that leverage DELMIA; drives end-to-end visibility over global operations and supply chain, giving them the power to optimize and achieve synchronization across their value network for significant ROI.

Witness the full discussion between our experts on blending optimization and food manufacturing planning by watching our on-demand webinar with Kraft Heinz, *Make It Happen for Food Production Planning Excellence.*



“ It’s about realizing that the technical implementation is the first step to successful business transformation, and success is ultimately measured by the actual value it delivers. Additionally, companies will need to make sure that their optimization solution is always tuned to be fit for purpose in order to drive constant improvement for their business. ”

Roel Van Den Broek,
Chief Revenue Officer, The Logic Factory

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Dassault Systèmes' DELMIA, powered by the **3DEXPERIENCE** platform, helps industries and service providers connect the virtual and real worlds of value networks to collaborate, model, optimize and perform. DELMIA provides solutions to leverage the virtual world of modeling and simulation with the real world of operations to provide a complete solution to value network stakeholders from suppliers to manufacturers, logistics and transportation providers, as well as service operators and the workforce. Through the full suite of solutions, food and beverage companies can equip themselves with additional capabilities such as Integrated Business Planning, Sales & Operations Planning (S&OP), Master Production Scheduling (MPS), Detailed Scheduling, Augmented Reality and Production Execution to drive supply chain excellence.



The Logic Factory (TLF) helps customers make lasting performance improvements in their supply chain by delivering high-end planning, scheduling and optimization solutions for manufacturing, logistics and workforce. TLF believes in building long-term relationships based on mutual trust—as a valuable partner that supports your business growth. A certified DELMIA Quintiq Platinum Partner, they excel in executing, hosting and supporting customers in a broad range of industries including Food & Beverage, Retail, Logistics, Aviation, as well as Agriculture & Commodities.

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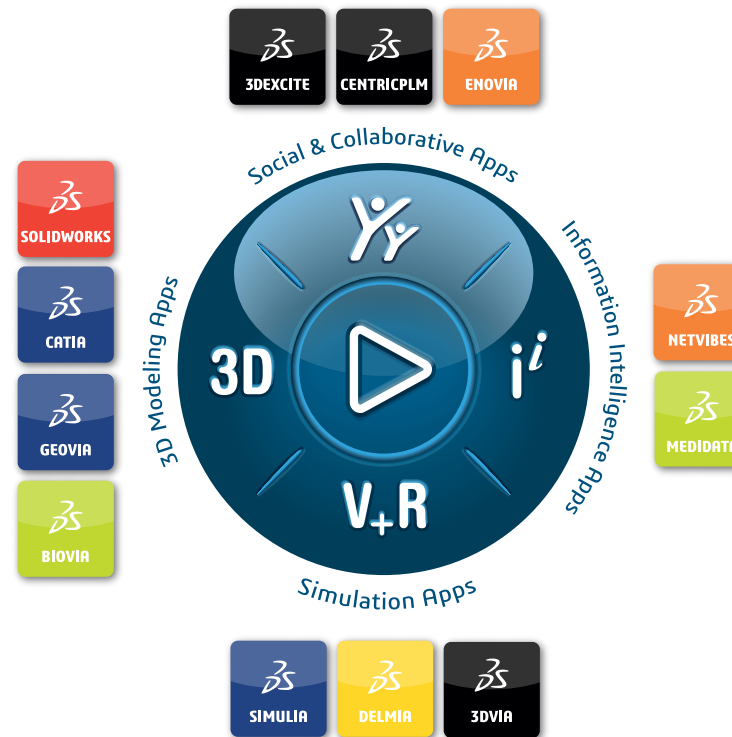
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Our **3DEXPERIENCE**® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com.



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