COMMENTARY

CIMdata®

Enabling Integrated Product Development for the Process Industry

SAP's Next Generation Specification & Formulation Solution

Takeaways

Formulated products are found in all aspects of daily life. They include food and beverage items, grocery store goods, restaurant meals, cosmetics, personal care products, pharmaceuticals, as well as materials used in manufactured items, such as plastics, paints, coatings, and resins.

Spreadsheets and documents are still widely used to define formulated products. However, sophisticated companies have been leveraging PLM solutions for years to gain a competitive advantage by effectively managing product information.

SAP recently released new specification and formulation management capabilities as part of the SAP Integrated Product Development solution within their SAP Business Technology Platform.

SAP's new capabilities enable the creation of formula and specification driven products and in addition to combined products that have both discrete and process items.

SAP's specification and formulation management capabilities enable process industry customers to create digital threads that span from customer requirements through product development into manufacturing thereby ensuring data integrity and traceability while improving business performance.

Introduction

Formulated and specification driven products (i.e., process industry products) are everywhere. They include food and beverage items and personal care products, through pharmaceuticals, chemicals, and materials used in durable goods such as plastics, rubber, paints, coatings, and resins, to name a few. The main business challenge process industry manufacturers face is to develop compliant and profitable products that meet or exceed customer expectations.[1]

Formulated products require both formula and specification capabilities. Formulas are used to capture and manage the substances, ingredients, and process steps used to define the formulas and recipes required to produce and deliver products to market. Specifications are used to effectively manage product data information for all product dimensions using properties and compositions. Historically, these critical capabilities have been document-driven; spreadsheets have been used for decades to

[1] Research for this paper was partially supported by SAP

develop formulas and recipes, and PDF documents have been used to deliver specifications that have been created in various office automation tools. Initially, this traditional approach is relatively easy to manage. It's simple for people to create and consume data in spreadsheets, and also to develop individual formulas due to their calculation capabilities, but 'this simple approach has drawbacks. Mainly, a spreadsheet solution doesn't scale, its calculations are difficult to validate, and it cannot be integrated to the end-to-end product lifecycle process. When the volume of information and the number of products and variants grow, managing the data, the calculations, and all changes to them become overwhelming. To be able to produce the recipe, it must be handed over to manufacturing and transformed into a bill of material, which should be an integrated process to avoid the errors that come with each disruptive and manual procedure.

Managing change is a critical capability all companies need for efficiency, traceability, and compliance. Within formulated products, there are often many variants. Formulas can vary by country (e.g., to support different regulations and consumer preferences), manufacturing plant, batch size, customer, etc. Packaging, and especially labels, vary for the same reasons but also to support marketing and promotion. For example, a package may have a different color or "new" label to attract attention. Each color or "new" label adds a packaging variant increasing design and production complexity.

When using a document driven approach, data is often created by copying or "save-as" thus creating a new file or document. In most companies these derivative documents are linked via tribal knowledge, a fragile internal process, or perhaps by a well-intended but often cumbersome naming and management convention. If anything changes, such as an ingredient, finding all the documents referencing the ingredient can be very difficult. Furthermore, tracking who made a change and who approved it can be difficult unless a workflow system is in place to capture change authorizations and all associated decisions. For products and processes requiring Good Manufacturing Practices (GMP), or the more general GxP framework, both eSignatures and a complete change log in which all relevant changes to e.g., a recipe, are tracked are mandatory.

In a company of any size, there are typically multiple production lines, plants, suppliers, and customers who all need access to the correct version of information. If each stakeholder has a copy of the document, then there are many sources of truth to synchronize, which is prone to error and not scalable.

Fortunately, business solutions are available to address these issues and many more not mentioned. For example, intelligent specification and formulation driven product lifecycle management (PLM) ensure that companies capture, manage, and share data effectively

SAP's Approach for Formulated & Specification Driven Products

SAP has built a strong reputation for providing enterprise solutions tailored to both discrete and process industries on its established Business Technology Platform. When CIMdata attended SAP Connect, we were impressed by SAP's strategic direction, its next-generation product architecture, and the new and user-friendly applications. Notably, SAP's method of linking transactional data with artificial intelligence (AI) helps close longstanding information gaps in business operations. Figure 1 illustrates how SAP's Integrated Product Development (IPD) solution supports and manages the formulated product lifecycle.

SAP Integrated IPD is built on the proven SAP Business Technology Platform (BTP). The benefits of SAP BTP include shared services and a common and robust data model. SAP BTP provides platform services such as security, workflow, AI, integration, and development tools, and enables capabilities including modern UI/UX, document management, collaboration, and extensions to ERP, manufacturing, and product structures (e.g., BOMs). SAP's AI approach includes Generative AI, and Agents. Common platform services facilitate streamlined process deployment for companies by minimizing integration complexity.

Adoption is further simplified since shared capabilities, such as collaboration features, are accessible to all applications on the platform, including PLM.

The common data model provides a single source of truth for product data, including discrete items, ensuring consistency and accuracy as data can be entered once then referenced by other platform applications and services. By referencing data, it is easier to collaborate and be confident that the data is current and accurate, which enables faster, more confident decisions. Knowledge and insights are easier for AI to derive as the relationships between data are well understood across the platform.

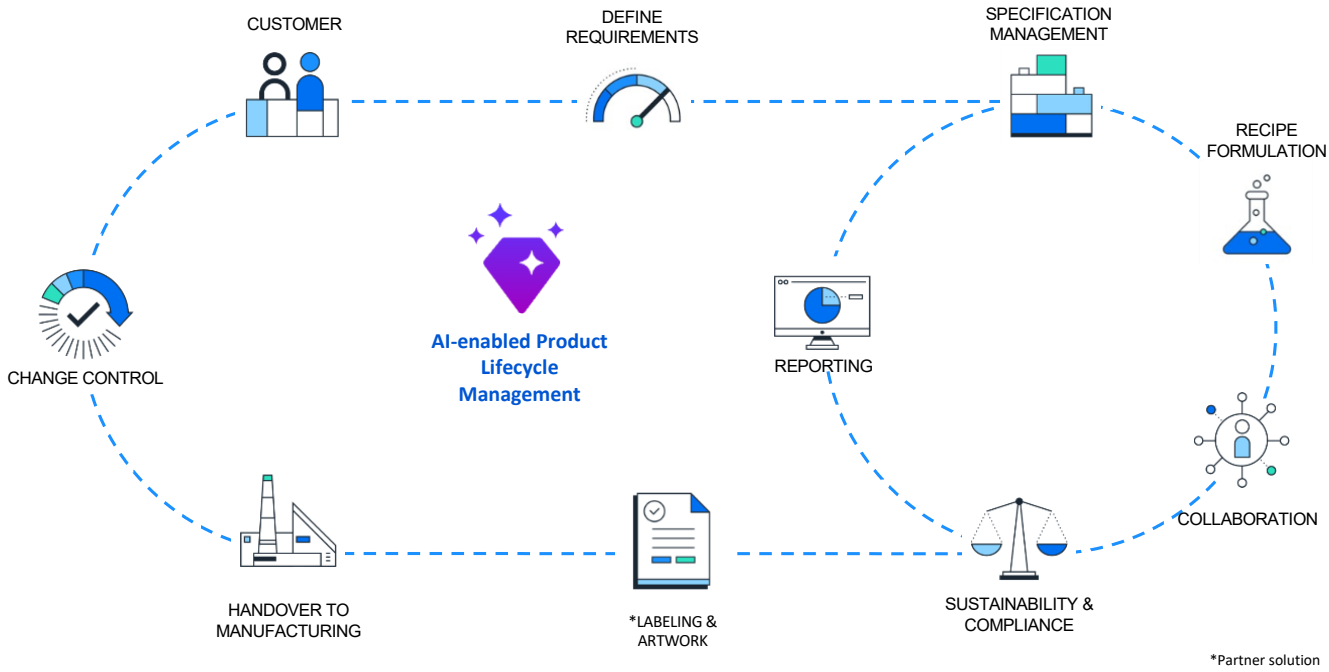

Figure 1: SAP's AI-Based Product Lifecycle Management for Formulated and Specification Driven Products
(Courtesy of SAP)

SAP's Specification Management solution manages detailed data for substances, ingredients, and packaging. The data is available for consumption across the lifecycle. Notable features include:

- Specification Inheritance creates dynamic parent-child links for shared data across variants, streamlining maintenance and ensuring traceability
- Property and attribute as well as AI-driven search
- Maintain and manage compliance relevant data for ingredients and substances
- Associated content and document management
- Sharable content with suppliers and customers via collaboration
- Data viewing that is configurable to specific personas, e.g., developer, purchasing, and manufacturing
- Specification comparison makes it easy for developers to see differences and similarities among two or more specifications

SAP's Recipe Formulation solution serves as the centralized intelligence of SAP's process. PLM enables data-driven recipe development. By digitizing and governing every formulated product, it provides a single source of truth that allows organizations to innovate at scale using integrated, enterprise-grade capabilities. Notable features include:

- Builds on and is tightly integrated with Specification Management and the rest of SAP IPD

- Full transparency of recipes including ingredients, compositions, nutrients, potential allergens; and the possibility to include a thumbnail image
- Hierarchical formula management including the ability to add secondary output and balancing items
- Optionally, processing instructions can be integrated directly in a formula
- Integrated and configurable calculations to enable proprietary processes
- Contribution View enables instant visualization of how individual formula calculations and composition items contribute to or impact the final primary output/recipe result
- Recipe comparison enables visual identification of changes
- Scale-up tools to facilitate transforming recipes from the lab to production volumes
- Handover to manufacturing for MBOM via SAP IPD enables end-to-end integration

SAP's integrated approach, as highlighted in their latest generation of easy-to-use specification management and recipe formulation solutions within the IPD platform, exemplifies how technology can address the challenges of change control, data duplication, and traceability. By providing a unified platform for managing both specifications and formulations, SAP enables process industry leaders to transform complexity into competitive advantage, ensuring that innovation, flexibility, optimization, and compliance go hand in hand.

Ultimately, the integration of specification and formulation management is not just a technical necessity; it is a strategic imperative for any organization seeking to thrive in today's fast-paced, regulated markets. Together, SAP's capabilities form the backbone of resilient, future-ready product development strategies.

Conclusion

Transitioning from fragmented, manual workflows to SAP's integrated digital thread is essential for process manufacturers navigating today's regulatory and competitive demands. By unifying Specification Management and Recipe Formulation within SAP Integrated Product Development on the SAP Business Technology Platform, SAP eliminates risks from tribal knowledge and spreadsheets, replacing them with a scalable single source of truth grounded in governed technical specifications. This enables R&D teams to optimize recipes in real time for cost, sustainability, and compliance.

SAP's seamless integration of Generative AI (i.e., SAP Joule) and Agents empowers organizations to extract deeper insights, automate decisions, and scale efficiently while staying agile. Furthermore, the easy-to-use UI and the AI capabilities enable non-experts to make better decisions to improve business performance.

For process industries, SAP IPD delivers end-to-end traceability and efficiency through features like specification inheritance, AI-driven tools, maintaining compliance data, recipe/specification comparison, scale-up capabilities, and smooth manufacturing handover—transforming complex formulation development into a governed, data-driven process that turns challenges into competitive advantages.

Organizations must act now to modernize their product lifecycle: outdated silos hinder innovation and compliance in regulated markets. Contact your SAP representative to explore how the latest specification and formulation solutions can enable compliant, profitable, and future-ready formulated products.

About CIMdata

CIMdata, a global strategic management consulting firm, provides services designed to maximize an enterprise's ability to design, deliver, and support innovative products and services. For more than forty years, CIMdata has provided industrial organizations, providers of digital technologies and services, and investment firms with world-class insight, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) topics and the digital transformation they enable. CIMdata also offers research, subscription services, publications, and education through certificate programs and international conferences. To learn more, visit www.CIMdata.com or email info@CIMdata.com.