HOW PRODUCT LIFECYCLE MANAGEMENT can help your business

by Hank Hogan

THE WAY GEORGE YOUNG SEES IT, TURNING A PROFIT IN THE chemical industry will increasingly benefit from managing products from conception to death or, in industry jargon, product lifecycle management (PLM). Young is CEO of Kalpyso LP, an innovation consulting firm in Beachwood, Ohio. The advent of tools written in ways that make sense to chemical formulators and a better business climate for the deployment of such tools are the reasons why there is a growing use for PLM, he says.

"I think you'll see more rapid adoption of it, as the industry, I think, has more appetite for capital spending, more appetite for building more innovative solutions."

PLM can be a single program or a collection of software, as well as working methods. Together, these can address either single stages of the lifecycle, connect different tasks or manage the whole process. PLM is the creation and central management of all product data and the technology used to access this knowledge. Thus, it should be viewed as a software technology and management techniques serving a business strategy.

PLM can help an additive or lube formulator to develop the least costly formulation by reducing the number of times the chemical wheel is reinvented. It can also help reduce response time to customer requests by enabling formulators to easily access previous research and results. One big advantage of PLM is its ability to search through old data more quickly and thoroughly.

From his experience, the payback for implementing a PLM system usually runs less than two years, Young says.

Many chemical companies use some form of PLM, with most doing so at a basic level. Some implementations can be robust. Specialty chemical companies, especially those that focus more on selling solutions, tend to go for a more robust system than commodity chemical producers.

Knowledge workers in chemical industries typically are involved in formulating products. They tailor them to meet cost constraints and to be manufacturable using available production tools. Formulated products have to comply with the appropriate regulations as well. PLM can help meet these requirements, because it ensures full traceability of materials in any formulation, from the supplier to the application.

PLM can also reduce overall delivered cost because the tools can enable the examination of all possible formulations. The one that yields the highest profit margins can then be selected.

This approach can not only save money, but it can actually win business, particularly when the speed with which a formulator responds to the request is critical.

"The first person to meet the performance specification of the customer often wins," Young says

Despite all of these advantages, robust PLM systems have not been widely adopted by chemical companies. Some of the reasons are financial, but others are technical. With regard to the latter, one of the issues is that PLM methods and tools have often seemed more suited to discrete manufacturing, such as the assembly of an airplane from parts. PLM's roots can be traced back to the automobile industry.

But that is changing with the advent of tools that speak the language of chemical companies. Infor, which is based in Alpharetta, Georgia, has deep roots in the chemical processing industry. Chemical product development focuses on formulation, specification management and regulatory compliance, says Venkat Rajaji, Infor PLM product manager. Environmental and sustainability issues are becoming more important, he says. Thus, tools that allow the early detection of potential problems have become more critical. With PLM, compliance can be designed right from the start.

"Design for compliance means being able to formulate up front and ensure compliance instead of doing it reactively and managing compliance from a manufacturing perspective. When you do that, the cost of compliance increases, the cost of quality increases and the cost of manufacturing increases," Rajaji says.

In addition to the sustainability trend, he sees

another. Product lifecycle intelligence means having brand analytics as part of PLM. This could allow discovering why one motor oil formulation sells better at a given location than another, for example. Understanding this situation is important when trying to sell a premium product, such as synthetic lubricants. Having better knowledge of what works—and what doesn't—in marketing to consumers could help companies improve their product development process.

Aras, in Andover, Massachusetts, is another PLM provider. The company bases its software on an enterprise open source solution, which eliminates licensing fees. The company's products have modules suitable for chemical processing as well.

Like other PLM vendors, Aras sees sustainability as a clear market driver for PLM, says Senior Vice President for Global Marketing Marc Lind. Environmental regulations vary by region, thus, a given product may have a different compliance status in every country. PLM can accurately account for this complexity and do so in a flexible way.

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Thiele

"Even when the product lifecycle model is represented accurately today, there will be ongoing changes in your markets which the PLM solution must be adapted quickly to address for both compliance reasons and consumer demands," Lind says.

Of course, like any model, what comes out of product lifecycle management is only as good as what goes in. Because regulatory compliance is such a large part of the chemical business, the environmental impact of a formulation is important.

However, it's not always easy to figure out exactly what that impact is. What seems to be obviously right may, in fact, be wrong.

Take the case of residual chlorine in lubricants, which had been set at 50 milligrams per kilogram (mg/kg) by several vehicle OEMs for factory-fill and service-fill. The toxicity of the chlorine and the dioxins that chlorine creates are the reason for such limits, says Terry Thiele, sustainable products strategies director for Wickliffe, Ohio-based Lubrizol Corp.

But the reality is that the chlorine in the lubricant is not a problem, Thiele says. The levels are simply too low to produce much toxicity. Instead, what happens is that other effects dominate, in particular the fact that lubricants with higher levels of chlorine also contribute to lower fuel consumption. That results in a completely different outcome than expected when oils of two different chlorine levels—50 and 125 mg/kg—were compared in studies.

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It took years to get these results accepted, he says.

In another instance, it may seem obvious that lengthening drain intervals would diminish any adverse environmental impact because less oil would go into the waste stream. Therefore, formulations with longer drain intervals would seem to be highly desirable. However, lubricant degrades with time and miles driven, which can ultimately hurt fuel economy. That can trigger another set of compliance issues related to fuel economy.

The above examples illustrate that an environmental burden and the accompanying regulatory compliance can be shifted along a supply chain in ways that are not immediately obvious. Lifecycle assessments can provide key information that can make PLM more accurate and comprehensive.

On the other hand, gathering the required data can be challenging. A formulation may consist of mostly bulk material, such as base stocks in a lubricant formulation. Often, though, there are several components in an additive package, with each component imparting a desired property. Boosting fuel efficiency via the incorporation of chlorine-containing molecules is an example. However, an accurate environmental lifecycle assessment depends a lot on disclosure of data by suppliers. Some additive packages could be protected intellectual property.

Fortunately, that amount of accuracy isn't typically needed in real world situations, says Jon Dettling, U.S. director for Quantis. An environmental lifecycle assessment consultancy, the company is a spin-off of two engineering universities, the École Polytechnique Fédérale de Lausanne in Switzerland and the École Polytechnique de Montréal in Canada.

"You see a lot of people placing too much emphasis on data collection within their own specific supply chain. A lot of times people could address the issue that we want to address without needing that much specific information," Dettling says.

"For many purposes it would be adequate to use industry average data for a lot of the information," he says. Sometimes, this approach is in fact better. Highly specific data is tied to one particular supplier. If the vendor mix changes, then that very exacting data may yield less accurate answers than industry average values would.

Of course, depending on how accurate the assessment needs to be, it may be necessary to have the input data as perfect as possible. One of the benefits of PLM is the ability to determine which variables have an impact on the environment and a product's performance. Typically, only a small fraction of the parameters matter and the ability to identify them is important, says Thiele.

On the matter of separating the important from the unimportant, Thiele says, "The critical exploration is finding the 15%. Using sensitivity will allow you to identify the 85% that you don't have to dot every I and cross every T from a data standpoint because you know it's not going to materially impact the output."