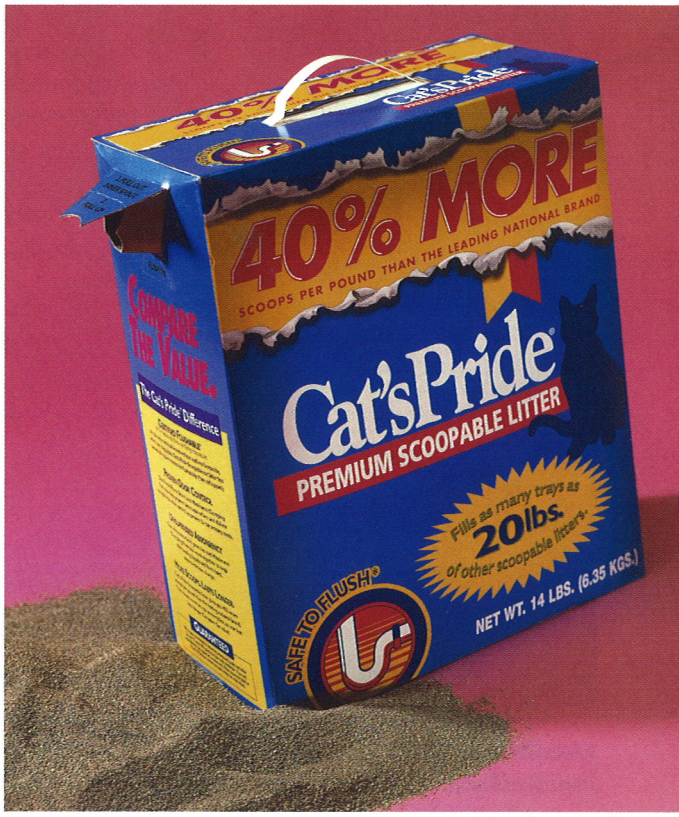
packaging digest®

Strategic testing stops leaky **litter cartons** in their tracks

After receiving reports that its cartons of Cat's Pride cat litter were leaking product on store shelves, Oil-Dri Corp. employed multivariable testing methods to fine-tune a finicky production process, eliminating problems with insufficient sealing.

After glue is applied via a hot-melt unit attached to a cartoner, carton flaps are closed, and pressure is applied. Through testing, Oil-Dri determined running the machine too slow resulted in glue dripping down the flaps and losing its tackiness, hindering proper sealing.



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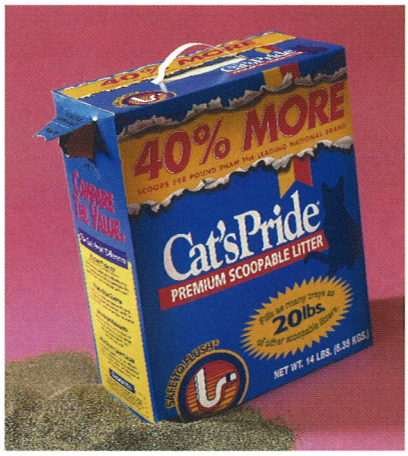
It' s an inescapable fact of the cat-lover's life that once in the litter box, cat litter does not often remain there. One particularly swift and hardy thrust of Fluffy's back leg, and the sand-like, scoopable grains inevitably find their way next to the box or across the room, to be tracked though the house. But, while cat litter consumers may be resigned to cleaning stray sprays of powder once the product has been poured from its original packaging, they do not appreciate lugging leaky cartons home from store shelves. Unfortunately, such was the case for consumers of Cat's Pride scoopable litter from Oil-Dri Corp., after the company changed its packaging from plastic jugs to paperboard cartons in the spring of '99.

Relative newcomers to the carton-sealing process, Oil-Dri found that while end-of-the-line tests indicated that filled cartons were sufficiently sealed before they were shipped to distributors nationwide, consumers' experiences told another tale. "We had consumers picking the cartons up off the store shelf and putting them down on the conveyor belt at the checkout counter, and having the litter leak all over the conveyor," relates Kelly McGrail, vice president of corporate communications for Oil-Dri. "It was

a huge quality issue."

After exhaustive testing and tweaking of equipment and



materials at Oil-Dri's production facilities failed to remedy the sealing issue, the company turned to QualPro, Inc., a consulting firm from Knoxville, TN. QualPro brought to the table a rigorous method of evaluation known as multivariable testing (MVT), which, explains Tom Cofsky, vice president of manufacturing and logistics for Oil-Dri, "involves letting statistical thinking drive the decision-making process." Using this methodology, QualPro not only discovered how to solve the sealing dilemma, but it also allowed Oil-Dri to increase its line speed by 35 percent and save up to $125,000/year in glue costs.

The Cat's Pride advantage

Established in 1941 as a distributor of industrial floor absorbent, Oil-Dri has grown to a $175-million, multinational company that mines, processes and packages clay-based products for a range of markets. Four major divisions—Consumer Products, Specialty Products, Crop Production and Horticultural Products, and Industrial & Automotive Products—process and ship a total of more than one million tons of product annually to more than 50 countries. With a more than 25-percent market share in the cat litter arena, Oil-Dri is the largest manufacturer of the product in the world, turning out its own brand, Cat's Pride, as well as manufacturing litter for private-label use and for other marketers, such as Church & Dwight and The Clorox Co.

What makes Oil-Dri's litter product the cat's meow, explains McGrail, is a proprietary formula that takes advantage of the lighter density and absorptive qualities of its clay. In Cat's Pride Scoopable, this results in 40-percent more clay per package as compared to competitive brands using heavier, sodium-bentonite-based clays. Capitalizing on this feature, Oil-Dri utilizes a bright-yellow banner, or "a billboard effect," across its packaging with bold black type highlighting the "40% more" advantage. A package redesign from plastic jugs to cartons in '99 sought to increase the impact of the billboard effect with a larger-size package.

"If you put our carton next to the competitor's on the store shelf, and you have five pounds of same, our package is bigger and it has the '40% more' banner across the carton," says McGrail.

Brands affected by the repackaging included Cat's Pride Scoopable, Cat's Pride MultiCat, and Scoop N' Flush, a specialty, paper-based product. Each of the varieties is offered in five carton sizes: 7-, 14-, 20- and 22-lb cartons for grocery retail environments, and a 28-lb size for mass merchandisers.

The new packaging format also increased the efficiency of the company's manufacturing operations, as the cartons allowed for quicker product processing. To accommodate the new cartons, Oil-Dri invested $1.2 million in two carton-filling and sealing lines, along with the necessary conveying equipment, for its Blue Mountain, MS, and Ochlocknee, GA, cat-litter facilities. Two identical carton fillers, both VCL-1500 units from Triangle Package Machinery, equipped with Nordson Series 3800 hot melt units, made up the bulk of the investment.

Coming unglued

Despite an impressive equipment lineup, Oil-Dri soon found that carton filling was not its strong suit. Says Cofsky, "We're a manufacturer. Historically, where packaging was concerned, the company had been involved primarily in filling bags, and to some extent, jugs. Carton filling was new to Oil-Dri."

Although the company experienced success with the smaller-size cartons, larger cartons proved more of a problem. According to Cofsky, success was first measured by the company in terms of the efficiency of machine operation, the amount of cartons run and uptime on the machine. Using the second barometer of success—the quality of the package as determined by the customer—Oil-Dri's new format was increasingly under attack, with inconsistent box seals and leaking boxes littering the marketplace.

The reason the poorly sealed cartons were literally slipping through the manufacturer's quality control cracks, explains Cofsky, was that the methodology used to determine whether the cartons were sealed was flawed. "We had a method of measuring whether the cartons were sealed, but that method was not representative of what would

happen on the store shelf." In fact, according to a limited survey of in-store box quality on selected carton sizes, 30 to 45 percent of cartons were found to be insufficiently sealed.

Furthermore, leakage was not detected until the cartons had made their way out into the marketplace. It was during shipping, Cofsky surmises, that the sand-like product would work its way through the channels formed by the glue beads on the carton flap.

With serious complaints streaming from its second-largest customer, Oil-Dri was frantic for a solution. Says Travis Yancey, assistant plant manager, "We always had a machine that was capable of the process, but we just didn't have the proper settings or the proper knowledge to seal the cartons sufficiently." Advice was sought from all corners of the operation—from marketing to manufacturing staff—as well as from suppliers, and everything from the packaging itself to the machine operation was modified. Says Cofsky, "We were good at changing, but pretty poor at making changes, and even though everyone wanted to make it happen, we couldn't get there."

Frustrated and desperate, Oil-Dri contacted QualPro, which focuses on process improvements through MVT, to "raise the bar on quality" and develop "a whole new way of handling things," says Cofsky. QualPro was charged with three tasks: to reduce the incidence of leaking boxes, to improve the efficiency of machine operation and to decrease carton waste.

MVT in action

Jim Villanueva, account director for QualPro, was summoned to Oil-Dri's Blue Mountain facility just before Christmas '99, and worked alongside the staff through the holiday season to solve what he deemed "a serious problem." Central to Oil-Dri's failure to solve its gluing problems, he says, was the lack of a "disciplined, problem-solving approach that was data-based."

After being sealed, cartons leave the cartoner via conveyor.

"They had worked and worked, and they had done a little of this and a little of that," he recalls. "And, they may even have made a little progress at times, but their lack of skill in gathering the appropriate data made it difficult for them to understand whether they had made progress and then to maintain some steady slope of improvement."

First, a method was introduced to more accurately evaluate carton seals at the end of the line that was based on the fiber-tearing bond of each of the carton flap's glue beads. The test package used throughout all experiments was the 28-lb size, made from .038 clay-coated recycled paperboard with a B-flute corrugated liner, supplied by Jefferson Smurfit. Analyzing the carton via the new technique, Villanueva determined that Oil-Dri was achieving only a 50- to 60-percent sealing rate.

Brainstorming by Oil-Dri employees on the areas to be tested came next. Eleven variables were chosen that Cofsky says centered on several key themes and areas. These comprised the method of glue application, such as glue temperature and pressure; the operational parameters, such as the speed the cartons moved through the line; the mechanical aspects of the process, including the level of compression on the carton; and some minor carton design modifications.

An initial screening experiment tested all the variables to determine which would positively affect the process. Says Villanueva, "Half of the things people are convinced will help them will not make any difference, and twenty-five percent will hurt them. So, it's only twenty-five percent of the variables that will have a positive impact." A

professional statistician from QualPro then digested the test results, using them to design further, more refined experiments on just three variables, each of which were tested at plus and minus conditions.

Says Cofsky, "All the while, you're implementing changes, and you're very closely monitoring your process and the results, based on what you're attempting to achieve."

Adds Kelly McGrail, "The refining process also helps you to optimize the relationship between those top three variables. So, in addition to knowing that those three things work to your advantage, the process helps you determine how to optimize the advantage of each one as it relates to the other."

Pleasantly surprising results

Not surprising to Villanueva, who says he's used to results that are counterintuitive, testing showed that by getting to the appropriate glue pressure and temperature, and by reducing the amount of glue used by 40 percent, Oil-Dri could achieve a sealing rate of approximately 99 percent. An additional boon for Oil-Dri, the results also showed that speeding up the line improved glue adhesion, and the company was able to increase its production rate by 35 percent, from 22 to 30 cartons/min.

In addition to meeting the three main tasks set forth by Oil-Dri, including presenting a consumer package that was of the highest quality, as well as saving the company a whopping $125,000 per year on glue costs, QualPro also initiated some less-tangible benefits, as well. Says Cofsky, "The impact of the process on employees was huge. Upon testing their ideas, we found that certain ones were very important. They saw their ideas implemented, and they saw us make positive progress. The impact on their morale was tremendous."

The experience also planted the seeds for a continuous statistical process control (SPC) system, as well as for the implementation of proper setup and operating procedures. Notes Yancey, "We increased our awareness that our decisions must be based on data. We learned that years of experience are very helpful, but we must use our data to make strategic decisions. We also learned that data doesn't make mistakes, even on a bad day."