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# Food and Fuel Technology Bundle

**Two years ago, ICM Inc. began a project to integrate a 40 MMgy ethanol plant with an existing food-processing facility. The same engineering firm that standardized the dry-grind ethanol plant design now prepares to deploy its latest technology package—and dry fractionation is just the beginning.**

By Ron Kotrba

LifeLine Foods produces corn meal and snack grits for chip makers like Frito-Lay.

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Ethanol producers know how ridiculous the food-versus-fuel debate is, considering a third of the incoming corn they process goes out the back door as animal feed for cows, pigs and chickens. Do the mainstream media know these cows and chickens are raised to be eaten by humans, making them food? If the notion of "fuel and feed-for-food production" isn't clear enough ICM Inc., a leader in dry-grind U.S. ethanol plant process design, is doing its part to clarify any confusion. It's not doing this as charity to the industry though.

Not long ago ICM downsized by 105 employees, a striking impact of the industry's slowdown. At the May 2008 Distillers Grains Technology Council symposium in Kansas City, Mo., Dennis Vander Griend, the brother of ICM's Chief Executive Officer Dave Vander Griend, said very clearly "We're looking for work." He meant that the the building bubble of 2005-2006 had burst and ICM needed to roll out its next successful design—the food-and-fuel technology package that it's calling the TKO process. According to Dave Vander Griend, TKO stands for total kernel optimization, the trademarked name for ICM's new food and fuel technology package.

ICM officially unveiled TKO in Nashville, Tenn., at the International Fuel Ethanol Workshop & Expo in mid-June, where the company hosted meetings with 28 private ethanol plants wishing to learn more. "From those, we received seven letters of interest," Vander Griend says. "Now we're going to the next level with those plants to look specifically at what makes the most sense for those facilities." The company calls dry fractionation the "key facilitator" to its new technology bundle of varying fashions.



**Part One: Dry Fractionation**

The TKO display model is in St. Joseph, Mo., where more than two years ago ICM bought 49 percent of a food-processing cooperative called LifeLine Foods, and colocated a 40 MMgy ethanol plant on-site. Dry fractionation separates some of the corn starch to produce snack grits and corn meal for companies like Frito-Lay to make its corn chips, and the remainder is diverted to industrial ethanol processing. According to Jeff Scharping with ICM product development, who gave a presentation at the DGTC symposium, the St. Joseph plant also sells its germ to Cargill Inc. for $350 a ton, and Tyson is purchasing the low-germ, low-fiber distillers grains for $225 a ton (May 2008 price). The plant has been in operation for eight months. In that time, Vander Griend says, "We've been determining the life cycle of the equipment—the reliability, performance and the efficiency of the dry fractionation portion—and we now have that information, and we're comfortable with it. We're comfortable enough to say we've done enough research and monitoring to take it to market."

The National Corn-to-Ethanol Research Center receives endosperm samples from the ICM dry fractionation process, and an NCERC researcher during this year's 2008 DGTC conference said there are variations, which was cause for concern. Dennis Vander Griend responded, saying there is still work to accomplish in quality control. When EPM asked Dave Vander Griend about this, his response was "You will always have a wide variation in starch based on the particular hybrid—the type of corn being grown. That won't change. The ability to understand it with infrared technology and such that both Monsanto and DuPont have come out with, the ability to understand the different varieties and different oil, starch and protein concentrations, will allow for selection and compensation to the farmer—but it's not something we're doing today."

The LifeLine project converted a food-processing facility to house an ethanol plant. With its operating experience there, ICM now seeks to replicate the success by outfitting existing fuel-grade ethanol plants with dry fractionation technology meeting (food-grade standards). "What we're trying to do in our front-end fractionation technology is to maintain AIV standards—food-grade standards—so options are not limited down the road; so the plant can go food grade if, say, its location is right and the marketing opportunities at the particular site would allow production of a coproduct for sale to a food processor in the area," Vander Griend says. "If the plant has the cleaning and separation equipment and everything else, they can pull off a stream of corn grits or meal for that purpose. If you've got a food-grade front end, you'd have that opportunity. We're trying to keep the most options open to our customers."

**Subsequent Pieces to the Technology Package**

There are advantages available beyond new food processing capabilities through dry fractionation, ICM says. “A guaranteed increase in ethanol production capacity; reduced natural gas consumption; decreased enzyme usage; a platform for emerging technologies; and a bridge to cellulosic ethanol,” according to an announcement the company released in June. The increase in ethanol production results from passing only starch through the fermentation tanks instead of whole ground corn. Scharping said a 100 MMgy to 115 MMgy ICM ethanol plant when outfitted with dry fractionation, could produce 130 MMgy. Of course, this necessitates the purchase of more corn.

Reducing natural gas consumption as a result of ICM’s food and fuel technology bundle would largely arise from the installation of a biomass gasifier utilizing the fractionated corn fiber, or hulls, for process steam. “Some will want to take the fiber and put it into cattle feed as a supplement,” Vander Griend says. “But most ethanol plants are located where the grain is—Iowa and Illinois—where there’s not a lot of cattle.” The St. Joseph plant is gasifying its corn hulls, and Bill Tietze with Primenergy, the company that supplied the gasifier for the ICM LifeLine Foods plant, says every hour 14,000 pounds of dry-fractionated separated corn fiber is fed to the Primenergy gasifier, making 60,000 pounds of steam per hour—about half the steam required to operate the plant.

Enzyme reduction work is going extremely well, according to Vander Griend. “We’re looking at different enzyme combinations and cocktails that improve the performance of the plant,” he says. “We’re also continuing to refine the dry frac process to recover more starch,” which would help boost the conversion ratio from 2.67 gallons of ethanol per bushel closer to the 2.8 number ICM guarantees in its dry-grind plant design. Dry fractionation is also a bridge to cellulosic ethanol production from corn fiber—ICM was on the list of companies awarded a “10 percent” cellulosic ethanol demonstration plant award from U.S. DOE—and will support additional and perhaps more imminent emerging technologies.

Today, pilot work moves ahead on ICM’s front-end oil extraction unit supplied by PEX. The PEX unit is being developed for efficient corn oil recovery from the dry fractionated germ. ICM is concurrently conducting pilot work on its single-cell protein system.

“What we’re doing in our pilot work at St. Joseph is taking our syrup product and aerobically growing protein on it,” Vander Griend says. “We’re converting that fiber to a protein so it’s a higher-valued feed product. Rather than selling something that’s currently selling dried at 10 cents a pound in distillers grains, we could be selling it at 25 cents a pound in the form of a protein.”

The process design company is prepared to sign contracts and get the ball rolling on retrofitting dry-grind ethanol plants, whether those facilities were originally ICM-designed or not. The benefit to retrofitting an ICM plant is that the company knows the design intimately, and can therefore integrate the dry fractionation equipment quicker, more easily and for less money. Downtime is virtually nonexistent during the integration period, and can be arranged around planned maintenance shutdowns, the company says. In its dry-grind design Vander Griend says ICM knew its dry fractionation technology would hit the market at some point, so space was reserved at some of the plants in between receiving/storage and the ethanol plant to accommodate any additional buildings and/or equipment. “Somewhere between those two locations you’ll pull the corn off, preprocess it and send the endosperm to the ethanol plant,” he says. Even though this could double the cost of a facility, the revenue stream could triple.

While this food and fuel technology package from ICM appears ideal for plant retrofitting, it is also available for greenfield projects and those partially under construction. “Investors won’t even look at a standard plant in Iowa today,” Scharping said, adding that dry fractionation would be a good way for financiers to differentiate projects from conventional dry-grind plants. It's also ideal for plants that are half-way built but are having trouble with revenue, Scharping said, “Coming back and re-wrapping dry fractionation technology on it may help add new, additional funding to complete the plant.”

*Ron Kotrba is an Ethanol Producer Magazine senior writer. Reach him at rkotrba@bbibiinternational.com or (701) 738-4942.*