

Cradle to Cradle

“All you need to get into the rerefining business is waste oil and money!” says Mark Williams, business development manager at Chemical Engineering Partners. “If you have those two, I can sell you a plant.” Williams’ assertion is backed by 25 years of experience within CEP and its affiliate, California rerefiner Evergreen Oil.

Evergreen was founded in 1982 by Jake Voogd, who envisioned that some day all used motor oil would be reused as base stock instead of being landfilled, incinerated or burned as marine diesel fuel. The first Evergreen used oil rerefinery came online in the northern California city of Newark in 1986, but bringing Voogd’s vision to life was no piece of cake. Early run times lasted only a few weeks before contaminants — heavy metals, additives and sludge — fouled reactors and poisoned catalysts. Voogd poured his energy into finding solutions, and run times lengthened.

By the early ‘90s, Evergreen had achieved run times of 10 to 12 months and 94 percent uptime overall. With the rerefining process nailed down, Evergreen split off CEP in 1993 as a separate company within Evergreen Holdings to market the process technology, while the rest of the company’s activities became today’s Evergreen Oil.

The successful technology encompasses a “front end,” in which separation, distillation and vacuum units remove water, light-end distillate, and a gooey concoction that makes a perfect asphalt extender. Most important, front-end processes “depoison” the oil to protect the catalyst in the “back end” hydrotreater. After hydrotreating, the outcome is a consistent water-white API Group II base oil, high in saturates, with a good viscosity index, virtually free of sulfur, and indistinguishable from virgin base oil.

Evergreen & CEP Span the Used Oil Spectrum



Evergreen's Newark, Calif., rerefinery doubled its base oil capacity last year.

Evergreen was, and still is, the only used oil rerefiner producing Group II base oils in the western United States. In 2010, the company added a second train to the Newark plant, nearly doubling its former capacity of 800 daily barrels.

"With our technology, we can get three quarts of base oil out of every gallon of used oil," Williams says. "You can recycle oil seven times before it's gone. I call it the circle of life."

Headquartered in Irvine, Calif., near Los Angeles, Evergreen sells all its rerefined oil to lubricant blenders. About 20 percent of them use it for green products with "recycled" on the label, while the rest use it interchangeably with virgin oil. Unlike its major competitors — the

plant needed. As capacity grew, the company bought out independent oil collectors, and today Evergreen is the second-largest used oil collector in California.

"This is not a switch you can turn on overnight," says George Lamont, president of CEP and vice president of technology for Evergreen. "About 65 percent of the used oil we collect is from automotive sources like Jiffy Lube and car dealers. Everything is in small lots — maybe 100 gallons at a time.

"A refinery is engineering-centered and capital intensive," he continues. "But for Evergreen Oil, the capital is a truck fleet. We deal with thousands of people and many, many small transactions, and we pay a staggering number

The Evergreen plant now produces two neutral oils, a light grade with a viscosity index of 102 and viscosity of 4.1 to 4.5 centiStoke, and a mid-range oil (7 to 7.4 cSt with a VI. of 107).

"We've been successful in placing all the gallons we make," McNeil says. "We have about 10 to 15 percent that can be sold on the spot market. I think the market for recycled oil is developing. I expect that in six months, maybe 50 percent of our output will be sold outside the state."

Recycling Incentives

Last year, Evergreen was one of many oil companies lobbying for the passage of two energy bills in the U.S. Congress that would have created incentives to build rerefineries, but neither of which passed.

The company was more successful at the state level, supporting California Senate Bill 546. The bill raised payments at used oil drop-off sites to encourage recycling, and also boosted the recycling fee paid by lube manufacturers on sales of new oil in the state, to 26 cents per gallon. (See "California Targets Used Oil" in January's issue.) Part of the revenue collected will go to fund a \$6 million Life Cycle Analysis (LCA) on how best to manage waste oil — should it be incinerated, partially refined for cheap fuel, or hydrotreated and sold as equivalent to new oil?

"The state is asking for stakeholder input," Thad McNeil explains, "and there are a lot of competing opinions. Those who don't hydrotreat are happy if used oil is burned as fuel. API likes the idea that virgin oil is better than rerefined. Our own group, NORA [National Oil Recyclers Association], hasn't been willing to make a statement so far because most members are simply used oil collectors.

"We rerefiners would like to see the LCA state clearly that the highest and best use of waste oil is to rerefine it. We are trying to keep the study from being turned into some kind of fluid economic model with no conclusions."

This is a time when "no conclusion" is not helpful to rerefining interests. And since no existing industry group has come forward to back the rerefin-

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From left, Mark Williams, Thad McNeil, George Lamont and Russell Burbank at Evergreen Holdings headquarters in Irvine, Calif. (Photo by Chris Colthart)

largest of which is Safety-Kleen Corp. — Evergreen does not market finished lubricants under its own brand.

Funding and Feedstock

Building a rerefinery from scratch costs \$30 million to \$50 million, about one-tenth the cost of a virgin base oil refinery, but having the money solves only half the problem. The other half is coming up with feedstock.

At the same time Evergreen built its rerefinery, it acquired a used oil collection company that provided most of what the

of invoices for a company our size. It's a totally different set of problems from operating a refinery."

Evergreen Oil focuses on collecting used transportation lubricants rather than industrial oils, since this is the major market in California. "What you feed into your refinery is what's going to come out," says Thad McNeil, vice president for Evergreen product sales. "We segregate motor oil and transportation products, so we're always on the cusp of newer generation oils. We're now making Group II, and we're skirting Group II+."

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ing viewpoint, McNeil and Evergreen have spearheaded the formation of their own group, the Used Oil Regeneration Institute. It includes five U.S. rerefiners (Evergreen, Safety-Kleen, Heartland, Universal Oil and Bango Oil), plus Newalta in Canada. More politics in the offing!

Meanwhile: "The net effect of SB 546 is that if you sell oil with greater than 70 percent rerefined content, you pay a reduced oil tax, 12 cents instead of 26," McNeil says. "That took a bit of work! We've worked with all the additive companies to get our products approved in their formulations at that 70 percent level, and I believe we've achieved that pretty much across the board." He notes that Evergreen does not get the reduced-fee incentive, but lubricant blenders who buy and sell in California do.

McNeil also notes that California is not the only place encouraging 70 percent recycled content in lubricants; some

municipalities, including New York City, are joining the parade. He foresees the day when recycled oil is its own market segment commanding at least the same price as virgin oil rather than being beat down as a "used" product. "Studies have shown that when the consumer is educated to the benefits of rerefined oil, they will accept it and may even pay slightly more," he says.

Waste and Other Services

While Evergreen is out collecting used oil, it also provides environmental services, which comprise about 25 percent of Evergreen Oil's business. The company operates one of the few permitted hazardous-waste-disposal sites in northern California, where it handles antifreeze, brake fluid, brake filings, filters, oily water, spills, and just about every type of oil-related waste.

Wastewater is a particular focus. Evergreen's wastewater plant treats about 15 million gallons annually, of which 7

million are picked up from more than 5,000 industrial customers by the company's fleet of vacuum trucks.

Russell Burbank, president and CEO of Evergreen Holdings, says, "Environmental services are integral to Evergreen's offerings, so we try to offer a full slate and the consulting help that customers need. The time is really right for this."

Evergreen and CEP have mastered both the technology and the business of taking oil from cradle to cradle. But how to market all this to other potential rerefiners? It actually does take a little more than just money and used oil.

"The infrastructure is very complicated," says Mark Williams. "Where are you getting the used oil? How are you picking it up and getting it to the plant? What are you doing with it now? Who and what are you competing against? Is it being sold as a fuel, and can you get a license to rerefine it? Last year we gave a seminar because so many people really don't understand the process."

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If sufficient used oil is available for rerefining, the quantity, quality and potential for expansion all will determine the size of the plant, particularly the expensive stainless-steel reactors and CEP's proprietary catalyst system for the hydrotreating section.

Is the proposed plant new or an add-on? New plant modules can be constructed in parallel, off-site, and then brought to the site and assembled. Stick-building in place takes longer and costs more, Williams points out.

If the initial evaluation pans out, CEP provides an overall design for the plant based on its proven record at Newark and four other refineries: the 1,000 b/d Wirawasta Gemilang plant in Indonesia; Finland's L&T Recoil (1,150 b/d); the hydrotreating section for Heartland's plant in Columbus, Ohio (1,500 b/d); and Universal Lubricants in Wichita, Kans. (550 b/d).

CEP is currently working on an ambitious plant for Lwart Lubrificantes near

Sao Paulo, Brazil. At approximately 2,500 b/d, this will be the second-largest rerefinery in the Western Hemisphere (after the 4,600 b/d East Chicago, Ind., facility operated by Safety-Kleen) and the first Group II plant in all of Latin America. It is due to stream by the end of this year.

Building Momentum

If a customer wants more than plant design, consulting and performance warranty, CEP teams with Mustang Engineering, a global construction company based in Houston. Lamont says, "The agreement with Mustang allows us to offer project management, procurement, construction management, and even fixed-price contracts. CEP isn't big enough to take on a \$30-to-\$50 million contract, but Mustang does this all the time, and we work as partners. This approach lends itself to overseas customers — it's the normal way to do things in the Middle East."

Evergreen also offers consulting ser-

vices to help customers design and implement their oil collection infrastructure. "Anything we can do to help someone get into rerefining, we'll do," Lamont says.

"We have a process we're very proud of," he continues. "We consider ourselves unique among those selling rerefining technology because we have our own plant and our own collection network, we've proven our process, and we're in the recycling business."

"Consumers should demand that waste oil is recycled," Russ Burbank adds, "and they should look for the word 'recycled' on the can of oil they buy. Today only a small percentage of used oil goes back to its original purpose as a base oil, but this is the most environmentally sound disposition in terms of energy consumption and emissions."

Thad McNeil sums up: "I think we're on the front end of the wave. And we're positioned to ride the crest. Jake Voogd's vision from the early '80s is now coming to fruition." ■



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