Reprinted from
e-scrapnews
www.e-scrapnews.com

Simplifying the process

by Jerry Powell and Kim Holmes

Can plastics from obsolete electronics be recycled unsorted? A European firm soon will enter the U.S. market with a unique plastics reclamation technology.

Plastinum's multi-stage cleaning system.

Extrusion of the company's unique composite resin.

Much of the expense associated with processing and recycling e-plastics (scrap plastics from obsolete electronics) is the technology and processes that go into sorting the many different resin types. Furthermore, in cases where the technology and equipment are lacking, the labor costs can be equally high. For this reason, much of the e-plastics captured around the world end up in China, where the material can be sorted, by hand, relatively inexpensively. What if the costly equipment or labor costs associated with sorting e-plastics were eliminated?

After many years of technology development, just such a process is heading to the U.S. Plastinum Polymer Technologies Corp. plans to establish a processing facility in California to handle the scrap plastics generated in the recycling of computers and other electronics. While many competitors also are looking to develop e-plastic recovery facilities, Plastinum is unique because the company's technology does not involve separating the incoming material stream by resin. Rather, company officials say they can produce high-quality, uniform composite resins that have many potential applications from a mixed stream.

The long road toward development

Unlike many firms in the plastics recycling industry, Plastinum Polymers is a publicly traded company in the U.S. The company, registered in Delaware, was founded as NG Plastics in 2000. Until as recently as February 2007, Plastinum was a subsidiary

of New Generation Holdings, but was then spun off as a separate company.

The company has a growing list of about 200 shareholders, none of which have upstream or downstream positions (meaning they neither generate recovered plastics nor make recycled plastic products). Instead, the financing of the company has largely been a home-grown effort, with most of the shareholders being employees within the firm, or individual European investors.

The genesis of the company goes back at least a decade, when Jacques Mot, the firm's longtime chairman, sought to commercialize the basic technology now used by Plastinum. Since that time, the company has expended considerable resources developing this technology, including $1.6 million through 2006, an additional $2.6 million last year, and an expected $1 million this year.

A key to the firm's technology development process has been the operation, over the past two years, of a pilot facility in Emmen, The Netherlands.

Sourcing the raw material

The company's principal area of market growth is the handling of mixed plastics generated from the processing of obsolete electronics and electrical goods. For instance, Plastinum is sourcing scrap material from Waste Electrical and Electronic Equipment (WEEE), which includes both consumer electronics and other electric devices, such as appliances, from a large processor in Europe.

The incoming scrap plastics are not as uniform as would be expected in a single-resin recycling system. The recent installation of new processing systems at its supplier's operations has led to Plastinum receiving a cleaner plastics stream than in the past, with recent shipments containing less copper wire and other non-plastic materials. For example, the shredded plastics that Plastinum has sampled from various processors contains about 15-percent metal and other contaminants. This affirmed Plastinum's belief that the high demand for this shred in China has been driven not by the value of the plastics, but rather the value of the metal content that can be recovered.

The firm has worked with the supplying processor to reduce the non-plastic inclusions, significantly. This changing quality of the inflow materials has slowed the completion of Plastinum's pilot facility, and the processes contained within it. In fact, the drastic change in the quality of the material coming into the plant almost negates the need for the final metal detection step.

Baled e-plastics.

The inflow material Plastinum is currently working with, however, does not contain plastics from cathode ray tube (CRT) monitors and televisions, which limits the presence of brominated fire retardants (BFRs) in Plastinum's end-product. The company plans to test the handling and processing of plastics from monitors and televisions to determine the best applications for this scrap. Company executives feel that its density separation processes allow for some sorting of BFR-containing plastics.

Beyond WEEE

In addition to processing WEEE scrap, the company has begun testing mixed household plastics generated at several materials recovery facilities in Germany. This material, much of which is dirty film, contains polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET) and a small level of polyvinyl chloride (PVC). The German system commonly incinerates this residue material.

While the household waste is a departure from the original WEEE scrap the company targeted, a company executive said that "Plastinum is focused on mixed post-consumer waste streams, in general, and is in full development on the household waste sector." The presence of PVC in the mixed post-consumer waste stream does not cause any problems or require special precaution in the melting and pelletizing process.

Pre-treatment system

Plastinum's current operation can handle up to 1,102 pounds per hour of mixed recovered plastics. Additionally, the firm's principals say their processes are scalable. For example, the company estimates that two employees can operate a 1,543-pound-per-hour pre-treatment system. On the plastics production side, a 3,307-ton-per-year plant would require two workers per shift.

The current pre-treatment system contains five distinct steps:

- **Air separation.** WEEE scrap processing starts with an air-separation step to remove much of the lightweight contaminants, such as dust and foil. This step produces three separate streams of material. Two separate streams of plastic are fed to the next step, while the third stream, which contains foils, dust and other non-plastic materials, is discarded.
- **Wet separation.** The recovered plastics are fed into a separation system that generates three streams: Light-, medium- and heavy-weight plastics. The heavy material typically is where the bromide-containing plastic ends up.
- **Proprietary process.** At this point, the plastic material goes through an experimental and proprietary separation technology that is leased from another party.
- **Centrifuges.** The plastics then pass through one of two centrifuges.
- **Metal control.** The final step is a magnetic separation process, guaranteeing that no metals remain in the plastics to ensure quality and protect machinery.

Pellet production

The key to the Plastinum process is the production of uniform composite resins from the clean WEEE plastics. The firm currently

Samples of dirty and cleaned mixed plastics from obsolete electronics.

has one lab-grade system and a full production unit.

Plastinum's system uses a proprietary mechanico-chemical chamber – called a Blendymer – linked to a standard extruder. The technology blends immiscible plastics mechanically. Company executives call this unit the "heart of the plant," as this specialized melting unit fuses the plastic at specific temperatures, thus producing a pelletized plastic. Spec sheets on the properties of test bars are available from the company.

The Plastinum composite resins are typically produced in dark or vibrant colors, such as green, black and red, although work is underway to make additional colors. Other additives, such as stabilizers, can be included at the extrusion step to obtain desired properties, and can be specifically designed to meet the resin buyer's needs. With this technology, the use of compatiblizers to blend the many resin types is not necessary.

According to the company, the Blendymer technology transforms mixed plastics "into a solid amalgam, with physical and mechanical properties, that can be classified as 'new thermoplastic material.'" Because the amalgamated resin has the properties of a new and different resin, Plastinum says the hybrid resin will get its own resin code and stamp to distinguish it from traditional resins currently used on the market.

Potential markets

Company executives say the firm's resins – labeled Infinymer Ssl 31.1 and Infinymer Sml 31.1 – can be used to make a number of products, including:

- Molded parts
- Pipe
- Cash register trays
- Furniture
- Sporting equipment
- Garden tools
- Pallets.

Plastinum is at a pivotal point, in terms of business development. The company has secured its first customer for the new polymer, and expects demand to grow rapidly as the resins become increasingly applied commercially. Infinymers can be used with standard plastic manufacturing techniques, such as injection, extrusion, blow molding and compression molding.

To Infinymer and beyond

Plastinum says it is ready to move beyond being a development-stage firm, to an actual plastics reclaimer. The firm plans to operate company-owned, or joint-venture, plants, with the first one planned for California. "There is no 'if' about us coming to America," said Kevin Von Tscharner, senior associate for Plastinum. "It is our priority market." The company already has assessed permitting issues in the Golden State, and Von Tscharner predicts that the overall permitting effort will require 10 months. That time frame could be shortened if the firm partners with a processor already operating in California.

Other plants may spring up in Europe as the firm finds partnerships and opportunities to capture more WEEE, and possibly household, plastics. Start-up capital investments for each facility are relatively low, at about $5 million ($US), making rapid expansion of the application of this technology possible.

While much of the company is U.S.-bound, Plastinum will remain very much an international company. Research and development activities will remain in Emmen, while operational headquarters will move to the U.S. In this new corporate structure, corporate executives will continue to work from Geneva.

Because demand from China is high for e-plastics, some U.S. processors and recyclers of e-plastics already are struggling with the competition. Plastinum hopes, however, that the eliminated need of the expensive process to pre-sort plastics before recycling will keep costs down and allow them to compete with Chinese demand. Also, with the growing desire for down-stream due diligence, Plastinum hopes knowledge of how the plastics are handled, as well as potential product end-uses, will drive interest in the U.S.

The Plastinum Polymer process eliminates two substantial obstacles in e-plastics and other mixed plastics recycling: The uncertainty that comes when plastics are exported and the expensive process of demingling the many resins. As the firm reaches the next stage of business development, the question is whether the manufacturing industry embraces this new polymer, creating a demand for the product of this innovative process. **ESN**

Reprinted with permission from *E-Scrap News*, P.O. Box 42270, Portland, OR 97242-0270; (503) 233-1305, (503) 233-1356 (fax); www.e-scrapnews.com.