Recycling: A practical guide

RIPS, a Nexans company, is dedicated to cable waste collection, grinding and reuse
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Market evaluation, outlooks and development

In early 2004, 2,900 companies were operating in the French waste recovery, recycling and reuse industry. Over the last five years, this industry has seen a major consolidation as 29% of companies exited the market. In contrast, between 1999 and 2003, the number of jobs in the industry has grown by 8%, from 27,600 to 29,800 employees.

The amount of investment in the industry has also increased to EUR 350 million in 2003—or 5.5% of the total sales—compared to EUR 330 million in 2002.

During the whole of 2003, 37 million tonnes of waste were collected by the French recovery, recycling and reuse industry, a slight increase (1%) over 2002. Whereas the collected volume showed limited growth, the rise in value was somewhat more pronounced—up 4% in 2003 compared to 2002. In 2003, the total sales of this industry amounted to EUR 6.3 billion. Over the last five years, the growth rate has been a strong 43%.

Breakout of total sales (EUR 6.3 billion) by waste type

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1 May 2004 – Source: Federec (French Federation of Recycling Trades) – “The French waste recovery, recycling and reuse market in 2003”
Non-ferrous metals recycling increased by 2% in 2003. During that year, 1.55 million tonnes have been collected by companies operating in this segment, and the volume processed and sold amounted to 1.45 million tonnes. The sales generated by the non-ferrous metals industry has stabilized at EUR 2.2 billion.

The plastics recycling market has seen a strong increase in volume, up 7% in 2003 over 2002, with an equivalent of 335,000 tonnes collected. The volume of plastics processed and sold outside the industry amounted to 330,000 tonnes. The plastics chain sales grew by 6% in 2003, to EUR 87 million.

For companies who seek increasingly to minimize the environmental impact of their activities, waste treatment is both economically and strategically important.

Out of 600 million tonnes of waste produced each year in a country like France, 30% are industrial waste.

Firstly, most waste-producing industries are already involved in efforts to reduce their production residues and discharges. Secondly, the treatment and reuse of waste by approved professionals is becoming mandatory, as the requirements specified by the French and European legislation for waste collection and transportation tend to apply to both waste producers and owners (see European Directive 2002/96/EC published in February 2003).

The companies using recycled raw materials benefit from the developments of the recycling chain, starting with the rise in technical and quality standards for the reuse of materials.

These various developments and issues are particularly important in the field of cable and non-ferrous metals recycling.
Challenges facing market players

- **For companies “producing” cable waste and non-ferrous metals** (such as cable installers, cord manufacturers, …)

  The French Environment Code (2000) states that these companies should be able to prove what they do with their waste and supply any necessary information to environmental officers. They are required to hand their waste over to approved recycling facilities only, otherwise they will be prosecuted. And European legislation tends to go in the same direction. In their ongoing efforts to optimize their industrial tool, these companies need a partner who integrates with their production process, while ensuring full “accountability” for waste treatment and usage.

- **For companies “owning” cable waste or discarded cables** (such as telecom service providers, utilities, manufacturing or service companies, logistics centers, reclaimers, …)

  These companies are also affected by the new European directives² on waste transportation and treatment. As they are often committed with their customers and users to sustainable development policies, they increasingly take the environmental issue into account for the management of their discarded cable inventory.

  They call for some eco-recycling involving:
  - more environment-friendly waste collection and transportation modes,
  - approved grinding and treatment plants,
  - compliance with legislation as well as the companies’ own sustainable development policies,…

- **For companies using recycled raw materials** (such as steelworks, foundries, …)

  These plants buy end-products from recycling companies (such as granules, …). First of all, they need guaranteed product quality, as well as responsive and flexible supply flows.

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NEXANS’ COMMITMENT TO RECYCLING

RIPS, a Nexans company

With a grinding capacity of 20,000 tonnes p.a., RIPS, in compliance with its operating license, is able to recycle under the best current economic and technical conditions such cable waste as manufacturing offcuts or discarded cables, made of non-ferrous metals, whether armoured or unarmoured, tarred or untarred, as well as plastic extrusion drains, and strips, wires and cables made of bare non-ferrous metals.

For each waste, RIPS files a preliminary authorization application so as to ensure full transparency before, during and after the recycling process. “Ensuring the accountability and compliance of waste treatment for our customers is paramount. Waste regulations are complex and companies may be unfamiliar with them. Our mission is to inform companies about regulations. Therefore, it is important to establish a strong and trusted partnership between waste producers and our company,” explains Thierry Costerg, President of RIPS.
RIPS: A proactive approach to waste recycling and treatment

With over 30 years of experience, RIPS provides a global expertise in the recycling of cables and non-ferrous metals. The company implements solutions for the collection and alternative transportation, treatment, grinding and reuse of power, communication and special cable waste made of non-ferrous metals or plastics, as well as for the trade of non-hazardous waste.

All RIPS production processes are rigorously monitored and guaranteed by ISO 9001 and 14001 standards.

For “supplier” companies which produce cables:
RIPS recycles non-ferrous metals and cable waste, no matter how complex (including grinding of all types of sheaths and insulators). RIPS adapts fully to production rates and processes, and provides full recycling accountability.

For “supplier” companies which own discarded cables:
RIPS ensures an end-to-end “environment-friendly” waste treatment, from cable collection to transportation to grinding to reuse, while complying with the latest regulations in force as well as environmental protection requirements and sustainable development policies.

For “customer” companies which use secondary raw materials:
RIPS provides high-quality end-products (granulated copper and aluminum) which are packaged and readily usable in an industrial production chain. Processed secondary raw materials can then be smelted and used in a wide range of applications.
Recycling: A practical guide
RIPS’ solutions for the collection, transportation, grinding and reuse of cable waste

“The mechanical on-site processing of metals includes the stripping and cutting of reeled cables, and the grinding of cable waste made of copper and/or aluminum”, explains Thierry Costerg. This process generates several waste flows (steel, non-ferrous metals in the form of copper or aluminum granules). “The quality of our products is defined according to the French standard NF EN 12861 for copper and copper alloys,” adds Thierry Costerg. Quality assurance is provided by a mass spectrometer which is used to check how much copper the granules contain as well as other metals (tin, lead, iron, phosphorus, aluminum, zinc, nickel) and to ensure that customers get a product meeting their expectations. Whether they are metallurgical plants (foundries, refineries), waste recyclers, traders or brokers, RIPS’ customers use these granules as alternative raw materials or alloy constituents.

Waste collection and transportation

A professional waste treatment process starts with the recovery and collection of cables. RIPS provides suppliers with various options to suit their specific needs:

- Waste collection may be integrated with a supplier’s industrial tool and ongoing production process, with dumpsters being made available on site so that waste can be periodically and quickly removed.

- Customized waste collection solutions may be matched to the supplier’s specific activities, region or country.

- Fast and environment-friendly waste transportation is ensured by road or railway.

- All French and European regulations in force are complied with, including French Decree 98-679 dated July 30, 1998 pertaining to waste transportation, trade and brokerage.
Cable waste grinding and reuse

RIPS’ waste suppliers are provided with the following services:

- Treatment of all manufacturing waste and discarded cables made of copper or aluminum (including manufacturing offcuts and cables of any gage, whether armoured or unarmoured, tarred or untarred; strips, wires and cables made of bare non-ferrous metals).

- Full process comprised of sorting, cutting, stripping, shredding, grinding, and granulation.

- Capability to treat waste from classified sites, as per RIPS’ operating license (issued by the prefect).

- Full process tracking and accountability through the use of BSDIs (industrial waste tracking forms).
End-products: Turning waste into secondary raw materials

After treatment and grinding, RIPS converts cable waste and non-ferrous metals into secondary raw materials which can be directly reused in production. The company thus provides its customers, such as foundries and steelmaking plants, with ready-to-use end-products in the form of copper and aluminum granules.

The quality of all these metals is guaranteed:

**Aluminum grades**
- A1(AL) > 99.8%
- A2(AL) < 99.8%

**Copper grades**
- 1A(CU) > 99.8%
- 1B 99.5% < (CU) < 99.8%
- No. 2 98.5% < (CU) < 99.5%

All production processes are subject to rigorous monitoring as per ISO 9001 and 14001 standards, using spectrometer analysis of produced metals.
RESEARCH DEVOTED TO RECYCLING

Environmental protection is the ongoing concern of the Nexans Group, which devotes a significant part of its research and development investment to this area.

Jérôme Fournier, Basic Research Manager at the International Nexans Research Centre (NRC) answers three key questions

Which particular projects are the NRC and RIPS working on?
“The cables are complex products made of several plastic layers of various kinds, such as PVC, polyethylene (PE or XLPE—see Glossary), or elastomers. As a cable recycler, RIPS is concerned with the treatment of polymers and wishes to be able to take this into account in its recycling process.
The NRC supports RIPS both for the technical analysis of polymer materials recovered from cables and for the innovative reuse of plastics in order to develop tomorrow’s recycling solutions. In summary, we are currently conducting research work with a view to recycling plastics from Nexans cables.”.

What are the NRC’s main research areas in the field of recycling?
“With the help of ADEME (the French Agency for Environment and Energy Control), the NRC has been studying new processes for separating materials, including metal/polymer separation and polymer/polymer separation. At the same time, a program was launched to make different polymer materials compatible with each other. Polymers such as PVC, PE or elastomers must currently be recycled separately. The main difficulty therefore consists of treating mixed polymers, especially cross-linked polyethylene (XLPE) which is used in most cables.

Therefore the NRC focuses on three major working areas:

- characterizing polymer deposits: it is essential to know the exact constituents and properties of the polymers produced by cable recycling. The content of residual metal and nonmetal impurities, the composition of mixtures, and the presence or absence of additives are key elements which will determine the type of recycling for materials. In the same way, the intrinsic properties of plastics are key recycling parameters as they determine whether a deposit can be reused for applications requiring low mechanical strength (e.g. traffic cones) or, in contrast, adequate properties in terms of hardness and tensile strength (such as pipes).
implementing polymers recovered from cables: it is obviously very important to study how the plastics treated by RIPS are implemented to give them a second life. The NRC, in collaboration with ADEME and CEREMAP (the French Center for Studies on Plastics Recycling) has explored the implementation potential and limits of each polymer family to be recycled. This research studies three main types of implementation: compression molding, extrusion and injection molding.

recycling deposits based on a strong knowledge of the nature, properties and implementation of plastics. The NRC has served as a test laboratory for building prototypes and all sorts of objects in order to verify the feasibility or limits of various recycling methods. The NRC has also established partnerships with other manufacturers to produce bituminous mixes made of polyethylene recycled from Nexans cables, which are then tested for rutting, or paving made of PVC or elastomer.

What are the opportunities offered by polymer recycling?

“We have quite concrete opportunities. Among other applications, recycled plastics are used in traffic cones, street furniture, pipes made of PE or PVC, industrial floorings, and even for elastomer floor coatings in some playgrounds! Through the main three implementation techniques (compression, extrusion, injection) and depending on the polymer type (PVC, PE, XLPE), we may consider various end applications and reuse levels. The recycling yield of plastics relative to the raw material may also vary significantly depending on desired properties and applications.
Besides, we examine the possibility of building the recycled material back into the cable itself. For Nexans, the ideal thing would be to recycle a large proportion of polymers in the manufacturing of cables or accessories without altering their final properties. This method is already being tested for cable waste produced in our plants. Further R&D programs in 2005 will also focus on designing new cables, taking into account their lifetime and recyclability. In conclusion, our R&D programs are further focused on the treatment and recycling of polymers from cable products for cable products.”
Core business:
With over 30 years of experience in the recycling of cables and non-ferrous metals, RIPS provides a complete waste collection, grinding and reuse solution which meets the needs and expectations of each organization.

Customers:
- Cable and cord manufacturers
- Telcos, manufacturing and services companies, logistics centers, reclaimers
- Steelworks, foundries
- Automotive OEMs

Chief Executive Officer:
Thierry Costerg, President de RIPS
thierry.costerg@nexans.com

Key dates:
1965: Founding of RIPS (dedicated to two activities: metals recovery and smelting)
1987: Creation of a recycling plant in Calais
2001: RIPS becomes a Nexans company
April 2002: Implementation of a Quality and Environment Management System
2005: Security will be integrated into the current management system

Production plant
Calais port area
770, quai de la Loire
62100 Calais France

2003 Key Figures
GRINDING sales: EUR 13.6 M
TRADE sales: EUR 13.6 M
18,000 tons of recycled waste
Employees: 40

Staff distribution:
35 employees in Calais
5 employees in Lyon

Calais – Production plant
- Waste treatment plant
- Logistics department
- Quality/Environment department

Lyon – Administration and sales
- Executive management
- Sales department (trade & grinding)
- Financial department

Infrastructure and assets
- 500 waste collection points
- 70 Ecorail skips
- 200 dumpsters (25 & 15 cubic meters)
- 4 trucks
- Approved transporter list
- 1 calibrated platform balance scale
- 4 hydraulic shovels
- 4 fork-lift trucks

Expertise:
- Strict compliance with regulations and legislation
- Turnkey logistics solutions
- Accountability and traceability for all operations
- End-to-end recycling
- Waste treatment in officially approved facilities
- High-quality end-products and processes
- Technical and innovation support
GLOSSARY

**Accountability**: strict transparency before, during and after the waste recycling process. All recycling operations, including waste treatment and reuse, are tracked using the BSDI system (based on industrial waste tracking forms).

**Eco-recycling**: End-to-end “environment-friendly” recycling, from waste collection to transportation to grinding to reuse. This involves using environment-friendly collection and transportation methods, approved grinding and treatment plants, as well as complying with regulations and sustainable development policies.

**Elastomer**: A synthetic polymer with the properties of natural rubber, such as high stretching capacity and elastic recovery.

**Granulation**: After grinding, the materials to be recycled are processed into smaller grains, called granules, which can then be separated according to their nature (e.g. copper or aluminum).

**Grinding**: (May be preceded with pregrinding as applicable). Cable and non-ferrous metals waste is ground into finer particles to facilitate the granulation and separation of the various materials.

**PE (Polyethylene)**: Polyethylene is the world’s most popular plastic, used to manufacture supermarket bags, shampoo bottles, toys, as well as cable insulants or sheathes. A polyethylene molecule is a long string of carbon atoms, with two hydrogen atoms attached to each carbon atom. Polyethylene is a thermoplastic material with a melting point of about 120 degrees Celsius.

**Polymers**: (Synonym of “plastics”). A compound obtained by combining lighter simple molecules (monomers). Polymers are generally organic or semi-organic substances, characterized by repeating patterns of one or more monomers. Polymers have most often a high or very high molecular mass. Polymers fall into three main categories, based on their thermal properties and processing mode: elastomers, thermoplastics, and thermosets (“duroplastics”).

**PVC**: Polyvinyl chloride. A synthetic (thermoplastic) material obtained by polymerizing vinyl chloride. PVC is used for manufacturing cables, pipes, finishing coats, artificial skins, insulating enamels, as well as pumps, junctions, fittings, etc.

**Recycling**: The whole process of converting cable waste into end-products (copper or aluminum granules) which are readily usable by manufacturers as secondary raw materials.

**Stripping**: The process of removing the outer or metal sheath from a cable, so as to obtain a “bare” cable.

**XLPE**: Cross-linked polyethylene. Polyethylene in which chemical bonds have been created between polymer chains. This is similar to rubber vulcanizing, except that a different, sulfur-free cross-linking technique is used. XLPE does not melt at 120 degrees Celsius and features improved thermal, mechanical and chemical strength.