The Hoboken recycling plant

Francis Vanbellen – Plant manager

Capital Markets Event on Recycling – 18-19 Nov 2010
Agenda

Plant history

Core competences

Flowsheet

Site visit
Plant history
Hoboken plant based on more than 100 years of history
Recent history

Transformation process started in late nineties

Continued process improvements and innovations since
Major flowsheet investments

Sulphuric acid plant
- 2005: Double absorption

Smelter
- 1997: New plant
- 2007-2009: Spent industrial catalysts

Leaching & electrowinning
- 2003: New plant

PM refining
- 1995-2001: Make-over
- 2008: New concentration plant
- 2008: Rh capacity increase

Sampling & assaying
- 2011-...: Make-over

Lead blast furnace
- 1995-2000: Plant make-over
- 2007: Glas cleaning installation

Lead Refinery
- 1999-2005: Plant make-over
- 2008: Gas burners

Special Metals Refinery
- 2006-2008: Make-over
Core competences
Core competences

Foster Flexibility
- Materials
- Operations
- Employees

Master Complexity
- Pyrometallurgy
- Hydrometallurgy

Ensure Reliability
- Sampling & assaying
- Knowledge management
- Market intelligence
- Risk management
- Integrity
- Environmental management

Materials: Au, Pd, Se, Ir, Ru, Rh, Pt, Au, Se, Pd
Operations: Cu
Employees: Ni, Pb, In, Bi, Sn, As, Sb
Risk management: Cu, Ag, Te
Knowledge management: Cu, Ag, Te
Market intelligence: Cu, Ag, Te
Integrity: Cu, Ag, Te
Environmental management: Cu, Ag, Te
Foster Flexibility

**Materials**

Wide variety of physical aspects and metal content: treatment of more than 200 different raw materials with different physical aspects (dry, wet, dusty, with plastic, ceramic...)

**Operations**

Flexible and robust operations which can cope with high variability of supply

**Employees**

Competence management – Intensive training and development of competencies in combination with appraisal, stimulates personnel to grow
Master complexity

The Hoboken flow sheet
- Unique, integrated combination of innovative pyrometallurgical and hydrometallurgical operations

Expertise in metallurgy
- Our experienced staff is the driver behind innovation (a lot of in-house R&D competences)
- Our long-standing in-house experience is an innovation driver
Ensure reliability

- **Sampling & assaying**: Recognized world-class service
- **Knowledge management**: Systematic approach to enhance process efficiency
- **Market intelligence**: Structured information gathering process
- **Risk management**: Hedging and metal accounting, stock take
- **Integrity**: Ethical business and fraud prevention
- **Environmental management**: Management systems: First Belgian company with one integrated certificate for ISO 9001, ISO 14001 and OHSAS 18001
Business Excellence

Our Business Excellence system is driven by the European Foundation of Quality Management (EFQM) model.

The EFQM approach is formalized in one integrated management system certified against international standards:

- ISO9001 certified for all our processes
- ISO14001 environmental care system
- OHSAS18001 safe and healthy production environment

UPMR obtained a 5* EFQM Award (October 2007) and an EEA-finalist award (September 2009).
Flowsheet
Flowsheet

Raw Materials

Sampling

Precious Metals Operations

Cu matte

Pb bullion

Leaching & electrowinning

PM residue

Ag, Au, Pt, Pd, Rh, Ir, Ru

Precious metals refinery

PM residue

Cu

Ni

H₂SO₄

Sulphuric acid plant

Smelter

SO₂

Smelter

Pb slags

Ni speiss

Copper bullion

Base Metals Operations

Blast furnace

Pb-bullion

Lead refinery

In/Te residue

In, Se, Te

Pb, Bi, Sb, Sn, As

Special Metals refinery

In/Te residue

PM residue

Pb bullion

Precious Metals Operations

Leaching & electrowinning

PM residue

Ag residue

Se residue

Precious metals refinery

Sulphuric acid plant

Nickel refinery

Smelter

Sampling
Sampling & Assaying

The wide variety & complexity of incoming materials mean that sampling & assaying are key success factors in determining our customer’s financial yield.

UPMR allocates more than 15% of its operating budget to these services.
Sampling

Unique state-of-the-art facilities

Dedicated to process all raw materials

Key drivers
- Maximizing automations
- Adequate capacities in growing segments (e-scrap, auto catalysts...)
- Shortening the lead times
- Respecting environmental, health & safety standards

Employing 120 people

Secured area

± 8000 lots & 350,000 t/year
Assaying

Recognized leadership in the precious metals industry

Up-to-date analytical equipment, supported by:
  • Robust quality assurance system
  • Laboratory information & management system

Key drivers
  • Customer orientation
  • Respect for short lead times
  • Continuous investment in analytical research & method improvement

Employing 100 people

55,000 samples/year
Recycling & Refining

Pb, Cu & Ni drive our unique recycling process. By using the specific properties of these collector metals, precious & other secondary metals are recovered with the greatest efficiency.

Our in-house developed Precious Metals Refinery is one of the world’s largest & most efficient refining facilities.
Precious metals operations
Smelter

Unique Isa smelt, submerged lance combustion technology, injecting oxygen enriched air & fuel in a molten bath

Separating precious metals in a copper bullion from mostly all other metals concentrated in a lead slag

Operating at 1,000 t/day

Highly flexible technology for PM recycling:
- Variability of physical aspect (lumps, fines, wet, dry, shredded material...)
- Variability of feed mix (e.g. volume e-scrap vs. total volume)
- Ratio PM / PGMs & impurities in the feed mix
Precious metals operations
Leaching & electrowinning

Leach copper to collect precious metals in a residue for further refining in the Precious Metals Refinery

Increase PM-content in residue from intake (Cu-granules) by a factor of 10

Cu electro winning process, producing 99.99% pure Cu-cathodes

Highly flexible technology
  • ratio copper / other metals
  • PM & PGM content
Precious metals operations
Precious metals refinery

Combination of classical methods & unique in-house developed processes

Unique flexibility on ratio of gold, platinum, palladium & secondary PGMs vs. silver, varying substantially according to raw material feed

High purity metal production

- Ag & Au: 4N & 5N
- Pt, Pd, Rh: 3N5, catalytic grade
- Ir & Ru: concentrates
Site visit
Forward-looking statements

This presentation contains forward-looking information that involves risks and uncertainties, including statements about Umicore’s plans, objectives, expectations and intentions.

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Francis Vanbellen
Plant Manager Precious Metals Refining

Francis Vanbellen holds a Master of Science degree in Chemical Engineering from the Catholic University of Leuven, as well as an MBA from the Vlerick Management School. Francis joined Umicore in 1981 as part of a team to start up Umicore’s first rhodium refining plant, before assuming other precious/special metals refining management responsibilities. During the 1990s Francis headed a range of departments ranging from business excellence & development to supply management and refining. In 2001, Francis assumed his current position as plant manager of Umicore Precious Metals Refining site in Hoboken, Belgium.