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CONTEXT

The recovery of waste, in particular waste containing metals, is strategic for the Walloon economy in terms of supply of raw materials for our industry. It also represents a significant potential for value creation based on a long and strong experience in metallurgy.

OBJECTIVE

The aim of the «Reverse Metallurgy» project is to create, in Wallonia, an internationally recognized platform for industrial, technological and scientific excellence in the field of recycling. The objective is also to create jobs and added value for the region.

The creation and development of new economic activities in the field of metal processing and recovery from the Circular Economy.

The realization of this potential is based on:

- Developing and controlling complete industrial value chains in metal recycling processes,
- Mastering key technologies and treatment processes,
- Innovating and its associated industrial transfer.

PARTNERS REPRESENTED IN THE MISSION











A competitiveness cluster in mechanical engineering with 280 industrial, academic, laboratories and research entities. The aim of the cluster is to increase these enterprises' innovation, production, and service capacities so as to raise their profiles on the European and world market.

Almost all fields of mechanical engineering are concerned: from consumer products, to health, with machines and industrial processes in between.

The cluster projects revolve around 4 strategic orientations:

- · Materials and surfaces of the future
- · Comprehensive forming technologies
- Microtechnologies and mechatronics
- Intelligent maintenance

MecaTech is also involved in the setting up of several Technology platforms on various topics such as Reverse metallurgy. The Walloon Government has also entrusted the Cluster with the coordination of the "Metallurgy, transport and batteries" Task Force.

RANGE OF PRODUCTS

Helping companies to develop their projects (research, training, investment, and innovation platforms), identifying key skills/partners, promoting synergies, and advising project leaders. Access to a national and international network: industrial, scientific, training partners and business organizations

Access to specific financing

ADDED VALUE

In the mechanical engineering field, a transverse field:

- Engine for innovation with close to 280 members united an economically promising field.
- Stimulation of hybridized technology: the machines and processes of mechanical engineering and their components incorporate an increasingly broad range of scientific fields and cutting-edge technologies leading to the "hybridization of mechanical engineering"
- Foster and facilitate networking with universities and research centres

MAIN REFERENCES

Link to the main projects here



www.polemecatech.be/en/

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COMPANIES

Part of the John Cockerill Group, the group counts for 5000 employees, and has activities in 19 countries. The group develops large-scale technological solutions in the fields of Energy, Defense, Industry, Environment and Services. The Hydrogen division develops integrated solutions for the production, storage and distribution of green hydrogen.

RANGE OF PRODUCTS

Hydrogen

- Alkaline Electrolysers: the largest "single stack" electrolysers in the world. John Cockerill
 electrolysers benefit from minimum maintenance and are designed for short and easy
 installation/commissioning.
- Hydrogen Refueling Stations: Cover a range of capacity from 100 to 1000kg per day, at 350 and 700 bars.

Multiple Hearth Furnace

The Nesa Solution*: a pilot MHF enables the time of passage, the temperature profile and
the atmosphere on each hearth (or at each level) of the thermal reactor to be controlled with
very high precision. Nesa Solution* provides a full set of thermal solutions in the very varied
fields pyrolysis, incineration and combustion, calcination of industrial minerals, regeneration of
activated carbon, carbonization or activation of carbon or biomass, ...

Integrated Solutions

 As a leading equipment designer and manufacturer offering the best in Engineering Procurement and Construction solutions.

ADDED VALUE

John Cockerill is playing a leading role in the energy transition by contributing to the development of renewable energies and developing new solutions. The 2 main innovative technologies for the metallurgic sector are:

- Electrolysers for green hydrogen production where John Cockerill is confirming its position as a major world producer
- The Nesa Solution allows contaminated, raw and worn materials to be recovered and allows manufacturers to conduct customized tests e.g. to validate thermal process

MAIN REFERENCES

Repsol (Spain) - 2.5 MW Hyoffwind (Belgium) - 25 MW



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The COMET Group has strengthened its position over the last 35 years in the ferrous, and non-ferrous metals market, but also extended its expertise towards other recycling-related fields. It includes a range of high-performance facilities that enabled it to achieve unrivalled recycling percentages.

Today the Group consists of about thirty companies across Belgium and France with more than 380 employees.

RANGE OF PRODUCTS

- Specialist in the recycling of ferrous metals with the most powerful shredder in Europe (7,000 hp shredder). The Group has become one of the major suppliers for the iron and steel industry in Belgium.
- Purchase and sorting copper and copper alloys, aluminium, lead, zinc, nickel alloys, stainless steel, electric motors or other cables from clients based all over the world.
- End-of-life vehicles (ELV): it was the first certified centre for the depollution of end-of-life cars in Belgium.
- Processing and recycling of electrical and electronic equipment, tyres, shredder residues and plastics issued from shredder residues.
- Research & Development teams looking for innovation in recovery.

ADDED VALUE

CERTIFICATIONS

- ISO 9001: 2015
- ISO 14001
- ISO 45001
- WEELABEX

MULTIPICK

Spinoff resulting from a research project with the Fédération Wallonie-Bruxelles, COMET Group, University of Liège and Citius Engineering, Multipick has developed a robot prototype allowing the automated recognition of various metals (aluminum, copper, brass, zinc, etc.) and sorting at very high velocities (more than 1 piece per second) in order to face the more and more strict markets in terms of product quality.

<u>www.cometgroup.be</u>

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CRM Group is a research Centre based in Liège and Ghent, recognized by the Belgian and Regional Authorities, specialized in the field of metallic materials. The CRM group employs 265 people and has a portfolio of over 320 patents. The fields of activities are structured around five platforms: Energy Shift, Circular Economy, Digitalization, Advanced Manufacturing and Construction.

RANGE OF PRODUCTS

CRM Group offers services and solutions to make industries cleaner, smarter, more competitive and more efficient. The activities cover the whole manufacturing chain of metals from laboratory scale to industrial pilot lines. The group also provides R&D solutions to their members and customers in a shorter timeframe, with a lower level of risk whilst creating added value.

ADDED VALUE

CRM Group offers support to more than 45 members and over 350 customers per year at different levels allowing to target the right added value for each individual ject. The holistic approach of working in the triangle product-process-application is implemented at all stages of their projects. This includes industrial technical assistance, research & innovation, development of technological knowledge and competencies and finally licensing of new in-house developed technologies.

MAIN REFERENCES

CRM Group has activities in various countries in Europe, the United States, Latin America as well as in India and Southeast Asia.

- the TEMPCORE® process is a guench and self-tempering process invented and developed by CRM Group for the manufacturing of high quality concrete reinforced bars (a.k.a rebars). CRM Group is the owner of the TEMPCORE™ brand name all over the world and has designed and commissioned 68 high performance TEMPCORE™ plants worldwide.
- Patented and Trademarked technologies like ISYRoll® and Mulpic®
- Member of EIT Raw Materials
- · Presence in numerous international networks, amongst which the World Steel Internatio nal association, the European Steel Technology Platform (ESTEP), SPIRE (Sustainable Process Industry through Resource & Energy Efficiency), thea RIES network (including SWERIM), etc...
- Multiple projects in HEU, RFCS and several other European and regional programs, some of them involving Nordic partners (SINTEF, DTI, Euler3D, Högenas).

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EverZinc is a global provider of specialty zinc materials including fine zinc powders, zinc oxides, battery zinc powders and Zano*, an ultra-fine zinc oxide.

EverZinc has 10 facilities in the world and processes about 200,000 tons of zinc per year.

RANGE OF PRODUCTS

EverZinc products are used in a wide variety of applications, including corrosion inhibiting paints, performance tires, pharmaceuticals, ceramics, glass, sunscreen, and many others. Already known as the leading producer of zinc materials for primary (non-rechargeable) alkaline batteries, EverZinc is now targeting the rechargeable battery market with customers active in the energy storage (grid and residential), UPS (Data-Centers, Telecoms...), defense, e-mobility (forklifts, e-bikes, e-scooters, rickshaws...) and IoT markets.

ADDED VALUE

The advantages of zinc batteries are as follow: Zinc is abundant and available in Europe, cheap, recyclable, non-toxic and safe (no thermal runaway, risk of fire).

EverZinc has already developed unique metallic zinc powders and zinc oxides to serve the emerging rechargeable battery market.

EverZinc is also the organizer of R-Zinc, the first European conference on rechargeable zinc batteries that took place for the first time in Brussels in 2019 and that will be organized for the second time on May 3rd and 4th, 2022 (www.r-zinc.com/en/).

MAIN REFERENCES

- Participant of the LOLABAT European funded project to develop a new generation of Nickel-Zinc batteries: https://cordis.europa.eu/project/id/963576/fr. In that frame, EverZinc is developing new materials to improve the cycling life of rechargeable zinc batteries.
- Mature projects for zinc battery technologies in the USA, China and India.

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Industeel is specialized in the production of hot rolled as well as forged steel plate, ingots and formed pieces, with the largest dimension range worldwide.

All our plate mills produce steel via the Electric Arc Furnace (EAF) route, a low-emission steelmaking process that uses high-power electric arcs to melt recyclable steel scrap.

RANGE OF PRODUCTS

- Complete range of high-quality steel grades, from carbon & low alloy steels to stainless steels and nickel-based alloys as well as product specialties.
- Products based on low-emission steelmaking process using recyclable steel scrap:
 Stainless steels, Steels for Pressure Vessels and Clad Plates, Steels for Cryogenic (e.g. for hydrogen storage) and Low-temperature Service, Steels for Offshore and Mechanical Engineering, Tailor-made components, High Strength Steels, Protection steels, Steels for Moulds, Tools and Dies and Wear Resistant Steels.

ADDED VALUE

- Testing facilities at their R&D Centre, a world-class partner equipped with a wide range of experimental set-ups for a variety of industries, applications and materials.
- Calculation Software for storage tanks, Technical support, ...

MAIN REFERENCES

- UR TM stainless 2205 Duplex /Customer: MARIANI METALS:
 The Garrison Crossing, (formerly named Fort York Pedestrian and Cycle Bridge), Toronto, Winner of two awards.
- Steelanol bioethanol project: Scale demonstration plant that will capture carbon-rich process gases from ArcelorMittal Gent blast furnace and biologically convert them into bioethanol. Industeel provided UR™ 304L austenitic stainless-steel plates for the distillation columns where ethanol is extracted using a bacterial metabolic process.
- Industeel's Product: 316L(N)-IG, 304B and 430; Customer: ITER INDIA; Final Application: ITER (International Thermonuclear Experimental Reactor) project is one of the world's most ambitious energy projects: largest tokamak ever designed.

https://industeel.arcelormittal.com

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JEAN GOLDSCHMIDT INTERNATIONAL -Hydrometal

ACTIVITIES

Jean Goldschmidt International - Hydrometal is a service provider to the industry, offering solutions for the recovery and valorization of complex by-products, industrial residues and (secondary) raw materials that contain base, minor and precious metals.

RANGE OF PRODUCTS

Valorization of the non-ferrous metal fractions of industrial residues and by-products using hydrometallurgical processes to separate, upgrade and purify poly-metallic complex raw materials.

ADDED VALUE

JGI-Hydrometal is a major industrial recycler dealing with a wide range of complex non-ferrous metal-bearing residues, by-products, secondary raw materials...

Alternative to landfilling and significantly contributing to the development of sustainable solutions to the depletion of natural resources.

CERTIFICATIONS

- SPW (Walloon authorities) certified the revalorization and recycling of toxic, dangerous and hazardous wastes
- ISO 14001 certification
- ISO 9001 certification for electro-refining high-purity tin
- IPPC conformity: total respect of the European Directive concerning the limitations applied to industrial companies in terms of rejects
- REACH compliant (REACH Regulation (EC) No 1907/2006)
- EcoVadis Business Sustainability certification: ongoing at group level
- OHSAS 18001 Certification (processing facility)
- Processing facility is a SEVESO company. The authorities regularly control our safety management system. All potential risks are identified, analyzed and controlled

MAIN REFERENCES

- Major global mining smelting refining companies
- Industries using non-ferrous metal (NFM) bearing catalysts

www.jgi-hydrometal.be

DFI FGATE

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JEMA is the leading Belgian provider of High Performances Power Supplies, and specialist in Technology Innovation in Power Electronics. JEMA designs, builds and installs worldwide high power, high precision, high stability DC controlled power supplies to meet specific, highly complex and demanding requirements through products and tailor-made solutions.

RANGE OF PRODUCTS

- Products at the cutting edge of State of the Art AC/DC and DC/DC controlled power systems.
 Applications in segments like medical, aerospace, plasma torch, reverse metallurgy, plasma coating and energy transition, including energy storage and hydrogen applications.
- Embedded intelligent control and communication systems allowing real-time remote intervention and maintenance for maximal reliability and availability.

ADDED VALUE

- Tailor-made answers for very demanding customers and their applications.
- · Innovative and agile organization providing high quality products and projects.
- 80 years of experience, long term collaborations, and very long-life products.

MAIN REFERENCES

- DC power supplies for particle accelerators including both modular type power supplies as well as specifically designed power supplies, on a wide range of power.
 Most applications for IBA (Ion Beam Applications) for all their accelerators and applications, such as main coil magnets, ion sources, beam line magnets, etc. It.
- Power supplies for research particle accelerators such as for klystron modulators for the CERN Linac 4 (CH), GANIL (FR) various magnet power supplies (dipoles and others), MYRRHA linear accelerator (BE), GSI FAIR accelerator (DE), RIKEN accelerator (JP) for atomic mass measurement, etc.
- Power supplies for a wide range of other applications, including:
 - Plasma torch and plasma furnace: ScanArc (SE, BE, NL, DE);
 - Battery chargers for various applications (Train chargers, industrial micro-grid application);
 - Test benches for space (FR, BE, GY) and rail applications;
 - Cathodic protection applications (BE), etc.



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Soudobeam is a provider of oxygen blowing solutions to the steel industry.

RANGE OF PRODUCTS

- Product for plants with Basic Oxygen Furnace (BOF technology): "lance tip".
- Product for plants with Electric Arc Furnace (EAF technology): "oxyfuel burner".

ADDED VALUE

Soudobeam delivers premium blowing products with a unique design.

Major advantages: extended lifetime, increased metallurgic efficiency and lower induced maintenance.

- compared with other products of the same category, the lance tips and burners have an extended lifetime of + 30% to 100%
- the oxygen blowing jets, optimized for each steel plant, increase the metallurgic yields of steel making process
- with lower induced refractory erosion and less slag & steel projections, the maintenance is decreased

All these advantages result in cost savings from 1€ to 3€/ton of steel.

MAIN REFERENCES

Leading supplier for the following plants for many years: ArcelorMittal (Dunkirk, Ghent, Luxemburg), ThyssenKrupp (Duisburg), Moravia steel (Trinec), US Steel (Kosice).

www.soudobeam.be

DELEGATE

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Synthetis focuses on the optimization of logistics: storage management and transport management, and is a recognized player in the steel industry sites modernization.

RANGE OF PRODUCTS

- FLUXX: highly advanced solutions for the optimization of fully automated yards based on the power of AI. FLUXX can be extended to match the plants specific needs, has a web interface including 3D views and communicates with the plant's MES and ERP.
- Customized production management systems for specialized sites.

ADDED VALUE

- Smart traceability and storage optimization
- Proposed movement for crane operators
- Intelligent control of automatic cranes, conveyors, transfer trolleys
- Optimization of internal transfers
- Optimization of loading plans
- Truck access management and site orientation

MAIN REFERENCES

ArcelorMittal (Western Europe), Aperam, Industeel, NLMK, Liberty Steel, BAO (P.R.C.)

Synthetis metals

www.synthetis.com

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UNIVERSITIES AND WALLOON RESEARCH DELEGATION

UNIVERSITY of LIEGE - GeMMe

ACTIVITIES

Gemme is a unique research group in Wallonia contributing to the development of innovative processes for an efficient management of mineral and metallic resources. Taking its roots in the traditional disciplines of mining, metallurgy and civil engineering, GeMMe experienced a deep mutation of its activities within the last ten years by making use of its know-how to unlock the values in industrial solid wastes, end-of-life consumers goods and complex geo-resources.

GeMMe is divided into three research units:

- The Geo-resources Geo-imaging group specialized in the development of vision-based characterization tools from outcrops to nanosized particles.
- The Mineral Processing & Recycling group focusing on energy- and water-efficient processes in the comminution and treatment of ores and inorganic wastes.
- The Construction Materials developing new and eco-friendly building materials making efficient use of industrial residues.

GeMMe has 4 laboratories:

- Electron microscopy
- Building Materials Laboratory
- · Mineral processing & recycling
- Sensor based sorting & characterization

RANGE OF PROJECTS IN METALLURGY

- Biolix: Bio-hydrometallurgical recovery of high technologies metals from waste electrical and electronic metals
- Pickit: Shredder Residue characterization by Machine Vision
- ANCORELOG Analytical Core Logging System & T-REX (time gated RAMAN sensor)
- Multipick: Intelligent robots that sort metal waste

www.gemme.ulg.ac.be/

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CRM GROUP



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MATERIA NOVA



Department Electrochemical storage in Gen3, Gen4 and Gen5 Batteries

UCLOUVAIN



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NEW METALLURGY

UCLOUVAIN



IMAP - Materials and Process Engineering iMMC - Institute of Mechanics, Materials and Civil Engineering

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WALLONIA EXPORT & INVESTMENT AGENCY

The Wallonia Export & Investment Agency (AWEX) is the institution in charge of the development and management of Wallonia's domestic and international economic relations.

Through a personalized, innovative, and sustainable approach, AWEX supports Walloon companies - regardless of their size, sector, or target market - in every step of their international endeavors. This includes exports, technological partnerships, and development abroad.

The agency's vast network of connections ensures the best advisors are always by your side. Our local anchors and agents abroad are capable of providing unparalleled insight to take your company to the next level. In addition, our connections will help establish your business in the global marketplace and promote it throughout the world. Training, incentives, and international financing are also available.

AWEX is also committed to strengthening Wallonia's position as the premier gateway for international investors seeking success in the heart of Europe. We work closely with them to inform, convince, and advise in every stage of their development.

Feel free to get in touch with one of our local or international agents via our websites listed above.

In our network of more than 400 employees in nearly 100 countries around the world, there is always someone ready and willing to support you in your approach.

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