



Industrial R&D and Pilot Platforms in Southern Belgium

Walloon Upscaling Expertise
in metals and raw materials



Reverse Metallurgy

R&D and Pilot Platforms



MINERAL PROCESSING / SUSTAINABLE MATERIALS ENGINEERING

SMART EXTRACTIVE METALLURGY OF NON-FERROUS

Research Centre

40 researchers and support staff
3,5 MEUR annual funding*
Stéphane NEIRYNCK (*General Manager*)

<https://www.ctp.be/en/>

PYROMETALLURGY / METAL PRODUCTION

SMART METAL PRODUCTION PROCESSES AND ADDITIVE MANUFACTURING

Collective Research Centre
(>45 Industrial Members)

267 researchers and support staff
39 MEUR annual funding*
Joeri NEUTJENS (*General Manager*)

<http://www.crmgroup.be/en>

BIO-HYDROMETALLURGY / PHYSICAL PRE-PROCESSING

SMART SORTING and GEOMETALLURGY

University
(GeMMe Research Unit)

30 researchers and support staff
2 MEUR annual funding*
Eric PIRARD (*Manager*)

<http://www.gemme.ulg.ac.be/>

Laboratory and Pilot Platforms

8 Locations in Belgium



Six sites in Liège

- Liège - Sart Tilman (4 sites)
- Liège - Val Benoit (1 site)
- Liège - Flémalle (1 site)

One site in Gent

- Zwijnaarde

<http://www.crmgroup.be/en>



One site in Tournai

Centre Terre et Pierre
Chaussée d'Antoing, 55
7500 TOURNAI

<https://www.ctp.be/en/>



One site in Liège

Allée de la Découverte, 9
Sart Tilman - B 52
4000 LIEGE

<http://www.gemme.ulg.ac.be/>

R&D and Pilot Platforms

CRM

RESEARCH AND INNOVATION

- 1. Metal production, energy and recycling**
 - Raw material processing, melting & refining, by-products treatment & valorisation
- 2. Metal processing & Metallurgy**
 - Casting & solidification, rolling & thermal treatment, product metallurgy
- 3. Smart surfaces and surface functionalization**
 - Functional coatings, lighting, energy & photovoltaic
- 4. Construction products and solutions**
 - Organic coatings, building & structure, metal working
- 5. Innovative designs and assembly solutions**
 - Civil engineering, assembly & testing, hybrid/additive manufacturing
- 6. Industrial solutions**
 - Engineering, finishing & metallic coating, process control & measurement, continuous coating pilot lines



INDUSTRIAL PILOTS

- Cold pre-processing techniques like drying, intensive mixing, agglomeration (extrusion, briquetting, compaction)
- Thermal processing : grate sintering, rotary kiln, multiple and rotary hearth furnaces, fluidized beds, vacuum heating furnace, fixed bed shaft furnace
- Smelting : rotary tilting furnace, induction melting furnaces (atmospheric and vacuum), and coming soon: a quite unique and versatile 125 litre plasma furnace (for CRMs, precious metals, liquid slag processing and granulation...)
- Numerous metal processing and coating lines



RESEARCH AND INNOVATION

1. Mineral processing

- Conventional and innovative efficient treatment of primary resources (comminution, separation, concentration)

2. Extractive metallurgy of non-ferrous

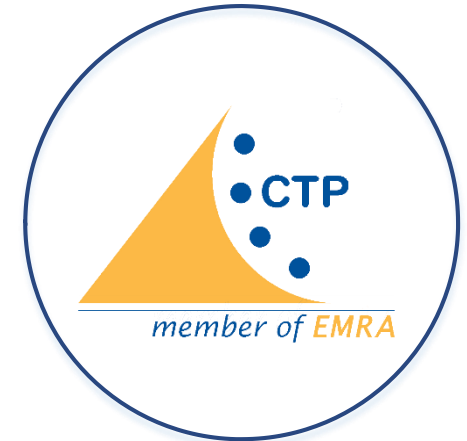
- Development of processes for the recovery of metallic values from primary and secondary resources

3. Smart Materials engineering

- New material formulation and testing (cement, concrete, stabilized materials), mechanochemistry and functionalizing (slags, fly ash, bottom ash...)

4. Waste processing and valorization

- Plastics/polymers/Composites, Residue Derived Fuel, Electric and Electronic Wastes, metals, industrial by-products, Domestic waste...



INDUSTRIAL PILOTS

- **Crushing and comminution pilot** (jaw, impact, hammer, roll, rod and ball mills, autogenous), dry or wet, batch or continuous
- **Mineral and waste treatment pilot** : screening/classification, DMS, Jig, spirals, flotation, aeraulic-densimetric-triboelectric separators, pelletizing
- **Hydrometallurgical pilot** : agitated tanks, steam generator, press-filter, belt-filter
- **Heat treatment pilot** : direct heating rotary kilns, dryers



R&D and Pilot Platforms

ULiège - GeMMe



RESEARCH AND INNOVATION

- 1. Bio-Hydrometallurgy**
 - End-of-life products and complex raw materials efficiency
- 2. Smart sorting**
 - Advanced 3D imaging and hyperspectral sorting
- 3. Geometallurgical characterization**
 - Process oriented “mineralogical” mapping
- 4. Physical pre-processing**
 - Energy-Efficient fragmentation and conditioning



INDUSTRIAL PILOTS

- Hydrometallurgical Cu recovery from recycling of EOL Vehicles and WEEE (BIOLIX)
- Hydrometallurgical REE recovery from recycling of EOL Vehicles permanent magnets
- Hydrometallurgical Sn-Au recovery from recycling PM-poor WEEE (NOVA)
- Sensor-based scrap sorting for automotive and WEEE recycling sectors (PICK-IT)



Laboratory and Pilot Services



- 1. Laboratory expertise** : material characterisation and failure analysis (chemical analysis, corrosion, mechanical tests, non destructive tests, tests in extreme conditions, calibration and certification).
- 2. Technical consultancy/assistance** : process/product know-how, claim handling, sales & after-sales support.
- 3. Process development** : Development, testing and demonstration of new or improved production processes, including metal production-energy-recycling-by-products, assembly, metal forming, additive manufacturing, finishing and coating and process engineering.
- 4. Product development** : Conception, design and testing of new or improved products from lab scale to industrialisation including forming and assembly and product metallurgy.



- 1. Laboratories** : Analytical requirements with specific expertise in mineral materials (minerals, slag, earth and sludge, dusts, etc.) and technological materials (plastics, composite materials, electronic waste and boards, etc.).
- 2. Studies & Tests** : Development of complete flowsheets tested in the laboratory and at pilot scale, mineral enrichment studies along with processing, recycling, shaping and upscaling.
- 3. Custom work** : With over 7000 m² of testing facilities, batches of several hundred kilos to several tonnes can be processed to achieve comminution, classification or physical separation through crushing, fine grinding, screening (vibrating screen, flip flow, sieving) or classification (dynamic separator, curved screen, spiral classifier, hydrocyclone separation) up to drying and heat treatment.
- 4. Consultancy** : In Belgium and abroad, on specific topics or as part of factory start-ups in mining and quarrying, exploration companies, concentration plants and waste processing units.



- 1. Hydrometallurgy and mineral processing**
 - Laboratory to semi-industrial pilot for all key steps of hydrometallurgy : Normal and pressure leaching, Precipitation, Solid/Liquid Separations, Cementation, Solvent Extraction, Ion Exchange and Electrowinning.
 - Laboratory to semi-industrial pilot for physical processing : Instrumented Ball Mill, Bottom Driven Flotation Cells, High Voltage Pulse Fragmentation, Dry Separation Techniques.
- 2. Primary and secondary raw material characterization**
 - Particle characterization, optical ore microscopy and quantitative image analysis.
 - SEM-based mineral liberation analyzer (Zeiss Mineralogic SEM-EDX).
 - Microanalytical tools (micro-XRF and EDX 60 mm²).