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Issue 2 | Nov 2025

REPTiS NEWSLETTER

Dear Readers,

Welcome to a new issue of our project's newsletter!
This edition arrives as we passed the end of our first year of work. We recently held our third consortium meeting at the Fraunhofer IFAM premises in Dresden, where we reviewed our progress and confirmed a major achievement: one of our primary milestones has been met! Mineral samples have now been transferred to the processing stage (see the chapter on Deliverable D2.1), paving the way for the first trials of titanium powder manufacturing. That means that in the next months we will start to see the powders we are planning to validate for all EU possible end users in the different powder metallurgy part fabrication technologies.

Beyond titanium, we are also looking in greater detail at the other Critical Raw Materials content of the Ukrainian deposits, and we will surely report on the outcomes of this work in later publications, including the newsletter.

The consortium is pushing forward with tremendous dedication, and we are especially proud to demonstrate the feasibility of establishing this crucial new supply chain for titanium alloy powders from Ukraine — a strategic partner country for the EU. This core mission remains the vital reason the EU chose to fund our project.

In the following pages you will find a wealth of technical information, as we have five different "Deeper Look" articles: covering ilmenite, titanium mining in Ukraine, the innovative Velta Ti process, sustainability within the Ti supply chain, and Metal Injection Moulding. That's quite a lot of reading! We've aimed to keep the information accurate yet accessible, but please don't hesitate to reach out directly if you have any questions or curiosities.

We are also excited to introduce two key consortium members in our «REPTiS Consortium Showcase» section: the renowned German research institution Fraunhofer IFAM (Dresden Branch) and Element 22, a dynamic German enterprise specializing in titanium powder metallurgical processes for diverse applications.

Finally, we provide a summary of our recent communication and dissemination efforts, highlighting the events we have actively attended and, more importantly, where you can find us next. While our first free Training Webinar on November 6th has passed (we plan to publish the footage soon!), we hope you will join us for our major Side Event organized with ten other European projects at the upcoming Raw Materials Week in Brussels on Friday, November 21st. We would love to see you there — please come and talk to our team!

We are always here to provide further information, so please feel free to contact us with any questions you may have.

Kenan Boz (EPMA), REPTiS coordinator

Co-funded by the European Union

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This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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WHAT IS REPTiS DOING?

REVIEW OF DELIVERABLES SUBMITTED

We continue keeping you informed on our activities by describing briefly the deliverables submitted in the last period, that is the reports that must be sent to the funding agency to demonstrate the fulfilment of the work originally foreseen. Here is a short summary of their content: being all "sensitive" reports, the descriptions will have to be somewhat short... thanks for your understanding!

D1.3-D.1.6 Business Case Descriptions

Our project will use four demonstrators, or business cases, to validate the titanium alloy powders produced. These are actual parts, from the portfolio of our partners that are the expected end users; and the deliverables 1.3, 1.4, 1.5 and 1.6 describe in detail their features.

The demonstrators are the following:

- Trabecular cup (medical)
- Hybrid outlet guide vane fittings (aerospace)
- Watch Casing (consumer goods)
- Bone Plate Implant (medical)

In the reports, all these parts have been described in terms of raw materials and property requirements.

Figure 1 | The four REPTiS business cases

D2.1 Optimised Ilmenite Ore Samples For Processing

We have successfully implemented a comprehensive set of technical measures designed to enhance the sustainability and efficiency of our ilmenite concentrate production. These efforts were strategically focused on reducing energy consumption, emissions, water usage, and overall waste generation. The scope of the activity was broad, encompassing geological exploration, optimizing the beneficiation processes, modifying ore transportation methods, and thoroughly evaluating low-carbon and renewable energy options. As a direct result of these improvements, we have produced an optimized ilmenite concentrate, which has now been transferred to the VELTI facility for subsequent hydrometallurgical processing and titanium powder production via the Velta Ti Process. This marks a significant milestone in our commitment to more sustainable operations (and indeed, it represented a project milestone).

Figure 2 | Ilmenite concentrate ready for processing in VELTI

We are available to give you more information (if non confidential, of course!).

INTERNAL MEETINGS

Third General Meeting Of Reptis (Dresden, Germany)

The third general project meeting took place on 1-2 October 2025 in Dresden, Germany, at the facilities of our partner Fraunhofer IFAM. It was the occasion to review the activities of the first year, that ended in August, make the plans for the next 6 months, and clarify together what is needed for a successful completion of the first reporting period that will happen at the end of February 2026.

A consortium dinner was held on 1st October in a downtown restaurant along the Elbe river. At the end of the second day of the meeting, the partners were given a guided tour of Fraunhofer IFAM labs, where they could see, among many other things, some of the equipment that is being used in REPTiS (mostly for characterisation purposes, although our German partner possesses full capabilities for nearly all powder metallurgy fabrication routes!).

Our next transnational meeting is tentatively scheduled for late April 2026 in Athens, and may coincide with the Review Meeting with our EU Project Officer.

Figure 3 | The start of the third transnational meeting at Fraunhofer IFAM Dresden, on 1st October 2025

Figure 4 | The REPTiS consortium partners present in Dresden, in front of one of the entrances to the Fraunhofer IFAM premises

A DEEPER LOOK INTO...

Our **Deeper Look Into (DLI in short)** section is where our consortium partners regularly share technical insights, providing you with a solid starting point to explore important topics related to the REPTiS project.

Here is the content of this issue:

DLI 03: Understanding Ilmenite
Kicking off this section (and continuing from our first issue), M. Lechner of MUL explains the bedrock of our work: the ilmenite mineral. Learn exactly what it is, where it can be found, and what its fundamental features are.

DLI 04: Mining and Beneficiation
This DLI, provided by VELTA, details their role in the supply chain, covering the exploration, extraction, and beneficiation processes. For those new to the term, beneficiation is the process that improves the economic value of ore by removing waste minerals to produce a higher-grade concentrate. This article also touches on the sustainability of these critical upstream processes.

DLI 05: The Velta Ti Process (Episode I)
VELTA continues its story by detailing the process that transforms ilmenite into titanium powders. In this first instalment, follow the journey from ilmenite to titanium oxide and discover the valuable byproducts obtained simultaneously.

DLI 06: Sustainability at IRES
We asked IRES to provide an in-depth look at how REPTiS maintains a constant focus on sustainability, ensuring that our activities are developed with the most environmentally and economically sound choices in mind.

DLI 07: Metal Injection Moulding (MIM)
Finally, Element 22 discusses one of the expected end uses for our new titanium powders: Metal Injection Moulding (MIM). Learn why this technology is a perfect fit for our alloy powders.

DEEPER LOOK 03/
CHARACTERIZATION OF ILMENITE AS A RAW MATERIAL FOR TITANIUM PRODUCTION : A REVIEW

Introduction

Ilmenite ($FeTiO_3$) is the most abundant titanium-bearing mineral on Earth and serves as the primary raw material for the production of titanium dioxide (TiO_2), which is widely used in pigments, titanium metal, and welding electrodes. This review provides a comprehensive overview of ilmenite's morphological, structural, and chemical characteristics, as well as its processing methods based on the deposit type. Additionally, global trends in the production and reserves of titanium minerals are analysed to contextualize ilmenite's role in the international market.

Characteristics of Ilmenite

MORPHOLOGY

The morphology of Ilmenite varies throughout the given type of deposit. In general, ilmenite crystallizes in a trigonal crystal system. It displays a layered structure composed of alternating Fe^{2+} and Ti^{4+} octahedral layers. Figure 5 illustrates the crystalline structure of $FeTiO_3$. The yellow, blue and red balls represent Fe, Ti and O atoms. The orange and blue octahedra represent the FeO_6 and TiO_6 clusters, respectively.

Ilmenite is found in the form of granular aggregates or tabular hexagonal crystals [1]. It often exhibits a metallic lustre and has an iron-black colour. It is paramagnetic and oxidation and cation substitution can influence its magnetic properties. Typical substitutions are Mg^{2+}, Mn^{2+}, Ni^{2+}, Nb^{5+}, V^{4+} and Ta^{5+}. Ilmenite has a density that ranges from 4.5 to 5.2 g/cm³ and a Mohs hardness between 5.0 and 6.0. Additionally, it possesses conductive properties. Figure 6 summarizes the different morphologies of ilmenite related to the deposit type and the influence on mineral processing.

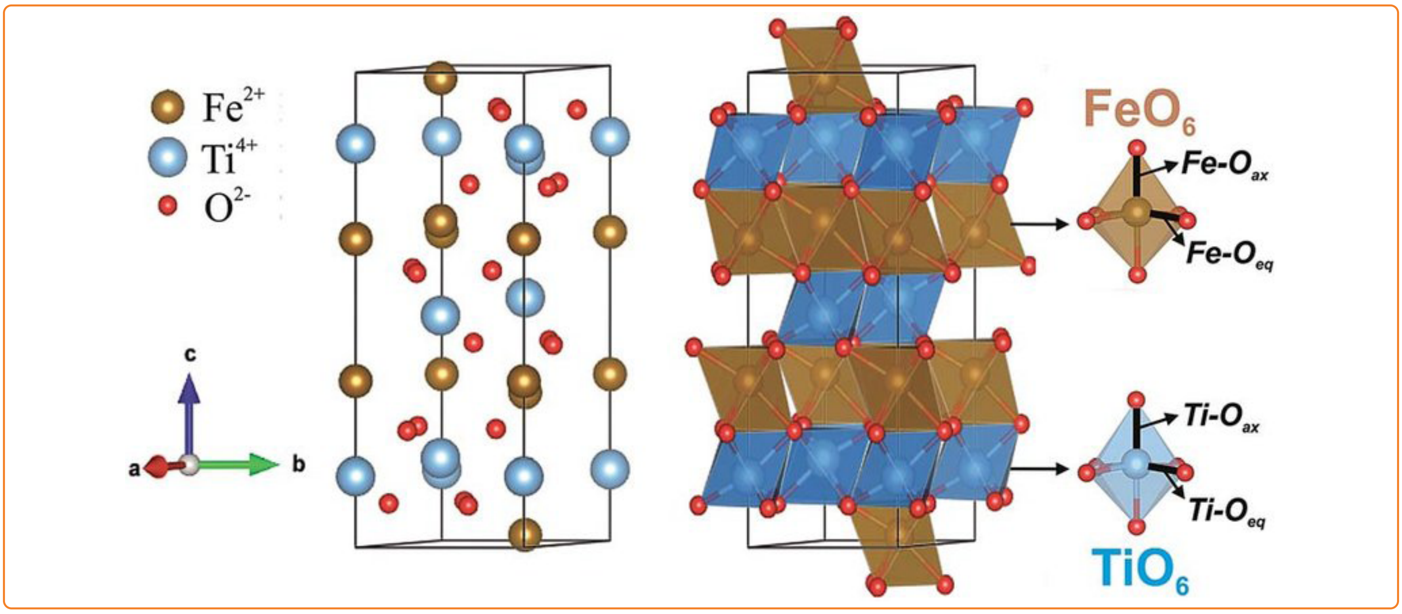


Figure 5 | Crystalline structure of ilmenite [2]

[1] O. Tschauner, C. Ma, M. G. Newville, and A. Lanzirotti, "Structure analysis of natural wangdaodeite—linbo3-type fetio3," Minerals, vol. 10, no. 12, pp. 1–12, Dec. 2020, doi: 10.3390/min10121072.

[2] R. A. P. Ribeiro and S. R. De Lázaro, "Structural, electronic and elastic properties of $FeBO_3$ (B = Ti, Sn, Si, Zr) ilmenite: A density functional theory study," RSC Adv, vol. 4, no. 104, pp. 59839–59846, 2014, doi: 10.1039/c4ra11320a.

DEPOSIT TYPE	ILMENITE MORPHOLOGY	RELEVANCE FOR MINERAL PROCESSING
Primary (Magmatic) (e.g., Norway)	• Hard Rock Deposit • Anhedral Grains • Coarse-Grained (>100 µm)	• Liberation Requires Crushing/ Grinding • Gravity Separation • Magnetic Separation (LIMS) • Flotation
Secondary (Placer) (e.g., Australia)	• Heavy Mineral Sand Deposit • Rounded Grains due to Transport • Fine-Grained (50–200 µm)	• No Crushing • Gravity Separation • Magnetic Separation (LIMS/HIMS)
Weathered Ilmenite (e.g., Ukraine, India)	• Heavy Mineral Sand Deposit • Porous, Oxidized Grains • Formation of Leucoxene/ Pseudorutile	• No Crushing • Reduced Magnetic Susceptibility • Gravity Separation • Magnetic Separation (Hims) • May Require Further Processing (E.g., Electrostatic Separation)

Figure 6 | Table of the morphology of Ilmenite related to different deposit types

SOLID SOLUTIONS AND OXIDATION

Figure 7 illustrates the oxidation pathways of titanium-bearing phases from the FeO-Fe_2O_3-TiO_2 ternary phase diagram. Path [3], particularly the oxidation of ilmenite to pseudorutile, is significant in weathered ilmenite deposits. Substitutions within the crystal structure, such as Mg^{2+} replacing Fe^{2+} and Fe^{3+} replacing Ti^{4+}, frequently occur.

These substitutions, along with the weathering process, affect the magnetic properties of the mineral. When ilmenite is oxidized (weathered), it transforms into pseudorutile ($Fe_2Ti_3O_9$) or leucoxene. Both of these products contain higher TiO₂ content but exhibit lower magnetic susceptibility [3], [4].

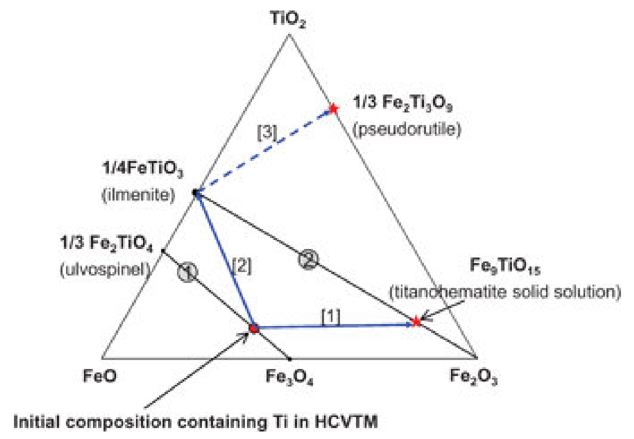


Figure 7 | Ternary system of FeO-Fe2O_3-TiO_2 [5]

[3] H. Salehi, S. Seim, L. Kolbeinsen, and J. Safarian, "Phase Transitions and Microstructural Changes During Oxidation and Reduction of a Weathered Ilmenite Concentrate," Min Metall Explor, vol. 38, no. 2, pp. 1167–1173, Apr. 2021, doi: 10.1007/s42461-021-00397-9.

[4] M. Contreras, M. J. Gázquez, and J. P. Bolívar, "Mineral Separation and Characterization of the Ilmenite Ore Phases: Optimization of the TiO_2 Pigment Process," International Journal of Thermal and Environmental Engineering, vol. 16, no. 2, pp. 105–112, Aug. 2018, doi: 10.5383/ijtee.16.02.006

[5] J. Tang, M. S. Chu, C. Feng, F. Li, and Z. G. Liu, "Phases transition and consolidation mechanism of high chromium vanadium-titanium magnetite pellet by oxidation process," High Temperature Materials and Processes, vol. 35, no. 7, pp. 729–738, Aug. 2016, doi: 10.1515/htmp-2015-0067.

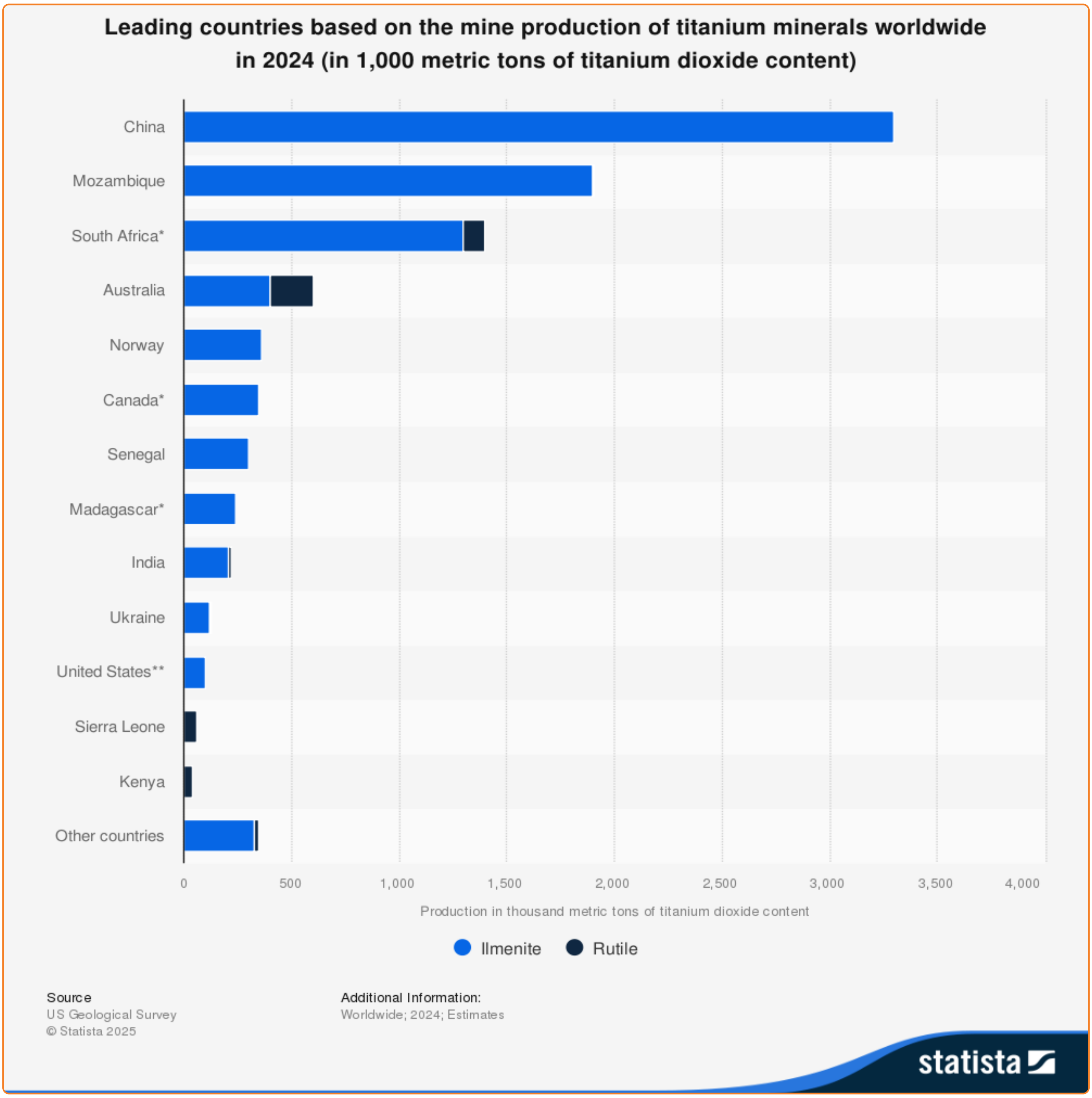


Figure 8 | Global production of titanium minerals worldwide [6]

Figure 8 shows the leading countries in the global production of titanium minerals in 2024, measured in thousands of metric tons of titanium dioxide. It categorizes the minerals into two types: ilmenite (represented by blue bars) and rutile (represented by black bars). China is the largest producer, with nearly 3,800 thousand metric tons of ilmenite. Following China are Mozambique and South Africa, which have significant ilmenite production. South Africa also produces a notable amount of rutile. Australia contributes to both ilmenite and rutile production, although its output is smaller than that of South Africa. Other countries such as Norway, Canada, Senegal, and Madagascar produce moderate amounts. Smaller producers, including Sierra Leone and Kenya, produce more rutile than ilmenite.

[6] U. Geological Survey, "mcs2025.pdf - Mineral Commodity Summaries 2025," 2025.

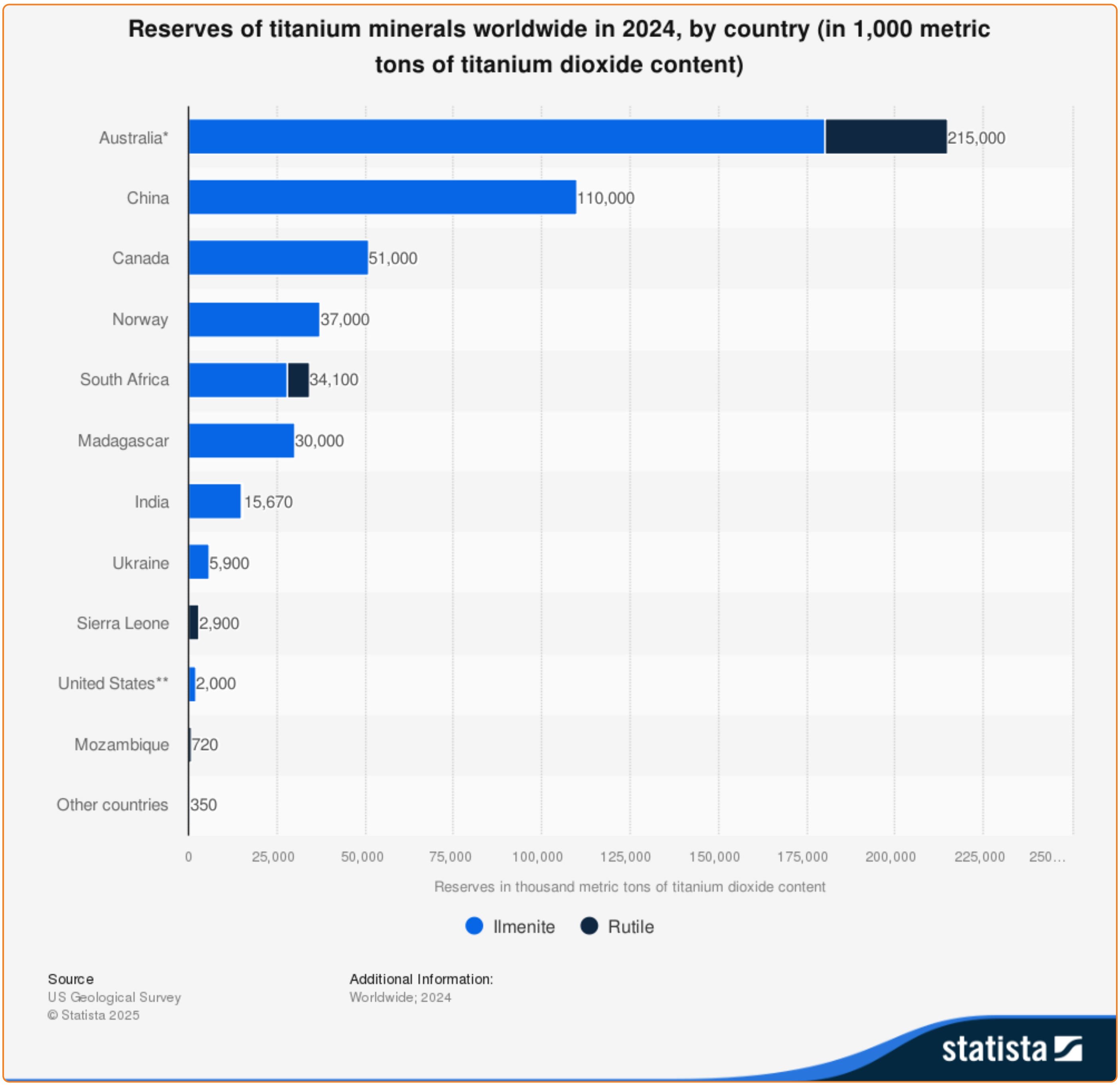


Figure 9 | Global Reserves of titanium minerals worldwide [6]

The chart in Figure 9 shows the estimated reserves of titanium minerals worldwide in 2024, categorized into ilmenite (blue) and rutile (black). Australia holds by far the largest reserves, with around 215,000 thousand metric tons, consisting of both ilmenite and rutile. China follows with 110,000 thousand metric tons, mainly ilmenite. Canada (51,000), Norway (37,000), and South Africa (34,100) also have significant reserves. Madagascar and India possess moderate amounts, with 30,000 and 15,670, respectively. Smaller reserves are found in Ukraine (5,900), Sierra Leone (2,900), the United States (2,000), Mozambique (720), and other countries (350). Rutile reserves are notable in Australia and Sierra Leone.

The charts reveal an important distinction between current production levels and long-term supply capacity. While China leads in production, Australia holds the largest reserves, positioning itself as a future leader if production increases. In contrast, countries like Mozambique might encounter challenges due to their limited reserves, despite having high current output. Recognizing this balance is crucial for predicting future market dynamics and managing resources effectively in the titanium sector.

[6] U. Geological Survey, "mcs2025.pdf - Mineral Commodity Summaries 2025," 2025.

DEEPER LOOK 04/
VELTA MINING APPROACH IN REPTIS

VELTA's responsibilities within the REPTiS project focus on enhancing the sustainability and efficiency of ilmenite extraction and beneficiation. This includes improving processes and equipment to optimize resource use and reduce energy intensity, leveraging weathering crust to minimize waste and land use, lowering the carbon footprint through alternative energy sources and transportation methods, and assessing residual critical raw materials (CRMs) and rare earth elements (REE) in ilmenite ores. These efforts align with REPTiS's goals of reducing environmental impact, increasing resource efficiency, and supporting the European Green Deal.

Geological Exploration and Resource Optimization

VELTA is conducting extensive geological exploration to study the weathering crust and aquifers at the deposit. Multiple boreholes are being drilled to assess geological and hydrogeological conditions, with samples analyzed in the laboratory to determine ore characteristics. Preliminary results were integrated into proprietary software for reserve estimation, enabling precise resource planning. A hydrogeological monitoring station, supported by a modular facility and a dedicated team, ensures continuous monitoring of aquifer conditions.

Figure 10 | Geological borehole sampling

To improve ore access in the watered minefield, dewatering pumps were deployed to remove water from the quarry, and trenches and sumps were constructed to redirect water flows, enhancing operational efficiency and reducing water resource use. Studies of the weathering crust utilization showed the increased ilmenite sand extraction per site, reducing land use and stripping works while boosting ore processing capacity and commercial ilmenite concentrate yield. Initial analyses of weathering crust samples also revealed high Al_2O_3 content, and ongoing laboratory testing with consortium partner, the University of Leoben, are held for defining optimal beneficiation schemes to further enhance resource efficiency. Based on the data obtained through the completed work, regulatory authorities granted permission for further exploration and evaluation of additional mineral products at the deposit.

Transportation and Infrastructure Upgrades

To reduce the energy intensity, carbon footprint, and water resource use in ilmenite transportation, VELTA conducted industrial testing of a new combined transport scheme, transitioning from solely hydrotransport (pumping slurry through polyethylene pipes) to a hybrid system integrating road transport using articulated dump trucks and stationary hydrowashing units. This transport scheme has been held for two hydrowashing units, supported by infrastructure upgrades including a new ore stockpile site, sumps, hydromonitors, pumps, and power lines.

Figure 11 | Field testing of the new transportation scheme

Beneficiation And Waste Reduction

VELTA is improving beneficiation processes to increase ilmenite yield and reduce environmental impact. Analysis of the existing refining section identified opportunities to reduce ilmenite losses. Samples from the beneficiation section were analysed by the partner institution, the University of Leoben, who has already developed improvements to the beneficiation scheme. Design documentation for upgrading the refining section is currently under development, with industrial testing planned to enhance concentrate quality and increase TiO_2 content, supporting the objectives of the REPTiS project.

Figure 12 | Ilmenite processing: sampling

Low-Carbon Technologies

VELTA is developing measures to reduce the carbon footprint of ilmenite processing. A project to transition direct-flow drying drums from diesel to liquefied or natural gas was developed. In parallel, an assessment of the available feedstock and a project for the installation of biogas equipment were carried out to further improve air quality and reduce emissions. Additionally, VELTA has explored renewable energy options, developing plans for solar panel integration and biodiesel use for transport equipment.

Working jointly with equipment suppliers, a project was developed for the installation of solar panels and energy storage systems as alternative sources of renewable energy for the facility. In collaboration with IRES, VELTA is collecting data to quantify reductions in energy consumption and carbon emissions, aligning with the European Green Deal's environmental goals.

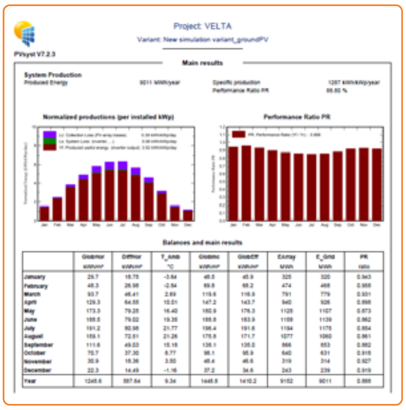


Figure 13 | Solar generation calculations

Critical Raw Materials Assessment

The University of Leoben conducted initial laboratory analyses of ilmenite samples to identify the presence of other Critical Raw Materials (CRMs), including Rare Earth Elements (REEs). While final results are still pending and will guide future CRM recovery strategies, preliminary findings indicate the presence of elements such as Nb, V, Hf, Sc, Y, La, Ce, Nd, and Th. These results underscore the potential for improved resource utilization within the REPTiS project and open new opportunities to develop a resilient and secure supply chain within the EU, laying the groundwork for further studies under future research programs.

Conclusion

The ongoing initiatives undertaken by VELTA within the REPTiS project reflect a comprehensive approach to enhance sustainability and efficiency of titanium feedstock production. Following the implementation of multiple process improvements, optimized ilmenite concentrate samples will be forwarded to the partner company, Velta RD Titan. These samples will undergo hydrometallurgical processing into TiO_2 and further to titanium metal powder via the Velta Ti Process.

DEEPER LOOK 05/
VELTA TI PROCESS: EPISODE I - FROM ILMENITE TO TIO_2 WITHOUT GENERATING WASTE

Traditionally, the production of titanium metal is based on the Kroll process, where the main raw material is titanium tetrachloride ($TiCl_4$) obtained through a complex process of chlorination of mineral raw materials with a high TiO_2 content, such as natural rutile, synthetic rutile, and titanium slag (the latter two are obtained by processing ilmenite). The use of ilmenite itself is rare due to the high chlorine consumption and the large amount of waste. This method has a number of significant drawbacks, including high energy consumption, significant environmental risks due to the use of gaseous chlorine (carbochlorination of titanium-containing raw materials takes place at 800-1000 ºC) and the generation of large amounts of hazardous waste.

Unlike the Kroll process, the innovative Velta Ti Process technology used in the European REPTiS project uses titanium dioxide (TiO_2) directly, obtained from ilmenite through hydrochloride decomposition and hydrolysis of titanium oxychloride ($TiOCl_2$). The Velta Ti Process thus avoids the titanium tetrachloride ($TiCl_4$) formation step and eliminates many of the environmental and process problems of the classical process. As a result, the Velta process offers significantly lower emissions and a significant reduction in energy consumption, while fully recycling liquid and solid streams into valuable by-products. This results in a waste-free production process, making Velta Ti Process technology more sustainable and environmentally acceptable than traditional methods.

Figure 14 | Ilmenite (crushed)

The Essence Of The Process: Hydrochloride Decomposition and Closed HCL Cycle

The Velta Ti Process is based on the hydrochloric decomposition of ilmenite using a hydrochloric acid (HCl) solution. A distinctive feature of the process is the ability to operate at relatively low temperatures (~120 ˚C), which significantly reduces energy consumption compared to traditional technologies [7].

At the first stage, the mineral ilmenite ($FeTiO_3$), as seen in Figure 10, reacts with an HCl solution to form soluble titanium oxychloride ($TiOCl_2$) and iron chlorides. In order to simplify the subsequent separation of titanium and iron, iron is completely converted to the ferrous state (Fe^{2+}) using ferrous metal (Fe^0). This avoids the formation of stable complex iron compounds and greatly simplifies its further separation.

Upon completion of the reaction, the resulting suspension is separated into two streams: a solution of titanium and iron chlorides and an insoluble sludge. This sludge consists of unreacted ilmenite, silicon oxide and other mineral components that do not dissolve in an acidic environment.

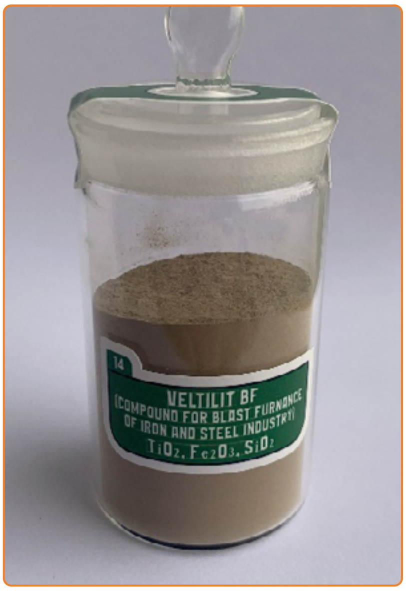


Figure 15 | Veltilit BF sample

[7] Brodskyy, A., Troshchylo, V., Gonchar, A., Chukhmanov, O., Hnatenko, R., Kuzimych, O., Bezukh, N., Ihumentseva, A., & Troshchylo, S. (2023). Method for integrated processing of titanium-containing feedstock to obtain high value-added products based on titanium, iron, calcium and nitrogen (Patent No. WO 2023/075738 A1). World Intellectual Property Organization. https://patents.google.com/patent/WO2023075738A1/en

The insoluble sludge is separated by filtration and sent for separate processing into a product with the trade name Veltilit BF (Figure 15), which is a titanium-containing additive that is added to protect blast furnace linings and extend their service life [8].

The second stage is the hydrolysis of the resulting titanium oxychloride ($TiOCl_2$). At this stage, titanium oxychloride reacts with water to form a precipitate of a mixture of oxide (TiO_2) and titanium oxyhydroxide ($TiO(OH)_2$). Further, after washing, drying and calcination, pure titanium dioxide (TiO_2) is obtained, suitable for further use in titanium metallurgy (Figure 16).

Figure 16 | Synrutile (titanium dioxide)

A particular advantage of the Velta Ti Process is the fully closed cycle of hydrochloric acid. The HCl vapours generated during the hydrolysis stage are completely captured, condensed and returned to the initial stage of the process, which ensures the recovery of approximately 50% of the hydrogen chloride used to decompose the ilmenite concentrate.

Production of Iron Oxide Pigments as a Solution to the Problem of Ferric Chloride Waste

After titanium in the form of oxide (TiO_2) and titanium oxy-hydroxide ($TiO(OH)_2$) is separated during the hydrolysis step, a liquid stream containing mainly ferrous chloride ($FeCl_2$) remains. This solution is further processed to produce iron oxide pigments of various colors (e.g. black, Figure 17).

Figure 17 | Black iron oxide pigment

At the first stage, the $FeCl_2$ solution is neutralized with a suspension of calcium hydroxide ($Ca(OH)_2$), which ensures the effective precipitation of iron hydroxide ($Fe(OH)_2$). The use of calcium hydroxide is an environmentally friendly solution, as it avoids the additional addition of foreign salts to the process and contributes to the production of pure and stable pigments.

After neutralization, the resulting ferric hydroxide precipitate is subjected to controlled oxidation with air or pure oxygen to produce pigments of different colours, depending on the process conditions:

- Black pigments (magnetite, Fe_3O_4), Figure 17
- Red pigments (hematite, αFe_2O_3), Figure 18
- Yellow pigments (goethite, α-FeO(OH)), Figure 19

Figure 18 | Red iron oxide pigment
Figure 19 | Yellow iron oxide pigment

The resulting pigments are characterized by high purity, color saturation and color intensity, which makes them suitable for use in a variety of industries, from coatings and paints, polymer coatings and plastics, various types of paper to building materials.

After the iron oxide pigments are separated, a liquid stream containing mainly calcium chloride ($CaCl_2$) remains. This solution is not a waste but is sent for further processing and obtaining other valuable products, which we will describe in detail in the next issues of our newsletter.

[8] Korthas, B., Hunger, J., Pschebezin, V., Adam, J., Harp, G., Kallio, S., Hurme, R., Wikström, J.-O., Hahlin, P., Wiedner, S., Di Sante, L., & Gelli, I. (2007). Hearth protection in blast furnace operation by injection of TiO_2 materials (Report EUR 22821 EN). Publications Office of the European Union. https://op.europa.eu/publication-detail/-/publication/92844658-07ff-4e2e-a2a1-42e02b303eba

DEEPER LOOK 06/
TOWARDS A GREENER TITANIUM VALUE CHAIN: HOW REPTiS EMBEDS SUSTAINABILITY FROM THE GROUND UP

Titanium is a critical raw material with strategic importance for Europe. From aerospace and defence to medical and consumer products, titanium's properties are unmatched, but so are the environmental and economic costs of producing it using conventional methods.

The REPTiS project takes on this challenge by not only proposing an alternative titanium powder supply chain through the innovative Velta Ti process but also embedding sustainability assessment as a core activity throughout the entire project. This is where the powerful combination of Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) comes into play.

Figure 20 | LCA methodology

What Are LCA and LCC? Why Do They Matter?

LCA (Life Cycle Assessment) is a standardized methodology (ISO 14040/44) used to quantify the environmental impacts associated with a product, process or system across all its life stages. REPTiS uses LCA to understand and minimize emissions, energy use, and resource depletion across each step of titanium and CRM processing, from mining ilmenite ore to transforming it into usable powders and parts.

In parallel, LCC evaluates the total economic cost including not just direct manufacturing expenses but also operational, disposal, and environmental costs over the product's lifetime. This approach ensures that new technologies are not just greener, but also economically viable.

Methodology in Action: How Sustainability Is Measured in Reptis

REPTiS evaluates the environmental and economic impacts of each process step from mining and beneficiation to powder production and part manufacturing using a Life Cycle perspective. Depending on the scope, this assessment follows either a "Cradle-to-Gate" or "Cradle-to-Grave" (Figure 21) approach, capturing all inputs (e.g. raw materials, energy) and outputs (e.g. emissions, waste, by-products).

At the heart of this methodology is the Life Cycle Inventory (LCI) (Figure 22), a robust dataset built using real data supplied by project partners. Environmental and cost-related information is collected through structured questionnaires, covering key aspects such as energy use, material flows, emissions, and by-products. This data collection is a collaborative and iterative process, with ongoing dialogue between sustainability experts and technical teams to ensure accuracy and relevance. As the project evolves and processes are refined, the LCI is continuously updated to reflect the most current performance metrics.

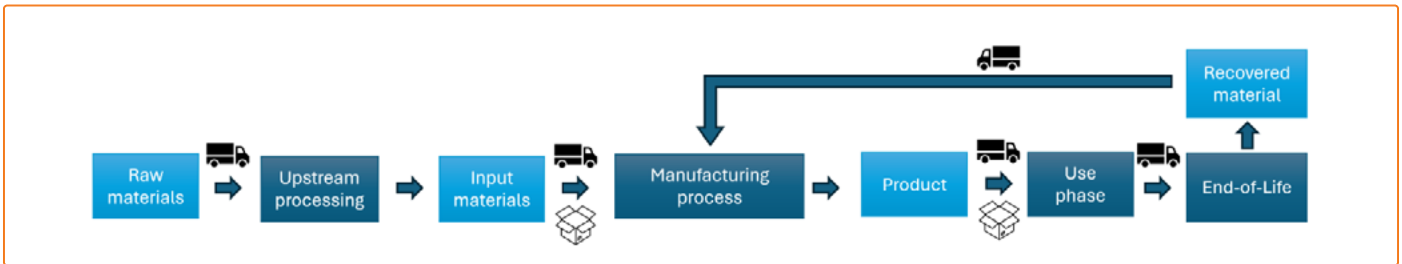
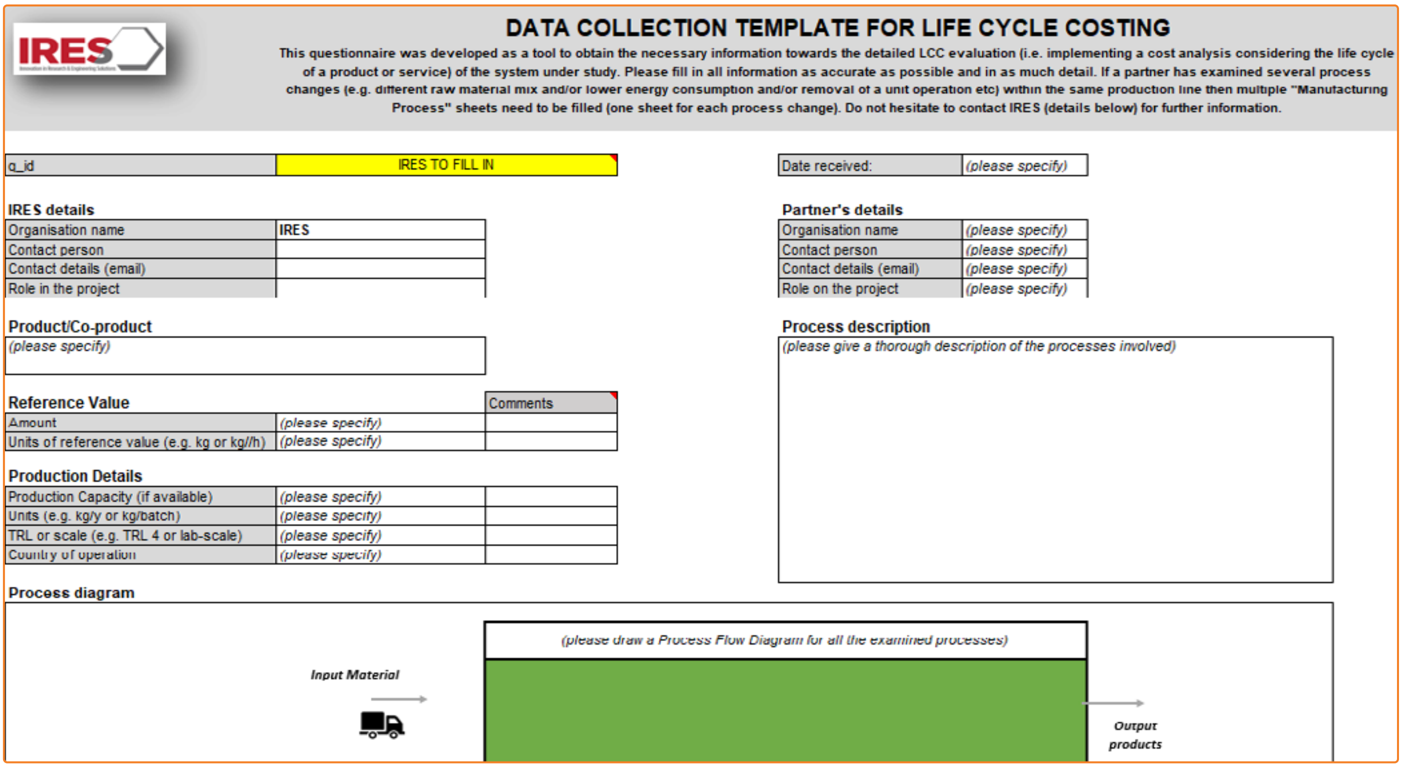


Figure 21 | Schematics of a cradle-to-grave cycle

Results That Matter: Evidence-Based Sustainability and Continuous Improvement


IRES

DATA COLLECTION TEMPLATE FOR LIFE CYCLE COSTING

This questionnaire was developed as a tool to obtain the necessary information towards the detailed LCC evaluation (i.e. implementing a cost analysis considering the life cycle of a product or service) of the system under study. Please fill in all information as accurate as possible and in as much detail. If a partner has examined several process changes (e.g. different raw material mix and/or lower energy consumption and/or removal of a unit operation etc) within the same production line then multiple "Manufacturing Process" sheets need to be filled (one sheet for each process change). Do not hesitate to contact IRES (details below) for further information.

q_id	IRES TO FILL IN
Date received:	(please specify)

IRES details

Organisation name	IRES
Contact person	
Contact details (email)	
Role in the project	

Partner's details

Organisation name	(please specify)
Contact person	(please specify)
Contact details (email)	(please specify)
Role on the project	(please specify)

Product/Co-product

(please specify)

Process description

(please give a thorough description of the processes involved)

Reference Value

		Comments
Amount	(please specify)	
Units of reference value (e.g. kg or kg//h)	(please specify)	

Production Details

Production Capacity (if available)	(please specify)	
Units (e.g. kg/y or kg/batch)	(please specify)	
TRL or scale (e.g. TRL 4 or lab-scale)	(please specify)	
Country of operation	(please specify)	

Process diagram

(please draw a Process Flow Diagram for all the examined processes)

Input Material

Output products

Figure 22 | LCI template for data collection

REPTiS goes beyond static sustainability assessments by integrating Life Cycle Assessment (LCA) and Life Cycle Costing (LCC), as dynamic tools for guiding innovation and decision-making. Rather than applying these methodologies solely as retrospective evaluations, REPTiS uses them in real time to identify environmental and economic hotspots (specific stages, materials, or technologies that carry disproportionate impacts or costs).

By systematically analysing inputs, outputs, and resource flows, the project is able to identify environmental (Figure 23) and economic hot-spots, pinpoint inefficiencies and prioritize improvement efforts as processes are developed. This approach enables the continuous refinement of extraction, processing, and powder production technologies, ensuring that sustainability gains are embedded into the technical core of the project not treated as an afterthought.

Through this iterative methodology, REPTiS aims to achieve measurable reductions in environmental burdens while maintaining economic viability. The outcomes will feed into Product Environmental Footprint (PEF) datasets and sustainability reports aligned with EU standards, positioning REPTiS titanium powders as both high-performance and future-compliant within strategic industrial value chains.

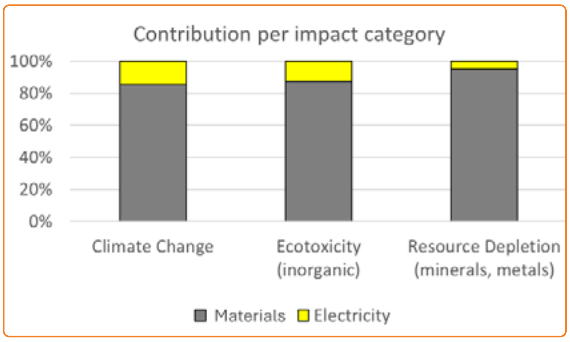


Figure 23 | Example of LCA results showing the contribution of materials and energy in different impact categories

DEEPER LOOK 07/
METAL INJECTION MOULDING (MIM): WHAT IT IS AND WHY IT MATTERS

Metal Injection Moulding is an advanced manufacturing process which combines the design freedom of plastic injection moulding with the strength and durability of metals. Fine metal powders are blended with a binder to form a feedstock that is injection moulded into a “green” part, debound to remove the binder, and sintered at high temperature to achieve near-full density with mechanical properties comparable to wrought material. The result is small, complex, tight-tolerance components produced at scale with excellent surface finish and repeatability.

Top Benefits at a Glance

- Complexity at scale: economic at medium–high volumes for intricate geometries and internal features that are expensive to machine
- Tight tolerances, great surfaces: near-net shape minimizes finishing
- Material efficiency: net-shape production drastically cuts scrap vs. subtractive methods
- Predictable quality: stable, repeatable process with well-defined controls and evidence
- Design freedom: injection tooling enables lattice, undercuts, text, and multi-part consolidation
- Cost position: competitive total cost where part complexity is high and annual volumes justify tooling

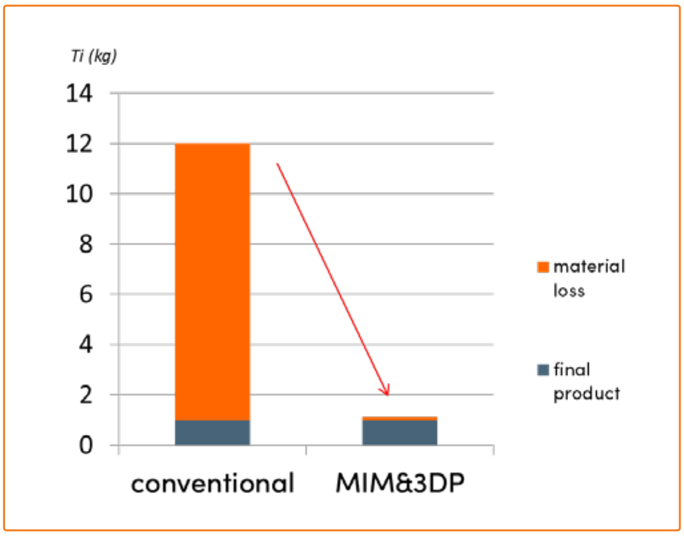


Figure 24: Ratio of material usage between MIM and 3D-printing and conventional machining (dependent on shape)

Where Mim Fits Best

Use MIM when parts are small (typically <100 g), highly featured, and produced in volume — for example: medical device fasteners and implant sub-components, dental parts, consumer wearables, aerospace clips and brackets, precision industrial couplings, and compact housings.

How Mim Works — The Workflow

FEEDSTOCK PREPARATION → fine metal powder + binder system blended to controlled rheology

MOULDING → injection of feedstock into tool cavities; parts ejected as “green” compacts

DEBINDING → solvent/catalytic/thermal removal of binder to create “brown” parts with controlled porosity

SINTERING → high-temperature densification to near-full density; controlled shrinkage yields final dimensions

FINISHING → optional blasting, tumbling, machining, coatings, or colouring (e.g., titanium anodizing)

KEY OUTPUTS → repeatable dimensions, target density, documented evidence of process stability (e.g., SPC, test coupons, density and mechanical test reports)

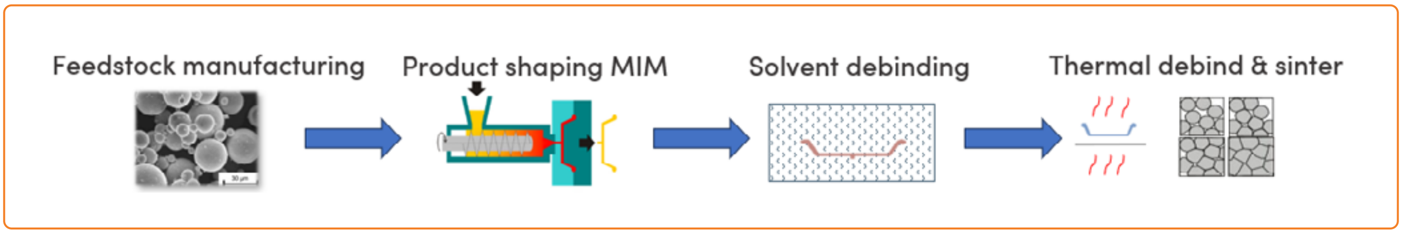


Figure 25 | Schematic workflow for MIM

Materials & Properties

MIM supports steels (e.g., 17-4PH, 316L), low-alloy steels, tool steels, soft magnetic alloys, and titanium alloys (e.g., Ti-6Al-4V) and commercially pure titanium for high strength-to-weight, corrosion resistance, and biocompatibility.

Correctly processed, parts reach wrought properties with fine microstructures and good fatigue performance after appropriate heat treatment.

Figure 26 | Different colours made by anodizing titanium MIM parts

Design Guidance (High Level)

MASS & WALL THICKNESS → avoid heavy sections; balance thickness to reduce distortion.

UNIFORMITY → use fillets and gradual transitions; avoid abrupt section changes.

DRAFT & EJECTION → apply draft angles suitable for the tool and feedstock.

TOLERANCES → dimensional change during sintering is predictable; design with sinter-shrinkage factors; typical tolerances are in the range of 0.2 +/- 4% mm without postprocessing

FEATURE STRATEGY → consolidate assemblies where possible; use ribs/bosses to add stiffness without mass.

Quality, Validation, and Standards

A robust MIM part producer typically aligns to ISO 9001 and, for medical devices, ISO 13485. For titanium implants and components, material and product requirements can reference ASTM F2885 (Ti-6Al-4V) and ASTM F2989 (CP Ti), among others. Typical validation includes IQ/OQ/PQ on moulding and sintering, density and mechanical testing, corrosion testing where applicable, and full device-level biocompatibility where required.

Figure 27 | Different demonstrator parts made by Titanium MIM
Left: occlusal screw; Right: part used in skin treatment

Sustainability & Economics

MIM's near-net-shape nature reduces material usage and machining time relative to subtractive routes, improving cost and carbon—especially on difficult-to-machine alloys like titanium. Energy-efficient debind/sinter cycles and recycled powder streams further lower footprint. Total economics are strongest when (complexity × volume) is high enough to amortize tooling.

When Not To Use Mim

- Very low annual volumes where tooling is not justified
- Very large or massive parts with long thermal paths
- Applications demanding single-crystal or wrought-only metallurgical structures

FAQs

IS MIM "AGILE" OR "WATERFALL"?

The manufacturing route is staged with clear gates; development can iterate through design loops quickly using prototype tools.

HOW CLOSE TO FINAL PROPERTIES IS MIM?

With correct processing, wrought properties are achievable: final heat treatment and surface preparation tune performance.

WHAT ABOUT COLOUR AND BRANDING?

Titanium parts can be anodized in multiple colours; steel can be coated (e.g., PVD) or passivated. Branding can be incorporated in the tool.

HOW DOES MIM COMPARE TO METAL AM?

AM excels for very low volumes and extreme customization; MIM wins on unit economics at volume for small, complex parts.

REPTiS CONSORTIUM SHOWCASE

In every newsletter, we present you some of the partners. In this issue, we have one of our end users, Element22, and the Dresden Branch of Fraunhofer IFAM!

ELEMENT22 (www.element22.de)

Element 22 GmbH is a titanium powder-metallurgy specialist based in Kiel, Germany. We deliver near-net-shape titanium components from prototype to series production with a focus on Metal Injection Moulding (MIM), debind & sinter services, sinter-based additive manufacturing — notably Cold-Metal Fusion (CMF) and Lithography-based Metal Manufacturing (LMM) green parts — and tape casting for thin metallic sheets used in the green-hydrogen economy (flow-field components). Our proprietary feedstock knowhow and control over the sinter process provides stable throughput (installed capacity ~75 t/year) and repeatable quality.

What Element 22 Offers

- MIM and AM of titanium (Ti-6Al-4V, CP Ti and Titan-aluminides) for small/medium, complex parts with tight tolerances and excellent surface finish
- Debind & sinter of MIM/CMF/LMM green parts: process-window development, shrinkage and distortion control, tailored thermal profiles and validation
- Tape casting for energy & hydrogen: thin, uniform metallic sheets engineered for corrosion resistance and flow performance in stacks
- Finishing & testing: blasting, tumbling, passivation/anodising access, metrology (CMM/SPC), mechanical and chemical testing
- DfM & simulation: early engagement to optimize geometry for sintering behaviour, yield, and cost

How We Work

FEASIBILITY & DFM → material selection, target tolerances, and gate criteria

PILOT & VALIDATION → IQ/OQ/PQ on moulding/sintering, dimensional studies, mechanicals, and process capability (Cp/Cpk)

INDUSTRIALIZATION → tooling optimization, control plans, and traceable documentation for regulated markets

SERIES PRODUCTION → stable throughput and continuous improvement on yield and cost

Figure 28 | Facility of Element 22

Quality & Compliance:

We operate certified quality systems (ISO 13485, ISO 9001) and apply EN/AS 9100 disciplines for aerospace-grade programmes. Titanium MIM/AM parts are produced to recognized standards such as ASTM F2885 (Ti-6Al-4V) and ASTM F2989 (CP Ti). Our track record includes the first FDA-approved titanium MIM implant (2011) and long-running supply into medical and high-reliability applications.

Sustainability & Supply Assurance

Near-net-shape routes significantly reduce machining scrap, and production is powered by renewable electricity. Closed-loop powder handling and efficient thermal cycles further improve footprint. Dual-source consumables and preventive maintenance underpin schedule reliability.

Role in REPTiS

Element 22 is a partner in REPTiS, where its main role is representing an end user for the powders developed. One of the demonstrators, a Ti-alloy bone plate, will be produced with REPTiS material and used to validate the viability of the powders developed for the MIM technology.

FRAUNHOFER IFAM, DRESDEN BRANCH (www.ifam-dd.fraunhofer.de)

A Renowned R&D Centre

The Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM is one of the leading research institutions in Europe for applied materials science and manufacturing technology. The Dresden branch is especially renowned for its work in powder metallurgy, sintering technologies, and additive manufacturing. Located in the heart of Saxony, Fraunhofer IFAM Dresden bridges basic research and industrial application. It works in close cooperation with universities, companies, and international research consortia.

Figure 29 | Facility of © Fraunhofer IFAM Dresden

The key research activities at Fraunhofer IFAM Dresden revolve around:

POWDER METALLURGY, including the development and optimization of powder-based materials, powder characterization, processing routes and material characterization.

ADDITIVE MANUFACTURING (AM) like powder bed fusion (electron-beam) and sinter-based technologies like additive screen printing, MoldJet, fused filament fabrication, lithography-based metal manufacturing or GelCasting.

HIGH-PERFORMANCE MATERIALS using advanced sintering methods like field-assisted sintering (FAST/SPS) or hot isostatic pressing

FUNCTIONAL MATERIALS, including thermoelectric materials and components for energy conversion.

MATERIALS FOR HYDROGEN PRODUCTION AND STORAGE

Role in REPTiS

The main task of Fraunhofer IFAM in the REPTiS project is the powder characterization in its accredited labs. Powder characterization is essential for ensuring quality and performance in powder-based technologies.

Fraunhofer IFAM's key capabilities are:

- Particle size distribution analysis via laser diffraction and image analysis
- Particle shape and morphology via image analysis and scanning electron microscopy
- Flowability and apparent density measurements
- Specific surface area analysis (BET method)
- Tap density and compressibility testing
- Chemical composition via spectroscopy and inert gas fusion
- Phase composition and crystallinity via X-ray diffraction.

For more details on the Dresden Branch of Fraunhofer IFAM:
https://www.ifam.fraunhofer.de/en/Aboutus/Locations/Dresden.html

DISSEMINATION & COMMUNICATION

EPMA SUMMER SCHOOL 2025

The yearly school for powder metallurgy organised by EPMA, the 2025 Summer School [9], took place in Lund (Sweden) from 23rd to 27th June 2025. The school trains every year more than 60 young engineers about the whole spectrum of powder metallurgy, with lectures given by selected speakers from the prominent universities, research centres and companies, and its success is testified by the fact that the 2025 was the 23rd edition, the event having been created back in 1998.

In this year's programme REPTiS had a plenary lecture, on Friday 27th, where T. Ranto of Montanuniversität Leoben, who actually also took part as a trainee, "changed side" to explain to his peers the rationale of the project and what we are expected to deliver, highlighting the importance for the PM titanium industry.
In the next years the project is expected to give demo talks at the next Summer Schools, shorter pitches with a more practical approach. The next edition is being organised in Porto (Portugal) in July 2026.

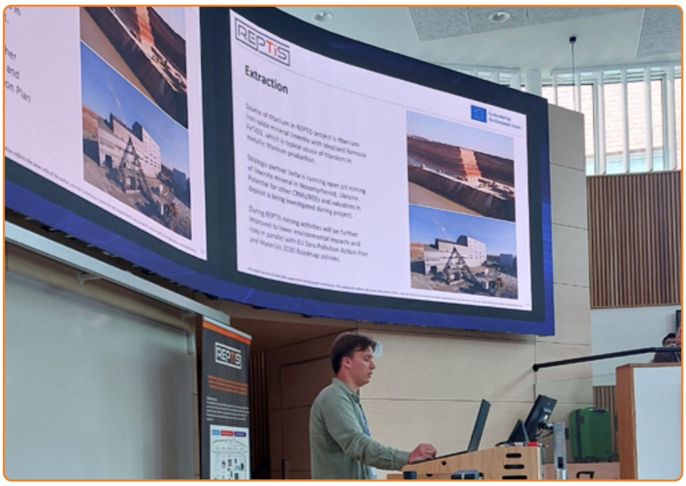


Figure 30 | T. Ranto (MUL) lecturing to 62 students about REPTiS at the EPMA Summer School in Lund (Sweden), on 27 June 2025

EURO PM2025

Our Coordinator and Dissemination partner, EPMA, organises every year the European congress for Powder Metallurgy. Being the most comprehensive event for powder metallurgy in Europe, gathering companies (our expected end users!) and researchers dealing with all possible PM materials and techologies, the EuroPM event is the natural place to present our congress. This year, in Glasgow, EPMA included many events related to Critical Raw Materials, and REPTiS was actively involved in organising some of them.

Figure 31 | The banner of the Euro PM2025 Congress & Exhibition

[9] Find out more at: https://summerschool.epma.com/

RESQTOOL/BLOOM CLUSTERING WORKSHOP

The first event was an interesting workshop, formally not linked to the powder metallurgy theme but organised just before the EuroPM so that some participants could enjoy both, co-organised by two Horizon Europe projects, RESQTOOL [10] (recycling of end-of-life cutting tools) and BLOOM [11] (innovative extraction and processing of CRMs). The latter is REPTiS' "sister" project, as it was funded in the same call as our project, and REPTiS already had interesting contacts (we mentioned them in the previous issue of this newsletter), including the invitation to speak at the IRTC2025 conference in Ljubljana, in February 2025.

The workshop, titled "Primary and Secondary Raw Materials: how can Europe reduce scarcity risks and boost the Green Transition" took place at the Crowne Plaza Hotel in Glasgow on Sunday 14th September, from 9:00 to 15:00. It gathered several experts on the CRM policies in Europe, UK and US, and speakers from projects and entities working on the subject. It was closed with a round table among all speakers, where the topic of the necessary steps to take to overcome the present situation were discussed.

Our project was represented by C. Kukla of Montanuniversität Leoben, who gave a presentation in the morning ("REPTiS Project: Responsible Extraction and Processing of Titanium and other Primary Raw Materials") and sat in the afternoon round table.

We thank RESQTOOL and BLOOM for the great occasion to share our approach and ideas with the many experts in the room! The full footage of the event has been published by RESQTOOL on their YouTube channel [12].

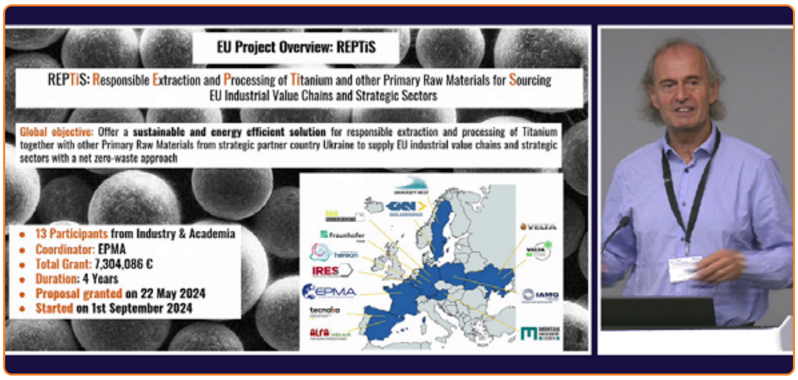


Figure 32 | C. Kukla (MUL) speaking in the "Primary and Secondary Raw Materials: how can Europe reduce scarcity risks and boost the Green Transition" Clustering Workshop in Glasgow, 14th September 2025

Figure 33 | Two images of the final workshop round table, where K. Kukla (MUL) represented REPTiS and his entity, Montanuniversität Leoben

[10] Find out more at: https://www.resqtool.eu/

[11] Find out more at: https://bloomproject.eu/

[12] https://www.youtube.com/playlist?list=PL-Ncc8xQMKW4LqadQDixVcfWWSsir_Ytc

CRITICAL RAW MATERIALS CORNER

One of the sessions organised by our project was a speaking session, hosted inside the Euro PM exhibition, on Monday 15th afternoon, 13:45-15:15. On a special stage named "PM Forum", inside the exhibition hall, 11 speakers from projects and entities related to CRMs had the chance of addressing the audience with a short pitch (8 minutes).
The access to the exhibition was free of charge, so even if the session was held in parallel with the many interesting technical sessions of the EuroPM conference, there was a good number of listeners (20-30).
Our project took care of organising the speakers list, and H. Yousefi of EPMA acted as a facilitator so that the tight programme could be carried out smoothly. Our project's pitch was given by I. Agote of TECNALIA.

CRITICAL RAW MATERIALS CORNER				
Monday, 15th September 2025				
13:45	13:47	Welcome	Hamid Yousefi - European Powder Metallurgy Association / REPTiS	0:02
13:47	13:55	RESQTOOL Project: Recycling of High Quality CRM Resources from Machining Tools for Re-use Applications	Jakub Szałatkiewicz - RESQTOOL Project / Phoenix Surowce Sp. z o.o.	0:08
13:55	14:03	BLOOM Project: Liberation Analysis for Optimizing Extraction and Processing of CRMs	Marko Komac - BLOOM Project / INTRAW	0:08
14:03	14:11	EURO-TITAN Project: Decarbonized Titanium Recovery from Aluminium and Titanium Production Residues	Beate Orberger - Euro Titan / Catura	0:08
14:11	14:19	REESOURCE: Securing Critical Raw Materials for Europe Through Responsible Mining Innovation	Duygu Yilmaz - REESOURCE / IFE	0:08
14:19	14:27	The ReeMAP Project for extraction of Critical Minerals	Pär Jonsen - ReeMAP Project / LKAB	0:08
14:27	14:35	START Project - Sustainable Energy Harvesting Systems Based on Innovative Mine Waste Recycling	Filipe Neves - START Project / LNEG	0:08
14:35	14:43	REPTiS Project: Responsible Extraction and Processing of Titanium and other Primary Raw Materials for Sourcing EU Industrial Value Chains and Strategic Sectors	Iñigo Agote Beloki - REPTiS Project / TECNALIA	0:08
14:43	14:51	Meeting Rare Earth Permanent Magnet Supply Chain needs via long-loop recycling	Thomas Kelly - Ionic Technologies	0:08
14:51	14:59	HARMONY: Holistic Approach to enhance the Recyclability of rare-earth permanent Magnets Obtained from aNY waste stream	José Manuel Martin Garcia - HARMONY Project /CEIT	0:08
14:59	15:07	A new state of the art: high magnetic performance and recycling of critical materials	Alexandre Damiens - MAGELLAN Project / Orano	0:08
15:07	15:15	PERSEPHONE Project: Autonomous Exploration and Extraction of Deep Mineral Deposits	Marko Komac - PERSEPHONE Project / INTRAW	0:08
15:15	15:15	*End*		0:00

Figure 34 | The programme of the Critical Raw Materials Corner, held in the Euro PM2025 Exhibition Hall, Glasgow, 15th September 2025.

Figure 35 | I. Agote (Tecnalia) addressing the audience of the Critical Raw Materials Corner

SPECIAL INTEREST SEMINAR ROUND TABLE "PM AND CRITICAL RAW MATERIALS: ISSUES AND OPPORTUNITIES"

On Monday, September 15th, REPTiS hosted a Special Interest Seminar — a unique format within the Euro PM2025 programme that differs from standard technical sessions by featuring invited speakers and a wider scope. Our session, titled «PM and Critical Raw Materials: Issues and Opportunities,» brought together 12 panellists in a dynamic round-table discussion, moderated by D. Yilmaz of IFE, Norway.

The core topic explored the crucial connection between the Critical Raw Materials (CRM) and Powder Metallurgy (PM) industries. PM is both an end-user (facing issues of material availability and price volatility) and a potential solution, offering an opportunity to embed CRMs into recycling processes, thus reducing dependence on external sources and securing supply chains.

Special Interest Seminar "PM and Critical Raw Materials: Issues and Opportunities"				
Monday, 15th September 2025				
16:00	16:05	Welcome	Bruno Vicenzi - European Powder Metallurgy Association / REPTiS	0:05
16:05	17:25	Round Table Discussion: "PM and Critical Raw Materials: Issues and Opportunities"	Moderator: Duygu Yilmaz - REESOURCE Project/ IFE	1:20
		Panellists:		
		Beate Orberger	Euro-Titan Project / Catura	
		Duygu Yilmaz	REESOURCE Project/ IFE	
		Filipe Neves	START Project / LNEG	
		Christian Kukla	REPTiS Project / Montanuniversität Leoben	
		José Manuel Martin Garcia	HARMONY Project /CEIT	
		Alexandre Damiens	MAGELLAN Project / Orano	
		Jakub Szałatkiewicz	RESQTOOL Project / Phoenix Surowce Sp. z o.o.	
		Marko Komac	BLOOM and PERSEPHONE Projects/ INTRAW	
		Fergal Coleman	Ionic Technologies	
		Nabeel Mancheri	EIT Raw Materials	
		Thomas Weissgärber	Fraunhofer IFAM Dresden	
17:25	17:30	*Recap and End*		0:05

Figure 36 | The programme of the Special Interest Seminar "PM and Critical Raw Materials: Issues and Opportunities", held at Euro PM2025 on 15th September 2025

Figure 37 | A picture of the panel in the Special Interest Seminar Round Table

PROJECT RECEPTION

To close a Monday afternoon dedicated to Critical Raw Materials, REPTiS and the other project RESQTOOL (also coordinated by EPMA) had the opportunity of briefly addressing the delegates taking part in the Congress' Poster Reception (where an award to the best poster in EuroPM was given), that became then a Projects Reception. K. Boz and B. Vicenzi of EPMA reminded the hundreds of participants in the reception the concept of both projects, and the presence of the project booths in the exhibition.

Figure 38 | K. Boz and B. Vicenzi of EPMA addressing the participants of the Projects Reception

PROJECT BOOTH

The project showcased its work at the EuroPM Exhibition (as we had the previous year), utilizing a booth that displayed informative posters, a roller banner, an introductory rolling video, and Velta Ti Process samples to highlight its foreseen activities and results.

Figure 39 | The REPTiS booth at Euro PM2025

REPTIS TRAINING WEBINAR

The REPTiS project successfully launched its first free training webinar, "Mining and beneficiation of ilmenite-bearing heavy mineral sands," on November 6, 2025. This dynamic educational event captivated participants by showcasing the consortium's vital work in pioneering a more efficient and sustainable titanium supply chain.

The session highlighted the journey from Ukrainian ilmenite (source of iron and titanium, but not only!) to producing high-quality titanium alloy powders, all while prioritizing the best possible environmental footprint and competitive cost.

Figure 40 | The graphics used to launch the first Training Webinar held on 6th November 2025

The webinar began with a concise introduction to the project by Bruno Vicenzi, Technical Manager at the European Powder Metallurgy Association. Following this engaging overview, two expert-led lectures anchored the event:

- ARTEM YAROVINSKY

  Chief Business Development Officer of Velta in Ukraine, offered participants a fascinating look into his experience mining ilmenite, focusing on the strategically important Birzulivske deposit.

- MICHAEL LECHNER

  University Assistant at the Montanuniversität Leoben, then took the stage to address the exciting opportunities currently emerging in the beneficiation process for ilmenite-bearing heavy sands.

The focused 90-minute programme ran from 14:00 to 15:30 CET and featured excellent interaction between attendees and the lecturers during the dedicated Q&A segments. The event was a clear success, providing a valuable platform for all those interested in Critical Raw Materials, mining, and the future of titanium production to connect and learn from industry leaders.

As the event happened while we were editing this issue, but too late to include the details, more will come in the next issue. And we look forward to announcing our next training opportunity, our second webinar, soon!

UPCOMING EVENTS

REPTiS is also preparing other participations in events in the next months. We hope you will be able to catch up with us there! For the moment, we have one, very important!

WE INVITE YOU TO A CRITICAL RAW MATERIALS WORKSHOP AT THE RAW MATERIALS WEEK 2025!

REPTiS is heading to Brussels for the exciting Raw Materials Week 2025 [13], and we are going with ten partner projects! Securing a reliable and sustainable supply of Critical Raw Materials (CRMs) is paramount for driving Europe's green transition. However, even the most innovative Horizon Europe projects often encounter common obstacles that limit their potential for full-scale impact across the value chain.

That is why REPTiS gladly accepted to team up with the REESOURCE [14] project and nine other Horizon Europe innovator projects to host a crucial side event, the workshop "Crossroads of Innovation: Shared Challenges and Joint Solutions in Raw Materials".

This interactive workshop is designed to cut through the noise, connect our varied innovation efforts, and accelerate the transition towards a resilient and sustainable CRM supply.

We aim to move beyond discussion and generate actionable insights that will strengthen Europe's open strategic autonomy.

Don't miss this opportunity to collaborate with EU-funded projects, industry leaders, and policymakers!

Figure 41 | Announcement for the critical raw material workshop at the raw materials week in Brussels

[13] https://single-market-economy.ec.europa.eu/sectors/raw-materials/week_en

[14] https://www.reesource.eu/

JOIN US TO:

- **Share Hands-on Solutions**: Discover concrete results and practical solutions emerging from multiple Horizon Europe projects.
- **Identify & Mitigate Barriers**: Collectively pinpoint common obstacles and work together to co-develop effective strategies to overcome them.
- **Explore Synergies**: Forge new connections and unlock powerful cross-project collaborations in CRM innovation.

EVENT DETAILS:

Friday, 21 NOV 2025	09:00–13:00	Marivaux Hotel, Brussels
Official side event of Raw Materials Week 2025		

The full details on the event are available on the Raw Materials Week website page for side events [15] but above all on the dedicated page of the REESOURCE website [16]. Our speaker in the event will be A. Yarovinsky of Velta (Ukraine), who will present with the title "REPTiS: strategic partnership with Ukraine for Ti availability in the EU".

As spaces are filling up fast for this essential collaborative event, secure your participation today and help us drive real-world change in the raw materials sector! Here is the registration link: RMW2025 REESOURCE side event - Registration.

Keep in touch with our website and social media to know more about our future activities! And contact us of you would like to organise anything together.

[15] https://single-market-economy.ec.europa.eu/sectors/raw-materials/week/side-events_en
[16] https://www.reesource.eu/crossroads-of-innovation-raw-materials-week-2025/

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You can find us on our website www.reptis.eu

There you can subscribe to this newsletter and all important news by filling the form that is proposed to you when you click "SUBSCRIBE" in the "Contacts" page. You will be inserted in our mailing list, that we will treat confidentially and from which you can opt out any time.

We are also active on the following social media:

LinkedIn: https://www.linkedin.com/company/reptis/

X (you know, Twitter): https://x.com/REPTiS_Project

YouTube: https://www.youtube.com/@REPTiS_HE

If you look for our Open Access documents, check Zenodo! There REPTiS has a community that can be reached at this link https://zenodo.org/communities/reptis, where all our Open Access material will be available for decades to come!

If you need to get in touch personally, you can also address your E-Mails to our coordinator Kenan Boz: kboz@epma.com

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