

RESQTOOL

NEWSLETTER

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COORDINATOR'S FOREWORD

Dear RESQTOOL Followers,

As Europe, and indeed the broader global markets, navigate challenging times that are reshaping our approach to the supply and management of raw materials for the industry, the sensitivity around these processes has notably increased, reflecting the recent shifts within the EU. It is no longer solely about environmental sustainability. With the release of the European Critical Raw Materials Act (CRM) and its supporting risk assessments and evaluations, security and defence have also become integral to our discussions and the wider view on CRM and their role and supply chain in the hard metal industry. This evolution underlines the tension between collective European goals and individual national needs, illustrating the complex landscape businesses must operate in. The dialogue around these issues has grown more intense, marking a significant change in tone among all stakeholders of these CRM's.



Figure 1: Kenan Boz (EPMA), REPTIS Coordinator

The European Green Deal remains a cornerstone of our strategy, aiming to reduce emissions, enhance renewable energy use, and combat pollution to foster a greener Europe. Economically, we are striving for greater self-reliance by diversifying our supply chains and enhancing our internal market's access to both primary and secondary sources. We are deepening our understanding of our supply chain dependencies on specific geographical regions. This enhanced knowledge is pivotal as we aim to keep all stakeholders informed as they navigate the complexities of forging new trade agreements in a constantly shifting global context.

With the current international landscape, we are adjusting to dynamic geopolitical shifts, reinforcing our defence capabilities, securing alternative energy sources, and cultivating alliances—all while carefully managing our interactions with global powers. We are committed to staying abreast of a rapidly evolving world, with a focused dedication to technology, environmental stewardship, economic stability, and international diplomacy.

As the RESQTOOL consortium, we are dedicated to addressing the pressing issues of recycling and supplying Critical Raw Materials for Europe, which are closely tied to the challenges mentioned above. We hope you find our latest newsletter informative and engaging. Please feel free to share it with others who may also take an interest in these topics. Furthermore, we are at your disposal for any additional information you might require, so do not hesitate to reach out with any questions: you will find all contact details on the last page of this newsletter.

PREVIOUS NEWSLETTER

Did you miss our previous newsletter? It featured all the essential information about our project's goals and ambitions. We recommend you start there to get up to speed! No worries if you haven't seen it yet, you can easily download it from our website, here: www.resqtool.eu/documents/



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NEWS FROM RESQTOOL

ACTIVITY FROM MONTH 09 TO MONTH 13

As in the first issue, we continue reviewing the work done by looking at the deliverables submitted (for those unfamiliar with the Horizon Europe and in general with EU-funded projects, it could be useful to go back to Issue 1 for explanations). As always, while we may not be able to divulge all the details in some of the deliverables, as some may be denoted and classified as confidential, we can give you a good basic knowledge of what may have been done and achieved.

DI.6 – Database on EU WC-Co scrap resources for Waste Data Collection

The available W(C) and Co resources coming from scrap in several European countries has been evaluated using the UNFC methodology, to create a publicly open database, accessible at www.hm-scrap.eu/.

D9.5 – Internal Progress Report I

Just at the end of the first year of the project, the consortium reviewed the activities carried on in an internal report, that included an assessment of the costs incurred, in order to verify the rate of use of the resources.

Get in touch with us if you would like to know more!

INTERNAL MEETINGS

Third general meeting of RESQTOOL in San Sebastián (Spain)

On 8th and 9th January 2025, the consortium met again in the premises of the Basque partner CEIT, in San Sebastián.

This was the third plenary meeting of the team, after the Kick-off in Chantilly (France) and the second meeting in Domodossola (Italy). After the first year of activity; that ended in November 2024, it was the occasion to review all what has been done, and plan ahead for the next months, also in view of the end of the first Reporting Period towards the funding agency, that will happen in May 2025.

The next general project meeting will take place in June 2025 in Jyväskylä, Finland, hosted by our partner Tikomet (the partner profile can be found in the RESQTOOL Team Tour section of this issue).



Figure 2: The RESQTOOL consortium members in front of the CEIT headquarters in San Sebastián.



Figure 3: A moment of the technical discussion during the meeting in San Sebastián.



Figure 4: In the afternoon of the last days the partners were offered a tour of the CEIT facilities.

RESQTOOL

IMPORTANT: RESQTOOL STATEMENT ON CLASSIFICATION OF USED HARDMETAL TOOLS IN THE EU

Our partners already involved in recycling would like to highlight an issue that restricts recycling of Critical Raw Materials, such as cutting tools.

The point is that the used tools are considered, to all respects, waste. As such, they are subjected to all waste management regulations, in all states and at the European level. The result is that the collection of the used tools from various remote locations, and the transportation from one country to another of used tools requires a sophisticated, especially large amount of paperwork even for small quantities. Special shipping, customs, permissions, and so on, make the process tedious and in some cases almost impossible. Even within the EU.

All this is understandable, from the policy maker and the citizens' point of view, because waste management is a source of high concern, being sometimes occasion for abuses, and prone to criminality infiltrations. But in the case of used tools, this caution is largely unneeded/too drastic/restrictive.

Our partner Sandvik depicts in Figure 5, how a new tool and a used tool look: they are almost indistinguishable. The difference might be just in the corners, cutting edges, where some 300-500 µm of the surface and the coating have been abraded/chipped away, and some surface scratches/discholoration due to the interaction with the machined material and the mechanical clamping in the machine tool. Technically, the composition is essentially the same as for a tool just taken out of the producer's selling box. The tool is not functional anymore, but its content, and environmental footprint is the same!



Figure 5: There is no difference between new (left) and used (right) carbide tools (courtesy Sandvik).

In fact, we claim that the used tools are not waste, or scrap. They should be rightfully referred to as “secondary raw materials”, or concentrate, and of a very precious kind, that is, with a very defined and CRM-concentrated composition, exactly the one needed to produce new, perfectly working tools, with only minor additions or adjustments, when correctly

recycled. For instance, a Tungsten-containing ore could contain less than 0.5% of Tungsten, whereas a drilling bit used in mining, even after use, typically contains more than 85% by weight of Tungsten (Figure 6).



Figure 6: Comparison in W content between a typical W ore and an hardmetal mining bit (courtesy Sandvik).

The issue we highlight for hardmetal tools is not limited to these materials: similar reports come from other very critical recycling routes, like that for permanent magnets.

Thus, an improvement of the rules would be beneficial, especially thinking that the EU Critical Raw Materials Act adopted in 2024 has the ambitious, rightful and important target of achieving 25% of the EU annual consumption of CRMs from recycling by 2030 - just 5 years from now.

If we want to give an extra boost to the circularity of our CRMs and reach this goal, we need to address not only the technical feasibility of the recycling, but also the formally legal restrictions and barriers related to it. We do not want to “relax” the regulations in a generic way, that could lead to unwanted drawbacks; but rather act “surgically” to remove barriers for a successful circular CRM management in Europe.

All this considered, and in the view of the announced Circular Economy Act that has been announced and is expected for the last quarter of 2026, the RESQTOOL consortium strongly recommends to:

- **Remove waste classification (codes I20199 and B1010) on tungsten carbide hardmetal tools**
- **Classify tungsten carbide-based hardmetal tools as “hardmetal recycling products”.**

Furthermore, this should be done before it is too late to help in achieving the 2030 target on recycling! It is needed right now.

If:

- you are interested in joining our efforts to achieve this objective, or
- you are involved in recycling of other CRMs and would like to add up to create critical mass to improve the current classification of CRM secondary raw materials (from “scrap”) in general, or
- you are involved on the policy side and would like to have a thorough discussion on the subject,

please contact us!

TECHNICAL SHORTS

In this section consortium partners will provide some technical info to dive deeper into some important topics related to the RESQTOOL project. In this issue, we briefly explain what has been done on labelling hardmetal tools, that includes defining the labels, or codes, and the most efficient marking strategies.

TS03: RESQTOOL CODING ACTIVITIES

Within the RESQTOOL project, one of the key activities is the encoding of the information necessary for the recycling of end-of-life tools. This information includes the chemical composition, microstructure, and the nature of the coatings, present in most cutting tools.

The GS1 standard has been adopted to include this information in each tool during the manufacturing process. Within the consortium, procedures have been agreed upon to integrate this information securely.

In addition to the recycling information, this standard allows for the inclusion of logistics data that will help with the efficient management of worn-out tools.

The GS1 standard is based on printing data matrices on non-functional areas of the tools. The selection of these areas is key to optimising the sorting process. The laser marking system is also crucial. In the RESQTOOL project, new laser marking techniques have been developed to improve the readability of the codes under changing lighting conditions.

In parallel, work is underway on the implementation of robotic sorting systems based on these new technologies.



Figure 7: Example of used tools with codes (photo by Tikomet).

TS04: AUTOMATED SORTING ACTIVITIES

The RESQTOOL project addresses the whole value chain of hardmetal tools recycling and production. Tools at the end of their life are being collected and handled to professional metal scrap companies where the first recycling operations are being carried out. The first operation is sorting due to the variety of materials and metals the tools are composed of. Sorting allows segregation of mixed hardmetal scraps to uniform materials groups which is essential for the metals recycling operations carried out in specialised plants and processes. Currently, sorting is carried out partially by mechanical operations, but final sorting is carried out by hand via labour intensive manual sorting.

That is why this aspect is addressed in RESQTOOL consortium where together with Stadler, Phoenix Surowce is developing robotised solutions allowing automated sorting of hardmetal scraps with use of Artificial Intelligence and vision systems. Application of automated and robotized solutions in sorting of highly variable hard metals scraps is challenging due to the various of shapes, colours, sizes, worn off marks, and other physical differences occurring at used tools. Additionally, the variety of hardmetal tools is extremely wide, which also increases the randomness of scraps that require sorting.

In Work Package 2, Phoenix Surowce is developing AI based vision systems for identification of selected groups of scraps allowing their sorting by robotic means. This way, exhausting and tedious human labor will be replaced by automation and robotics, freeing the more valuable employee time for other activities in the company. Robotized sorting allows continuous operation and an easy increase of sorting throughput as well as adaptation to sorting requirements. That is why this approach was selected to address this first, but the most important, step in hard metals recycling and efficient recovery.

Phoenix Surowce have developed a vision system which is collecting pictures of hardmetal scraps; and based on that, the AI models are being trained and verified to provide data for next operations. Next, robots equipped with specialised grips are programmed to pick the identified hardmetal scraps and segregate them in programmed groups. The below picture (Figure 8) presents part of the test stand developed by Phoenix, with conveyor belt and robot with developed gripper, which allows tests and software development for carrying out the sorting operations in automated way.

Current work focuses on training and testing of the AI modes, robots, transport operations, and handling of the hardmetal scraps to increase the accuracy, develop interfaces, and robotize sorting system design. In the RESQTOOL project, new laser marking techniques have been developed to improve the readability of the codes under changing lighting conditions. This approach will allow unique identification of the recycled scraps by code instead of shape, size and colour.

In parallel, work is underway on the implementation of robotic sorting systems based on these new technologies.

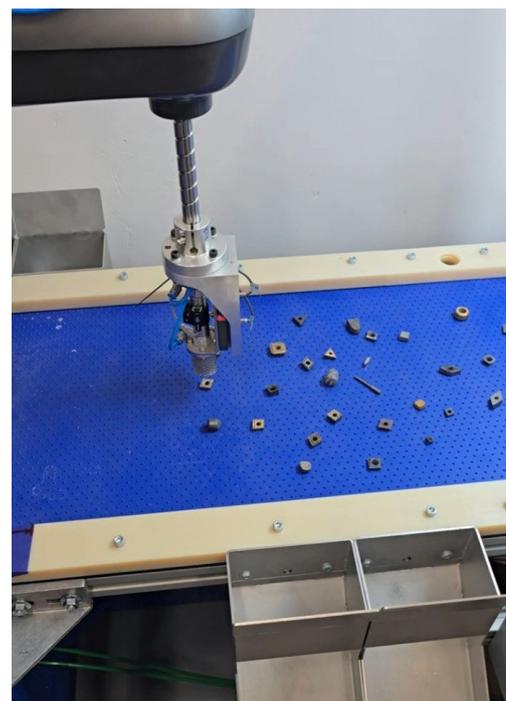


Figure 8: The test stand developed by Phoenix, with conveyor belt and robot.

RESQTOOL EVENTS

EURO PM2024

In the Euro PM2024 Congress and Exhibition, the annual event organised by EPMA (also coordinator of RESQTOOL) in Malmö (Sweden), 29 September to 2 October 2024, the project had several activities. The event is the key Conference and Exhibition for the European powder metallurgy community, with a very strong contribution of hard materials, and in particular hardmetals technical papers and participants, both from the R&D and the industrial sides.

RESQTOOL set up a stand in a special area dedicated to EU projects, together with other projects where EPMA is involved (START and REPTiS). The stand contained all material already available (a rolling video, leaflets, posters and a roller banner) and many illustrative samples: cutting tools and scrap tools in various stages of the different recycling processes, some reagents and intermediate products, and sample recycled powders. The booth was visited on the second day by a number of attendees that adhered to EPMA's Young Engineers initiative in the congress.

On the same day, a presentation given by A. Serpe (University of Cagliari) titled "HM as Urban Mines of CRM: the RESQTOOL Platform for a Sustainable Recycling" explained the basics of the project and of the bio-based recycling process to the audience of the Special Interest Seminar "Sustainability in Hard Materials".



Figure 9: RESQTOOL booth at Euro PM2024.



Figure 10: RESQTOOL booth at Euro PM2024: the showcase with samples and the rolling video.



Figure 11: Prof. Angela Serpe presenting at Euro PM2024.

HAGENER SYMPOSIUM
PULVERMETALLURGIE, HAGEN
(GERMANY) 28-29TH NOVEMBER 2024

RESQTOOL was also present at the very important German conference of the Fachverband Pulvermetallurgie (FPM), held in Hagen at the end of November. In that symposium, EPMA brought project material, leaflets, and the rolling video already used before.

The event is naturally hosting many presentations on hard materials, as the German community is historically very strong in that sector.

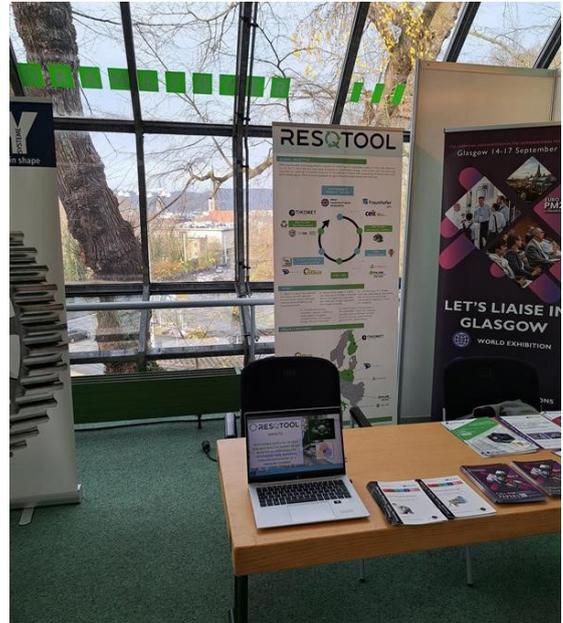


Figure 12: RESQTOOL was represented also at the Hagen FPM conference in November 2024.

INTERNATIONAL MEETING ON
CIRCULAR METALLURGY, RAW
MATERIALS, BY-PRODUCTS &
RECYCLING, BERGAMO (ITALY),
28-29TH NOVEMBER 2024

In November, F. Pirone of FILMS presented at the "International Meeting on Circular Metallurgy, Raw Materials, By-Products & Recycling", held in Bergamo (Italy) on 28-29 November 2024 and organised by AIM, the Italian Metallurgy Association. The conference covered a very wide spectrum of topics¹. The title of the speech was "RESQTOOL project: sustainable recycling of critical raw materials".



Figure 13: Francisca Pirone (FILMS) presenting at the International Meeting on Circular Metallurgy, Raw Materials, By-Products & Recycling 2024.

RESQTOOL EVENTS

WINTEREV 2024, LONDON (UK), 10-11TH DECEMBER 2024

The RESQTOOL project and its potential outcomes have been discussed at the Winterev², the meeting of experts in Hard Materials organized every second year. The event has been held at NPL facilities in London, UK on the dates of 10-11 December 2024, with the title “Thematic approach to Hard Material evaluation”. The meeting aimed to examine in depth the specific characterisation methods and their disadvantages and capabilities. Each contribution is targeted from an expert, followed by a practical or theoretical worked example of how the technique or modelling approach will advance our knowledge of the properties of hard materials. In the last session, Steven Moseley (Hilti) and Joel Ronkainen (Tikomet) from RESQTOOL consortium presented the current progress in the project regarding recycling of hardmetals, followed by a Q&A and an interactive discussion together with the audience.



Figure 14: J. Ronkainen (Tikomet) presenting in Winterev 2024.

RAW MATERIALS WEEK 2024, BRUSSELS, 9-13 DECEMBER 2024

The Project Coordinator and Dissemination and Communication manager partner EPMA visited the Raw Materials Week 2024 in Brussels, a large high-level event (more than 1000 participants) organised by the EU and focused this year on the newly adopted Critical Raw Materials Act. It was a very good occasion to get in contact with projects and other stakeholders involved in CRMs, and also on CRM recycling, like our project. RESQTOOL leaflets were available for participants in the conference halls.



Figure 15: RESQTOOL leaflets at the Raw Materials Week 2024.

UPCOMING EVENTS

RESQTOOL is also preparing other participations in events in the next months. We hope you will be able to catch up with us there!

PLANSEE SEMINAR

The 21st Plansee Seminar³, the prestigious meeting organised by the Austrian company Plansee at their headquarters in Reutte, will take place this year in the week 1-6 June. It is a renowned event in the hard and refractory materials world, that gather most experts in the field. RESQTOOL has been invited, in the person of T. Karhumaa (Tikomet) to present on “Hard Metal Recycling: Challenges and Opportunities”.

SUMMER SCHOOL 2025

RESQTOOL will be present at the 23rd Residential PM Summer School organised by EPMA in Lund (Sweden) from 22nd to 27th June 2025. This year some more room will be given in the school to the hardmetal, cutting tools and machining topics, and our project will be there to address the trainees with some practical information on what we are doing, what is our goal and its importance.

EURO PM2025

RESQTOOL will take part in Euro PM2025 in Glasgow (UK), 14th to 17th September 2025. There will surely be a booth in the exhibition and a speech connected to it; and we are planning to organise a special event just before the congress, related to Raw Materials. Stay tuned with us to know more and possibly take part!

In these events, we will have presentations so that you can learn more from our partners if you take part as well.

Keep in touch with our website and social media to know more!

RESQTOOL TEAM TOUR

UNIVERSITY OF CAGLIARI (UNICA) – DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING AND ARCHITECTURE (DICAAR)

The University of Cagliari, established in 1606, is a public institution located in Sardinia, Italy, and serves as a regional hub for higher education and research. Comprising six faculties, 17 departments, and a university hospital, UniCA provides over 24,750 students with a comprehensive range of educational opportunities across a large variety of fields. These offerings include Degree and Professional Degree Programmes, Master's Degree Programmes, Single Cycle Master Degree Programmes, as well as postgraduate courses, university Masters, Specialisation Courses, and Ph.D. Programs. The university is highly connected internationally, with over 400 bilateral and multilateral collaboration agreements and active participation in numerous global research initiatives.

The UniCA Research Unit involved in the RESQTOOL project belongs to the Department of Civil and Environmental Engineering and Architecture (DICAAR), which represents a polytechnic sector of the University. DICAAR integrates multidisciplinary expertise in the fields of design, planning, preservation, environmental and landscape management, architectural and historical-archaeological heritage, as well as structural, infrastructural, and georesource management. Located in the regional capital city of Cagliari, known for its scenic coastal views and vibrant Mediterranean lifestyle, DICAAR is a key reference point for regional government in these areas and maintains strong academic and professional ties with local, national, and international organizations and businesses.

Within this context, the Chemistry & Environmental Engineering Group (C&EEG) at UniCA has developed an internationally recognised expertise in solid and liquid waste management, with a particular

focus on regulatory frameworks, research, and innovation. The group is dedicated to advancing circular economy principles through waste minimisation and valorisation, as well as wastewater and sediment treatment, all under a green chemistry and engineering approach. As far as the focus of the RESQTOOL projects is concerned, the team is also highly active in sustainable recovery of critical raw materials (CRMs) from technological and industrial waste, as well as agro-industrial waste valorisation in bio-refineries, which is reflected in their publications, patents and research projects. In collaboration with the Italian industrial partner F.I.L.M.S. SpA, the group has developed specific expertise in the green recovery of metals from Hard Metals (HM) waste, which forms the group foundation for the RESQTOOL project.

In the RESQTOOL project, the primary role of the C&EEG group, in partnership with F.I.L.M.S., is to promote innovative, low-environmental-impact methods for recycling CRMs from HM waste, thereby supporting the HM value chain with secondary source materials. The key objectives include:

1. Validating on a pilot scale a Bio-based chemical recycling (BioCR) process for HM waste regeneration using bio-derived organic acids.
2. Providing insights into sustainable and innovative approaches for selective CRM recovery under a green chemistry framework, aligning with EU regulations.
3. Validating and licensing a patent on leaching mixtures derived from dairy waste enhancement (WO 2023/199263 A1) in an industrially relevant setting.
4. Developing new multidisciplinary research and development initiatives in collaboration with key HM industry representatives to train students, educate new researchers, and prepare future professionals for careers in this field.



RESQTOOL TEAM TOUR

TIKOMET OY

OVERVIEW

Tikomet is a company specialising in the recycling of hardmetal and an international expert in the industry. We recycle hardmetal by way of environmentally friendly zinc process. To us, recycling is synonymous with the sustainable use of raw materials. The recycled hardmetal powder that we manufacture is used as raw material in the manufacture of hardmetal products. We also offer a recycling service for hardmetal raw materials delivered to us by our customers. The company belongs to the hard metal producer Ceratizit and is part of the Austrian Plansee Group, which has over a century of expertise in the industry.

MISSION

To contribute to the sustainable use of natural resources by recycling used hardmetal tools and manufacturing environmentally friendly hardmetal powder.

CORE COMPETENCIES

- **Recycling:** Tikomet utilises used hardmetal tools as raw materials and processes them using the zinc method to produce recycled hardmetal powder. This approach supports the conservation of natural resources and environmental protection.



- **Research & Development (R&D):** Continuous investment in R&D to develop innovative and eco-friendly solutions for customers.
- **Health, Safety, Environment, and Quality (HSEQ):** Commitment to protecting employee health and safety, as well as the environment, guided by the company's Code of Conduct and ISO 9001 and ISO 14001 standards.

COMPANY HISTORY

Founded in 1994, Tikomet Oy has grown from a small hard metal producer into a key player in the hard metal recycling industry. Over the years, the company has continuously invested in advanced recycling technologies and processes, ensuring the highest standards of quality and sustainability. In 2015, Tikomet Oy became part of the Plansee Group, further strengthening its market position and expanding its global reach.

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If you read this newsletter and found it interesting, why not enter the RESQTOOL community?

If you have not done so yet, go to our website www.resqtool.com and click "**SUBSCRIBE**". You will be inserted in our mailing list (you can opt out any time!) and receive info about our activities.

You can also follow us on three social media:

LinkedIn: www.linkedin.com/company/resqtool-he-project/

X (you know, Twitter): www.x.com/RESQTOOL

YouTube: www.youtube.com/channel/UCrONO4fI0r4ZEXrOL6FbXLA

All our Open Access documents will be stored on Zenodo. We have a RESQTOOL community there (www.zenodo.org/communities/resqtool), visit it if you prefer downloading or reading there rather than from our website (but the website is cool!).

If you prefer a direct E-Mail, contact our coordinator Kenan Boz, kboz@epma.com

Notes:

¹ <https://www.aimnet.it/manifestazione.php?id=827&idc=4>

² <https://seminars.epma.com/event/hm-seminar-winterev/>

³ <https://www.plansee-seminar.com/>