# TASK O3-A5
# TECHNICAL CONCLUSIONS OF FINAL INTERNATIONAL SEMINAR IN WÜRZBURG (GERMANY)

Erasmus+

# CONTENT

# INTRODUCTION

The Final International Seminar on NanoSafe project results in Würzburg (Germany), a task assumed by the deliverable identified as O3/A5 "*Technical conclusions of First International Seminar in Würzburg (Germany)*".

This task is included in Intellectual Output 3 "*OER for training and raising awareness* " of the NanoSafe project.

This Final International Seminar held in Würzburg (Germany) hosted by DNV focused on the use of nanomaterials in stone products and was attended by professionals from the stone sector. At this multiplier event, all the results produced at this stage of the project were disseminated.

The different risks and prevention measures for the use of nanomaterials were analysed and the strengths and weaknesses of each of them were discussed as well as their adaptation to the current needs of the stone sector and whether they respect EU environmental policy. The experts' comments were used to improve this intellectual outputs.

This technical report compiles the main conclusions with the aim of implementing corresponding improvements in the project results.

# AGENDA

**2022 October, 13th** **Arrival of the participants and Platform connection (online)**

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| 14.00 – 14.15 | Welcome to participants by host organisation (DNV R. Krug). |
| 14.15 – 14.30 | Short presentation of the project NanoSafe (DNV R. Krug). |
| 14.30 – 14.55 | Safety risks in handling nanomaterials (DNV R. Krug). |
| 15.00 – 15.15 | Presentation of the partnership. (DNV R. Krug). |
| 15.15 – 15.40 | Online Resource Centre of NanoSafe Project (CTM D. C. Pérez). |
| 15.40 – 16.00 | Nanoproducts applications. (DELTA G. Zaverdinos) |
| | Coffee-Break |
| 16.20 – 16.40 | Health and Safety condition using nanoproducts in stone industry (CTM J. Llorente). |
| 16.40 – 17.00 | VR technology tool of NanoSafe Project (CTM C. M. González). |
| 17.00 | Discussion / Closure of the Seminar. |

The Final International Seminar was held by coordinator of the project (DNV). It was carried out by Mr. Reiner Krug, Managing Director of the German Association of Natural Stone Industry (DNV).

The German Natural Stone Association (DNV) has been dealing with vocational training in the natural stone industry for years. In addition to the creation of the vocational training “quarry stone mechanic”, the DNV is also active in the field of education and training beyond the borders of Germany.

The seminar was attended by teachers/head teachers in Germany and also trainers of stonemasonry/ stone sculptor/ natural stone mechanics schools and employees in natural stone companies:

The training of stonemasons in Germany is already very good, there are dual courses of study and continuing education. Therefore, the VR training game are very suitable for basic training. In Germany, many refugees are employed in the stone industry, and here too the VR training game is intended to convey the basic knowledge without language barriers.

All the presentations and interventions of the Final International Seminar were recorded and posted on the NanoSafe project website, to be made available to all interested parties in the following link:

https://www.nanosafeproject.eu/oer/direct-accsess/technical-documents/

# 1. Short presentation of the NanoSafe-Project [DNV]

The DNV is actively committed to training and further education in the natural stone industry within Europe. The knowledge bundled in the association is primarily intended to benefit young apprentices and employees working with natural stone.

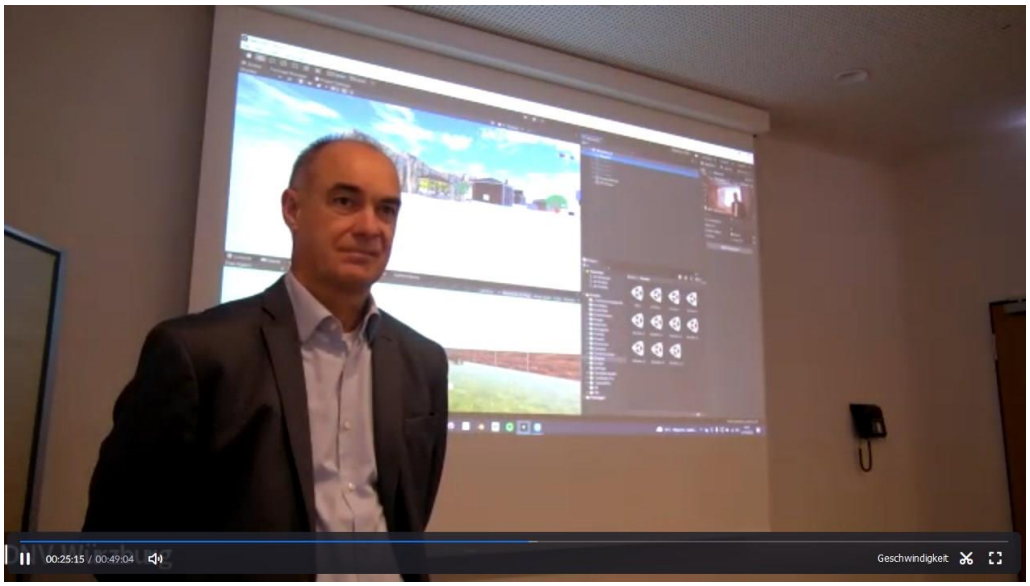
In the NanoSafe-Project, the coordination of the DNV with European partners will develop best practices in the production and handling of nanomaterials in the natural stone industry. The focus is on preventive measures during processing, in particular health and environmental aspects at the workplace as well as corresponding risk assessments. NanoSafe will create a virtual training tool that interested vocational training institutions, universities and technology centers as well as industry associations, organizations and company trainers can use free of charge.

Mr. Reiner Krug gave a short presentation of the NanoSafe-Project and highlighted the importance of this project and the need to digitize in order to have greater prescription capacity by teacher, trainer, experts and professionals in the construction sector.

Mr. Krug also introduced the project partners involved.

# 2. Presentation of objectives and results [DNV]

**Mr. Reiner Krug** gave a brief presentation of the tasks and expected results of the project, emphasizing that this project is of educational scope for training purposes.



He briefly explained what the project is about and why this topic is so present. There is currently only limited knowledge about possible health risks. But it is necessary to know the basis of hazards at work and what is to do to prevent health effects. There is therefore a need for training of professionals in the stone sector. He emphasised that especially schools should receive support, which are multipliers and should draw attention to this.

The Managing Director also explained the results expected after the end of the project. These are guidelines on risks and health and environmental protection measures in the production and processing of natural stones, a 3D training tool for the safe handling of nanomaterials in natural stone processing and a freely accessible learning platform (OER) for further education.

He then presented the project stages. This includes, in particular, research into the use of nanomaterials in the quarry. It also includes the assessment of the most important risk situations and measures derived from them. From this, 10 typical areas of application were identified and the associated protective measures for the workers were developed.

These project results are then made available as digital teaching material on the Nanosafe website.

Then he gave a brief introduction to the project partners.

After that he went on to discuss what nanomaterials are and what is meant by the term nanotechnology. He explained this by using the best-known example “lotus effect”: fine nanostructures ensure that water beads off the leaf of the lotus blossom and that the adhesion of dirt particles is minimised. Or even in sunscreen, nanomaterials provide protection against ultraviolet radiation.

He then presented the nanolist of BG-Bau and its risks, which are comparable to fine dust exposure. He complimented the BG Bau, which already offers good virtual training opportunities in the field of nano in order to inspire and introduce young people to the subject.

## 3. Presentation of contents [CTM / DELTA]

**David Caparrós Pérez** (CTM) explained where the focus of this project is: to provide stone workers with a better understanding of risk and safety at workplace. To facilitate this, a website has been created with ICT based tool to offer an OER (Open Educational Resource) for training and raising awareness. All project results and data sheets are uploaded on this platform and are freely accessible to everyone.

Learners and professionals of the stone sector are able to upload new information and update this information. This OER is an educational platform created during the project.

**G. Zaverdinos** from Delta Materials and Innovation Solutions (DELTA-MPIS) then spoke about health and safety condition using nanoproducts in stone industry in Greece.

He also gave a brief introduction to the company and its tasks in the field of nanotechnology.

Other topics of his lecture were: What are Nanocomposites, enhancing thermal conductivity an the benefits, use of composite structures in cold sintering an cyber physical systems by DELTA-MPIS - digital twinning.

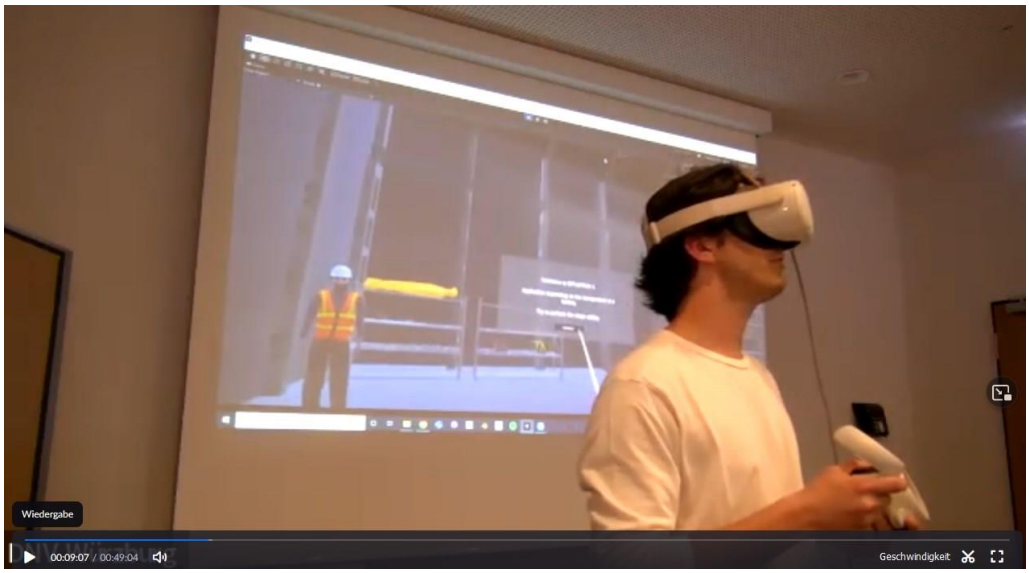
Afterwards, **Juana Llorente** (CTM) talked about most commonly used nanomaterials in construction for example titanium dioxide, zinc oxide, silicon dioxide, carbon nanotubes, copper oxide, silver. Most popular treatments today are consolidants and water repellents. Water repellent nanoproducts have appeared in recents decades, nanometric particles improve their penetration capacity, giving them better performance and can achieve superhydrophobicity.

The addition of inorganic nanoparticles such as silica, aluminium, tin and titanium oxides to commercial polysiloxanes causes, after their application to the stone, the appearance of a certain surface roughness and a reduction in surface energy, which give the stone hydrophobic properties.

She concluded by talking about protective equipment for skin, eyes and mouth.

## 4. Presentation of VR technology tool [CTM]

**Mr. González** (CTM) explained the safety training game aimed at improving the understanding of safety requirements for working with nanomaterials. This training has been developed in a virtual reality (VR) game. It requires the user to evaluate 10 different situations in which the use of nanomaterials may pose a risk. In each situation, the stone worker will have to observe the environment and complete each of the missions. The missions will range from quizzes to simple tasks such as picking or collecting objects.




He introduced the following 10 missions and commented on the individual mission steps shown.

Mission 1. Use sawing machine with water cooling to reduce dust

Mission 2. Application of different products in a factory

Mission 3. Pouring of nanomaterial powder into a liquid matrix to create a mixture

Mission 4. Nanomaterial applied with a spray-gun on a stone material surface

Mission 5. Nanomaterial fixed in a solid matrix which is being drilled

Mission 6. Application of different products in factory (part II).

Mission 7. Dust-air mixtures in a factory

Mission 8. Nano-waste management environmental protection

Mission 9. Nanomaterial applied as an aerosol

Mission 10. Waste cleaning or disposal after working hours

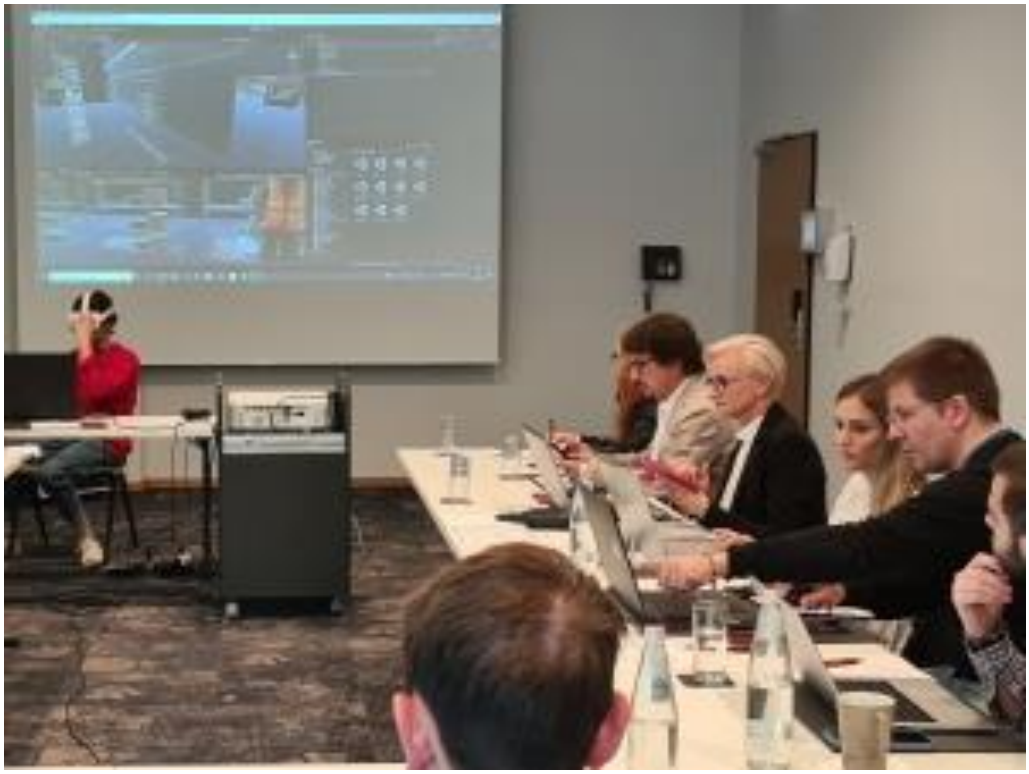
He underlined, that by the end of this course the user will be able to identify personal and collective protective equipment for the use of nanoproducts, will appreciate the main health and safety risks associated with the use of nanoproducts, will understand some key concepts on protection and accident prevention in the use of nanoproducts and exposure to nanomaterials and will understand the basic concepts of the potential impact of nanomaterials on the environment.

These 3D animations were designed and produced on the basis of all the previous information developed in the project, to support the implementation of NanoSafe training courses and the OER.

This 3D Training Tool will be available for free on the project's website and on the YouTube channel to be created in the project, which can be used as support material for the courses that will be developed for awareness and learning about safe environments in the stone industry for the application of nanomaterials.

## 5. Discussion [DNV]

As the agenda established, once all presentations had been finished, a discussion was held, in which participants had the opportunity to express their doubts and concerns regarding the project to seminar speaker.



**Feedback of participants**

NanoSafe can be a useful tool for newcomers or lateral entrants to acquire the basic knowledge.

Especially in the current era of immigration from third countries, this can be a useful addition to schools and training institutions.

The question arose whether fine dust is the same like nanomaterial?

Reiner Krug said: "The science said yes. Its not really clear how dangerous are nanoparticles. Our project is only a best practise tool for the moment.

In Germany we have more problems with Titanoxid, which is not in our stone sector, but in the concrete sector, especially in the company.

It is important to bring the awareness to the workers, this could be a danger, because the young workers don't like to wear masks or gloves. Nobody think about if you make a impregnation of a stone that could be a risk for your health and to protect themselves."

## NUMBER OF ATTENDEES

The total attendance at the Final International Seminar of the NanoSafe project was 9 external people, in addition to the project participants:

**Deutscher Naturwerkstein-Verband E.V (DNV)**

Reiner Krug
Jana Kern (Online)

**Asociación Empresarial Centro Tecnológico del Mármol y la Piedra (CTM)**

David Caparrós Pérez
Carlos Martínez González
Juana Llorente García

**Bildungszentren des Baugewerbes e. V. (BZB)**

Frank Bertelmann-Angenendt

**Delta Materials and Innovation Solutions (DELTA-MPIS)**

Georgios Zaverdinos
Dimitrios Dragatogiannis

**Scuola Edile Padova - CPT**

Alessia Ranci
Andrea Pagnacco
Christine Rossi

**National Technical University of Athens - (NTUA)**

Thanos Katsavrias

Due to the Data Protection Law, the *Attendees list* is not available for public use.