Karlsruhe Institute of Technology

European Federation of Clean Air and Environmental Protection Associations (EFCA) International Symposium

Ultrafine Particles – Air Quality and Climate

Online Conference
June 17, 2026

BOOK OF ABSTRACTS AND PROGRAM



EFCA

HOST ORGANIZATIONS

KIT | Karlsruhe Institute of Technology
Karlsruhe Institute of Technology (KIT) pools its three core tasks of research, higher education, and innovation in a mission. The KIT Climate and Environment Center develops strategies and technologies to secure the natural bases of life.
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GUS | Gesellschaft für Umweltsimulation e.V. (Society for Environmental Engineering). It is the organization of people, institutions and companies who work in environmental engineering and testing. Since 1969, GUS supports the development of environmental engineering on a non-profit basis.
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CEEES | The Confederation of European Environmental Engineering Societies is the umbrella organisation of national technical societies for environmental engineering and testing. CEEES promotes technical advisory boards, seminars and conferences with the support of national member societies.
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INTRODUCTION

Ultra Fine Particles (UFP), are considered to cause serious health problems and environmental effects. Combustion is a major source, also by producing volatile organic pollutants which are converted in the atmosphere by photochemical reactions. Increasing applications of man-made nanomaterials add to the problem. A further interest results from their specific role in atmospheric processes such as cloud formation and precipitation and, in fact, in climate. The relation between UFP and human health and that of UFP and climate are both areas of intense research and cross-links between these fields are found nowadays.

The political objective to decrease exposure to particulate matter makes use of the mass-based metrics PM_{10}/$PM_{2.5}$, which do not properly represent all risks for human health. EFCA is, therefore, in favor of the development of a fraction-by-fraction approach on particulate matter, both with respect to size and chemical composition. This position was adopted by the European Commission in the recent Air Quality Directive which has marked Ultrafine Particles and Black Carbon Particles as pollutants of emerging concern and has called for appropriate measurements to be taken.

EFCA's 10th Ultra Fine Particles Symposium 2026 will again feature the most recent scientific progress and improve the dialogue with policy- and rule makers in Europe.

EFCA and KIT, together with GUS and CEEES are pleased to organize this event 2026 in an online format. We cordially invite all experts to contribute actively and hope to see you in the virtual meeting.

PROGRAM

WEDNESDAY, JUNE 17 | ONLINE (ZOOM)

14:00 – 14:15
Opening & Welcome
Thomas Leisner; Gordana Pehnec; Lucia Bernal Saukkonen

14:15 – 14:40
Keynote 1
Meritxell Garcia-Marlès

14:40 – 15:10
Session 1 Urban
Alexander Mangold
Soatoavina Randrianomenjanahary
Astrid Manders

15:10 – 15:20
Break

15:20 – 15:45
Keynote 2
Armin Hansel

15:45 – 16:15
Session 2 Observations
Anneke M. Batenburg
Wolfgang Junkermann
Zhiqiang Zhang

16:15 – 16:25
Break

16:25 – 16:50
Keynote 3
Johan Øvrevik

16:50 – 17:10
Session 3 Sources & health
Helena Moratin
Noël Daemen

17:10 – 17:30
Discussion
Karl-Friedrich Ziegahn & all Participants

THE SESSIONS

Opening & Welcome
Thomas Leisner, Conference Chairman; KIT
Gordana Pehnec, President EFCA
Lucia Bernal Saukkonen, EC Brussels, Belgium

Keynote 1
Meritxell Garcia-Marlès, University College Cork
Ultrafine Particles in Urban Europe: Phenomenology, Sources, Trends and Policy Implications

Session 1
Alexander Mangold, Royal Meteorological Institute of Belgium, Uccle
Fine particle number concentration and size distribution for the urban background in Brussels, Belgium
Soatoavina Randrianomenjanahary, IMT Nord Europe
Long term variation of UFP sources: Rising evidence for increasing nucleation sources contribution
Astrid Manders, TNO NL
Emission inventories and modelling of ultrafine particles, from city scale to Europe-wide

Keynote 2
Armin Hansel, University of Innsbruck
Ultrafine particle exposure from individual aircrafts in Innsbruck

Session 2
Anneke M. Batenburg, National Institute for Public Health and the Environment (RIVM), Bilthoven
Expansion of UFP measuring capabilities of the Dutch National Air Quality Monitoring Network
Wolfgang Junkermann, Karlsruhe Institute of Technology (KIT)
UFP - where, when, why and how many?
Zhiqiang Zhang, MPI for Chemistry, Mainz
Diffusivity and concentration profiles explain slow atmospheric nanoparticle growth

Keynote 3
Johan Øvrevik, NIPH Folkehelseinstituttet, Oslo
Primary and secondary particles from transport emissions. Role of chemical composition for toxicity of ultrafine particles

Session 3
Helena Moratin, Universitätsklinikum Würzburg (UKW)
ALI and submerged exposure of human cells towards carbon fibres
Noël Daemen, Additive Mindset, Maastricht
How safe is Additive Manufacturing?

Short Summary of the 10th EFCA Symposium on Ultrafine Particles – Online - 17.06.2026

More than 100 experts from various countries participated in the 10th symposium on ultrafine particles (UFP) to discuss UFP sources, ambient UFP measurements, urban UFP, UFP toxicity and epidemiology, and UFP related policy in 3 sessions. The symposium started with an impulse statement by Lucia Bernal Saukkonen of the DG Environment of the European Commission on improving legislation on ultrafine particles.

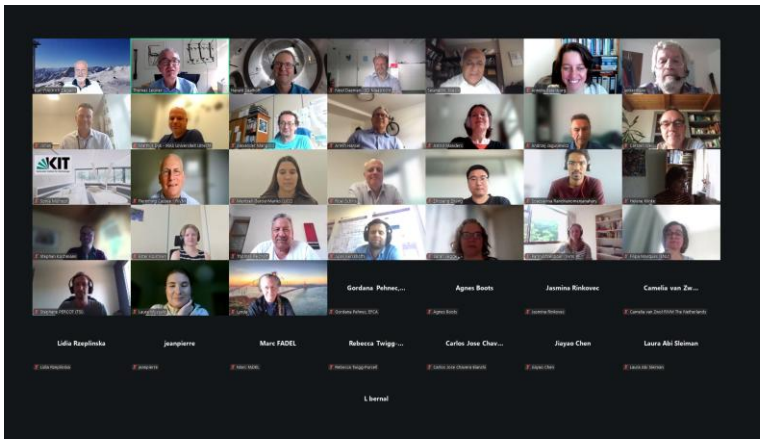
A first session on urban UFP began with a keynote lecture by Meritxell Garcia-Marlès showing phenomenology, sources, trends and policy implications for ultrafine particles in European urban areas. The following presentations addressed fine particle number concentrations and size distribution for the urban background in Brussels and its dependence on meteorological conditions, long term variation of UFP sources with rising evidence for increasing nucleation sources contribution, emission inventories and modelling of ultrafine particles, from urban to European scale.

The second session on UFP specific observations started with a keynote by Armin Hansel on ultrafine particle exposure from individual aircrafts in Innsbruck capturing the diurnal and seasonal impact of real-world aircraft specific UFP exposure. Furthermore, the expansion of UFP measuring capabilities of the Dutch National Air Quality Monitoring Network was presented including new instrumentation and the measurement location selection. Additionally, global sources of UFP and the importance of power plant emissions were discussed.

The third session on UFP sources and health started with a keynote lecture by Johan Øvrevik on primary and secondary particles from transport emissions and the important role of chemical composition for toxicity of the ultrafine particles. Furthermore, the impact of carbon fibers on human lung cells was addressed as well as the slow atmospheric nanoparticle growth depending on diffusivity and precursor concentration profiles. Finally, the safety of additive manufacturing like 3D printing was discussed.

The final interactive discussion on all presentations emphasized the opportunities given by the new EU air quality directive for implementing UFP monitoring and potential future targeted mitigation.

The Organizing Committee



Keynote 1

Ultrafine particles in urban Europe: phenomenology, sources, trends and policy implications

Meritxell Garcia-Marlès (mgarcia-marles@ucc.ie)
School of Chemistry and Sustainability Institute, University College Cork, Cork, Ireland

Ultrafine particles (UFPs; particles with diameters below 100 nm) have emerged as a priority air pollutant due to growing evidence of their adverse health effects and their distinct behaviour compared with regulated particulate matter (PM) metrics. Although they contribute little to PM mass, UFPs dominate particle number concentrations (PNCs) and exhibit strong spatial variability driven by local emission sources and atmospheric processes. Their recent inclusion in the 2024 European Union Ambient Air Quality Directive marks an important step towards future regulation, but major scientific challenges remain regarding harmonised monitoring, source attribution, and long-term assessment.

The RI-URBANS project produced one of the most comprehensive assessments of urban UFPs conducted across Europe. Long-term PNC and particle number size distribution (PNSD) measurements from 29 monitoring sites in 21 European cities were harmonised through rigorous quality assurance procedures, enabling robust comparisons across diverse urban environments. The harmonised dataset was used to investigate UFP spatial variability, identify emission sources through Positive Matrix Factorisation (PMF), and evaluate long-term trends between 2009 and 2019.

The results revealed pronounced geographical gradients, with PNCs increasing from Northern to Southern and Eastern Europe. Road traffic was identified as the dominant source of UFPs, while photochemical new particle formation (NPF) and residential heating represented important location and season specific contributors. Long-term analyses demonstrated an overall decline in UFP concentrations, largely driven by reductions in traffic emissions associated with stricter vehicle standards and the widespread adoption of diesel particulate filters (DPFs). In contrast, nucleation mode particles remained comparatively stable, reflecting the increasing importance of NPF events.

The insights derived from this work contribute to a better understanding of UFP behaviour in urban environments, support evidence-based monitoring recommendations, and inform targeted mitigation measures to improve air quality and protect public health across Europe.

Key words: Ultrafine particles, Particle number size distribution, Positive Matrix Factorisation, Air quality, Urban environment, Traffic emissions

ABSTRACT

Presentation

Fine particle number concentration and size distribution for the urban background in Brussels, Belgium

Alexander Mangold, E. Koistinen, Q. Laffineur and A. Delcloo
Royal Meteorological Institute of Belgium, Atmospheric Composition, Measurement and Modelling Group, ACM^2, Brussels, Belgium

The Royal Meteorological Institute of Belgium (RMI) is setting up an ACTRIS aerosol in-situ National Facility in Uccle, Brussels. Within this framework, several aerosol parameters are measured. These parameters include the aerosol light absorption and scattering coefficients, important for characterising the influence of aerosols on the Earth's radiative balance. Further parameters are the number concentration and the size distribution of atmospheric particles, ranging from 10 nm to 10 µm. These parameters are essential for studying atmospheric processes like the formation, growth, origin and transport of particles, as is also the case for air quality studies. The measurement site of RMI is located in the southern part of Brussels and measurements are representative for the urban background.

Since October 2024, the total number concentration and the particle number size distribution for the aerodynamic diameter between 0.5 to 10 µm are measured. Since May 2025, the particle number size distribution of ultrafine particles (UFP, 10 to 800 nm) has been measured with a mobility particle size spectrometer. Such measurements for the total particle number concentration and size distribution have not yet been done systematically for Brussels.

We will present averaged daily and seasonal data for particle number concentration, mass concentration of light-absorbing particles and Absorption Angstrom exponent. For the UFP, we will look at seasonal averages for the size distribution and look also into the concentrations for different size ranges (10-25 nm, 25-100 nm, and 100-800 nm). Few new particle formation events have been detected so far. At the RMI site, auxiliary meteorological data are available, as well as data of a collocated polarized automatic lidar ceilometer, from which the mixing layer height and some information on particle type are operationally derived. These auxiliary data will be used to interpret the found particle properties and in particular new particle formation events.

ABSTRACT

Presentation

Long term variation of UFPs sources: Rising evidence for increasing nucleation sources contribution

Soatoavina Randrianomenjanahary[1,2], Suzanne Crumeyrolle[2], Hui Chen[1], Eric Bourrianne[2], Joel Ferreira De Brito[1], Véronique Riffault[1]
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Corresponding author: soatoavina.randria@imt-nord-europe.fr | Keywords: UFP, Source apportionment, Non-negative Matrix Factorization (NMF)

Ultrafine particles (UFPs, D_p < 100 nm) pose great health risks, as they can penetrate deep into the pulmonary alveoli and reach the bloodstream [1]. Understanding their sources is essential for developing effective emission regulation policies. This study aims to develop a newly approach based on Non-negative Matrix Factorization (NMF) [2] receptor modeling, combined with a Traffic versus Photochemistry segregation using the concentrations of black carbon from fossil fuel (BC_{ff}) [3], to identify and quantify sources of UFPs at ATmospheric Observatory in LiLle (ATOLL).

Three different datasets were used: (i) a focused analysis on summer (June-August) from 2019 to 2024; (ii) a seasonal source apportionment over full year 2023 to quantify the intra-annual variability; and (iii) a five-year (2020 – 2024) long-term source apportionment to assess factor temporal trends.

The model applied to summer data across the years revealed strong nucleation (D_p < 30 nm) particle number concentration (PNC, 40%) with shared contribution between traffic (55%) and photonucleation (45%). Seasonal analysis showed a lower contribution of photonucleation (12%) compared to traffic (88%) in winter. The long-term analysis revealed a slight increase of +1.9 $\%yr^{-1}$ for nucleation PNC, while Aitken (40 < D_p (nm) < 90) PNC decreased, with a trend of around -10 $\%yr^{-1}$.

References:

[1]: Ohlwein, S., et al. (2019). International Journal of Public Health, 64(4), 547–559.
[2]: Wang, Q., et al. (2023). Environmental Science: Atmospheres, 3(12), 1805–1819.
[3]: Rodríguez, S., & Cuevas, E. (2007). Journal of Aerosol Science, 38(12), 1207–1219.

ABSTRACT

Presentation

Emission inventories and modelling of ultrafine particles, from city scale to Europe-wide

Astrid Manders[1], Quinten Bohte[1], Marya El Malki[1], Antoon Visschedijk[1], Jeroen Kuenen[1]
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Ultrafine particles can protrude deeply into the body and are potentially more harmful than larger particles, in spite of their low mass contribution. They are highly variable in space and time and not yet regulated but identified as species of concern for which EU now requires monitoring. Particle number (PN) emission inventories have recently been developed and are continuously being updated in EU projects, with focus on road transport. They still come with considerable uncertainties. Modelling of PN ambient concentration is challenging: particle number is not a conserved quantity and particle formation from precursor gasses (nucleation) is a process that depends on many factors which makes it hard to include in a chemistry-transport model (CTM). The CTM LOTOS-EUROS has incorporated the SALSA2 module to represent ultrafine particles. In the first phase, the model was applied on city-scale excluding the nucleation process but including measurements as a background, for the cities of Berlin and Rotterdam and bottom-up emission inventories. In the second phase, the model was run on European scale, including nucleation, using Europe-wide inventories. Most recently, condensable organic gases in the model's volatility basis set were coupled to SALSA2 and their impact on ultrafine particle number and size distribution was tested. We will show examples of the three approaches from different projects and discuss their benefits and disadvantages.

Keynote 2

Ultrafine particle exposure from individual aircrafts in Innsbruck

Armin Hansel
Institut für Ionenphysik und Angewandte Physik | Universität Innsbruck, Austria

Aircraft engines are associated with high ultrafine particle (UFP) emissions during take-off and landing. These particles are formed through gas-to-particle conversion in the engine exhaust.

Studies have shown that exposure to UFPs can have adverse health effects, as these particles can enter the bloodstream and act as carriers of toxic substances[1]. While there is no guideline level for UFP by WHO, an hourly Particle Number Concentration (PNC) above 20.000 particles/ cm^3 is considered “high”[2].

We deployed a weather station, a microphone, two fast UFP sensors and a fast CO_2 sensor on the roof of a school building located approximately 1 km from the runway of the Innsbruck airport in the direction of the city center. The portable UFP sensors (Partector2 an Partector2 Pro) characterize PNC and particle size distribution virtually in real-time. We carried out long term measurements over several month to capture the diurnal and seasonal impact of real-world aircraft specific UFP exposure. We observe UFP plumes lasting only minutes with PNC of several hundred thousand particles/cm^3 of individual aircrafts approaching the airport from the city center. The number size distribution is dominated by a mode diameter smaller than 25 nm. In winter months PNC during the day exceeded the WHO “high” classification limit almost every day.

While high PNC are a first indication of UFP exposure, a chemical analysis of individual aircraft related plumes is needed. Due to the low mass contribution of UFP and the short plume duration real-time chemical characterization of these organic aerosols (OA) is challenging. High-resolution (Orbitrap) mass spectrometry seems feasible for real-time ambient measurements achieving molecular resolution at relevant concentrations with temporal resolution of seconds.

This work was supported by OeAD Sparkling Science Projekt Atemluft.

Presentation

Expansion of UFP measuring capabilities of the Dutch National Air Quality Monitoring Network

Anneke M. Batenburg, Camelia van Zwol, Joost Wesseling, Dirk Wever, Sjoerd van Ratingen, Ernie P. Weijers, Guus Stefess, Ronald Spoor
National Institute for Public Health and the Environment (RIVM), Centre for Environmental Quality (MIL), Bilthoven, the Netherlands | anneke.batenburg@rivm.nl

The health effects of ultrafine particles (UFP) have come under increased scrutiny. In 2021, the Health Council of the Netherlands published the advisory report “Risks of ultrafine particles in the outside air”, which highlighted that our knowledge of UFP exposure and health effects is limited by a lack of structural measurements of UFP concentrations in the Netherlands. The report therefore recommended

- measuring UFP concentrations structurally in the Dutch National Air Quality Monitoring Network and
- performing structural and validated model calculations to obtain a national overview of UFP exposure.

At the subsequent request of the Ministry of Infrastructure and Water Management, RIVM made an inventory of available data, knowledge and measurement equipment, and developed integrated strategies for incorporating structural UFP measurements into the national network and improving UFP models.

The National Air Quality Monitoring Network currently performs indicative UFP measurements with three TSI EPC 3783 instruments. Diurnal and weekly cycles can already be observed in these indicative data, and they have been used to scale an updated empirical map of average UFP concentrations in the Netherlands as well. On a project base, short-term measurements of UFP are performed using more compact equipment.

Newer counting equipment (TSI CPC 3750-CEN10) has been purchased recently to perform stationary UFP concentration measurements according to the latest technical standard (EN 16976:2024). The locations where the new measurement equipment will be placed are selected with the specific aim to improve the yearly average concentration map and obtain better estimates for the exposure of the Dutch population to UFP. The new data will be made available to the public.

This presentation will discuss the progress so far, first experiences with the new equipment and next steps, including steps required for compliance with the new EU Air Quality Directive.

ABSTRACT

Presentation

UFP - where, when, why and how many?

Wolfgang Junkermann[1], Jorg Hacker, Andrew McGrath [2,3]
[1]Karlsruhe Institute of Technology, IMK-IFU, Garmisch-P., Germany | [2]Airborne Research Australia, Parafield | [3]Flinders University Adelaide, South Australia

Ultrafine particles are potential cloud condensation nuclei, once grown into Aitken size mode. Their number concentration is essential for aerosol cloud interaction, rainfall and atmospheric latent energy budgets. However, due to the small size (invisible for remote sensing) and high spatial and temporal variability their spatial distribution and regional budgets are widely unknown and model calculations often underestimate real concentrations. Based on airborne investigations with small environmental research aircraft we investigate 3D transport, major sources, their source strength and contribution to the regional budgets. Source allocation and characterisation can then be used to reconstruct historic trends and the potential role of changing anthropogenic emissions to current extreme weather patterns.

Presentation

Diffusivity and concentration profiles explain slow atmospheric nanoparticle growth

Zhiqiang Zhang, Hyun Gu Kang, Ulrich Pöschl, Thomas Berkemeier*
Multiphase Chemistry Department, Max Planck Institute for Chemistry, 55128 Mainz, Germany
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Over the past decades, numerous studies have been performed to elucidate and characterize the processes and effects of atmospheric new particle formation and growth [1]. Growth rates of atmospheric nanoparticles are often smaller and less dependent on condensable vapor concentrations than expected [2]. We develop and utilize a new kinetic multilayer model of multiphase chemistry (KM3C) to fully resolve the reactivity, diffusivity, and differential concentration gradients of different chemical species across the gas phase, interface, and condensed phase [3, 4]. We apply this new model to analyze published data of the growth of nanometer-sized organic aerosol particles from field measurements in Hyytiälä, Finland, and from the CERN CLOUD experiment [2]. We find that nanoparticle growth can be accurately predicted when the relevant processes, properties, and temperature dependencies are taken into account. Previously unexplained observations can be reconciled by inclusion of vapors that fall into the semi- and intermediate volatility ranges at room temperature, but are sufficiently low-volatile to contribute to particle growth at low temperatures. Particle phase state also showed a pronounced effect, with diffusivity coefficients indicative of viscous but non-glassy particles yielding good agreement with the data. This study reveals an important fundamental dynamic in atmospheric aerosol growth, where oxidation chemistry at lower temperatures leads to less oxidized molecules, which is effectively balanced by lower volatility, leading to an apparent near-constant growth rate of nanoparticles. This interplay can be successfully described with kinetic models following absorptive partitioning theory and correcting for viscous phase states that cause mass-transfer limitations. The results provide new insights into the condensational growth of newly formed molecular clusters, which is crucial for the climate relevance of new particle formation.

References

[1] M. Kulmala et al. J. Aerosol Sci. 35, 143–176 (2004).
[2] D. Stolzenburg et al. npj Clim Atmos Sci 8, 75 (2025).
[3] T. Berkemeier et al. Atmos. Chem. Phys. 20, 15513-15535 (2020).
[4] H. G. Kang et al. ACS ES&T Air, https://doi.org/10.1021/acsestair.5c00438, (2026)

Keynote 3

Primary and secondary particles from transport emissions. Role of chemical composition for toxicity of ultrafine particles

Johan Øvrevik
NIPH Folkehelseinstituttet, Oslo

The presentation was available only as a live session.

Presentation

ALI and submerged exposure of human cells towards carbon fibres

S. Mülhopt[1], S. Klein[1], M. Mackert[1], C. Schlager[2], T. Krebs[2], S. Fritsch-Decker[3], C. Weiss[3], F. Krampe[4], T. Ehret Kasemo[4], S. Hackenberg[4], M. Steinke[4], A. Scherzad[4], H. Moratin[4] and D. Stapf[1]
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Keywords: aspect ratio, aerodynamic diameter, cell surface dose, exposure studies, deposition efficiency
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Introduction
Carbon fibres (CF) and CF-reinforced plastics are innovative materials that are increasingly being manufactured, recycled and disposed of. Depending on the processing method, fibres and fibre fragments may be released into the environment. The fibrous morphology of the treated and released CF fragments can meet the criteria established by the World Health Organisation (WHO) as parameters for the classification of critical fibres: specifically, the WHO applies the aspect ratio β – the ratio of length (l) to diameter (d) –and examines the geometric parameters $l > 5$ µm and $d < 3$ µm. In this project, in vitro systems derived from primary human cells are used to assess the harmful CF activity in the respiratory tract niche.

Method
CF were milled and either dispersed in air by a segmented belt aerosol generator, or mixed with cell culture medium for submerge exposures. For biological testing, monocytes were isolated from human blood samples, differentiated into macrophages (MP), and characterized using flow cytometry. The MP were then submerged with 4–8 µg/cm² CF and incubated for 24 hours. After exposure, the cellular localization of CF in the MP was examined using a transmission electron microscope (TEM). Cytotoxicity and inflammatory responses were estimated in a metabolic assay (MTT) and by cytokine secretion, respectively.

Results
CF were detected by TEM and internalization was demonstrated. Furthermore, upon exposure, MP modulate the secretion of proinflammatory cytokines IL-8 and MCP-1. These results underscore the immunomodulatory properties of CF in vitro.

Discussion
Since IL-8 and MCP-1 are involved in fibrotic processes, donor-derived nasal fibroblasts are currently being incubated with CF-conditioned MP culture medium to assess possible induction of fibrotic mechanisms. The specific induction of fibrotic-associated cytokines puts emphasis on shared features between CF and asbestos fibers and calls for further investigation.

ABSTRACT

Presentation

How safe is Additive Manufacturing?

Presentation title: AM Safety Management: “How safe is Additive Manufacturing ?
Corresponding Author name: Noël Daemen MBA, LLM | Affiliation: Additive Mindset (research dept. of 3D Maastricht bv)
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The technology of 3D printing in itself is not safe. Dangers arise during production, storage, transport, processing in production processes or in use of the (end) products. These dangers can be of chemical or physical nature or with respect to quality, environment, digitisation or human action. Improper use of the technology poses risks to health, intellectual property assets and the environment. In practice, it appears that companies lack knowledge about safety aspects and guarantees regarding quality, health and safety when using 3D printing technology.

The use of 3D printing as a development technology is increasing substantially worldwide. For success in the medium to long term, our research shows that wider acceptance is dependent on trust in quality and safe use.

Our research shows that 3D printing is safe if various conditions are met. Just like with other similar technologies. These are organisational measures such as training and procedures, installation of technical facilities, strict compliance with rules and procedures by users and those responsible, monitoring and targeted efficient and effective enforcement of laws and regulations.

Our goal is to raise awareness and share knowledge about AM Safety Management. We can share conclusions of our Dutch /Belgian study. We did worldwide desk research and interviews with e.g. users, suppliers, researchers and also military department. Extensive knowlegde and understanding of practices in the field have been collected. The project was initiated by the AM-industry (NL, B) together with SEVESO-companies. The project is co-funded by RVO /Dutch Ministry of Infrastructure and Water Management.

Topics in this study are:
- Dangers and risks in AM: chemical (e.g. VOC, UFP), physical, quality, energy & radiation,
- environment, digitalisation (e.g. cyber and IT security) and human behaviour.
- Inventory of laws, regulations and standards.
- Risk mitigation strategies.
- Tools: safety charts, manuals and posters.

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Venue

Online Conference
Everyone who has registered will receive the link to the Zoom event via email.

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